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ITALIAN ADAPTATION OF WARR'S JOB-RELATED AFFECTIVE WELL-BEING SCALE: FACTORIAL STRUCTURE AND RELATIONSHIPS WITH THE HSE MANAGEMENT STANDARDS INDICATOR TOOL

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Standardized methodological frameworks including the UK Health and Safety Executive Management Standards (HSE-MS) have been proposed to aid comparison across organizations in quantifying job stressors. In contrast, the measurement of job strain (and job-related well-being) has been characterized by lower standardization, resulting in multiple conceptualizations and indicators. Here, we evaluated the psychometrics of the Italian adaptation of Warr's (1990a) Job-related Affective Well-being Scale (W-JAWS), and its suitability as a job strain indicator to be integrated with the HSE-MS approach. In line with previous studies, data from 541 civil servants supported a 4-factor measurement model (i.e., Anxiety, Comfort, Depression, and Enthusiasm), and highlighted linear relationships with multiple HSE-MS risk indicators (i.e., Demand, Control, Peer Support, Change, and Role). Overall, our findings qualify the W-JAWS as a suitable standardized job strain indicator tool, which could be used synergically within the HSE-MS approach to provide comparable results across organizations and countries.

Keywords: Workplace stress assessment; Job-related affective well-being; Factorial structure; Diagonal weighted least squares; Management Standards approach.

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Over the last decades, workplace stress assessment has been recursively ameliorated to aid comparison across studies, organizational contexts, and countries (standardization and benchmarking) while identifying and quantifying the most critical job dimensions indexing psychosocial hazards (i.e., job stressors). Several standardized self-report tools such as the Copenhagen Psychosocial Questionnaire (Kristensen, Hannerz, et al., 2005) and the Job Content Questionnaire (Karasek et al., 1998) have been translated and validated in multiple languages to be used in both research and applied settings (for a review, see Tabanelli et al., 2008), and multiple methodological frameworks have been proposed by both academics and public authorities.

The Management Standards approach of the UK Health and Safety Executive (HSE-MS) (Cousins et al., 2004; MacKay et al., 2004) is one of such methods and probably among the most advanced for work stress prevention. According to the HSE-MS approach, work-related stress may be assessed by considering seven categories of psychosocial hazards, which have the potential to lead to stress-related negative outcomes: Demand, Control, Managerial and Peer Support, Relationships, Role, and Change. As part of this

approach, the HSE developed the Management Standards Indicator Tool (MSIT), a 35-item self-report questionnaire for the screening of these factors, which provided evidence of adequate psychometric properties (Edwards et al., 2008). The MSIT has been translated into several languages, and adopted in several countries, such as Iran (Akbari et al., 2016), Ireland (Boyd et al., 2016), Taiwan (Kao et al., 2015), and Italy (Balducci et al., 2017; Toderi, Balducci, et al., 2013), where the HSE-MS approach has been integrated with the Italian law on workplace health and safety (Legislative Decree n. 81/2008), and the MSIT is the most commonly used questionnaire for the assessment of work-related stress (Balducci & Fraccaroli, 2019).

Whereas standardized approaches to the quantification of job stressors, such as the HSE-MS, are increasingly used in both research and applied settings, the conceptualization and operationalization of job strain (i.e., the workers' psychological and physiological reactions to stressor exposure) has been characterized by a wider range of models, methods, and indices. For instance, job strain has been frequently indexed by self-report measures of job-related burnout and emotional exhaustion (e.g., Kristensen, Borritz, et al., 2005), job satisfaction (e.g., De Jonge & Schaufeli, 1998), and other context-free measures of mental health such as the General Health Questionnaire (e.g., Balducci et al., 2018). While such a degree of heterogeneity is partially linked to the multifaceted nature of the stress response, it might represent a major limitation for comparing and meta-analyzing data collected from different organizational, linguistic, and cultural contexts.

A promising unified and empirically supported framework on job strain assessment has been identified by the vitamin model proposed by Peter Warr (1987, 1994, 2019), and the corresponding measure: Warr's (1990a) Job-related Affective Well-being Scale (W-JAWS). In the following paragraphs, we firstly describe the vitamin model and the W-JAWS. We then introduce the aims of the study, namely the evaluation of the psychometric properties of the Italian adaptation of the W-JAWS, and the investigation of its relationships with the MSIT.

Warr's Vitamin Model and the Job-Related Affective Well-Being Scale

Coherently with the increasing consensus toward identifying affective strain as the most immediate and direct response to job stressors (Ford et al., 2014; Pindek et al., 2019), Warr's (1987, 1994, 2019) vitamin model focuses on affective well-being as the most widely studied consciously accessible component of mental health. Building on consolidated frameworks of core affect (e.g., Matthews et al., 1990; Russell, 2003; Thayer, 1990), and partially in line with more recent models of work-related subjective well-being (e.g., Bakker & Oerlemans, 2011) the author proposed three main axes implying four distinct quadrants of the job-related affective well-being space: (1) the Pleasure-Displeasure, (2) the Anxiety-Comfort, and (3) the Depression- Enthusiasm axes. As shown in Figure 1, Axes 2 and 3 are predicted to be positively related as both build on the Arousal and Pleasure dimensions of core affect, with greater importance attributed to the latter than to the former (as represented by the elliptic shape of the model).

The vitamin model also predicts specific relationships between job-related affective well-being and features of the work environment, including Opportunity for Personal Control (i.e., discretion, autonomy, decision latitude) and for Contact with Others (i.e., social support, lack of isolation), Externally Generated Goals (i.e., job demands), and Environmental Clarity (i.e., information about the future, low role ambiguity) (Warr, 1994, 2007). Importantly, such job characteristics are predicted to be nonlinearly associated with affective well-being. Following the analogy of vitamin intake and physiological effectiveness, the author proposed that the presence of desirable job characteristics "beyond a certain level" may not further improve affective well-being, and in some cases (e.g., extreme job autonomy) can be even harmful, resulting in a

curvilinear inverted-U relationship (additional decrement) between positive job characteristics and affective well-being.

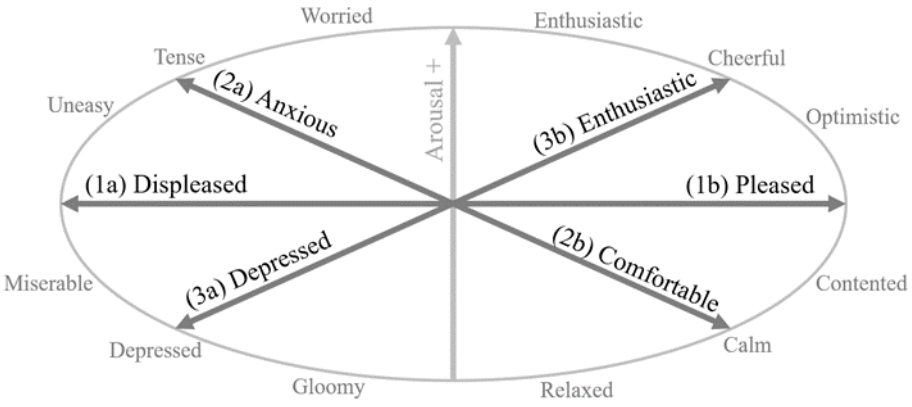

FIGURE 1
Conceptual model (main ellipsis) and items (surrounding adjectives) of the W-JAWS (modified from Warr, 1990a).

Finally, the vitamin model is accompanied by a standardized scale, the W-JAWS, which has been widely adopted in both research and applied contexts, and translated and validated in several languages including Finnish (Mäkikangas et al., 2007), Portuguese (Gonçalves & Neves, 2011), Dutch (Jeurissen & Nyklíček, 2001), Polish (Mielniczuk & Łaguna, 2018), and Spanish (Laguna et al., 2017). The scale consists of 12 adjectives capturing the Anxiety-Comfort and the Depression-Enthusiasm axes in terms of positive (six items, e.g., "calm", "enthusiastic") and negative affective states (six items, e.g., "tense", "depressed"), whereas the Pleasure-Displeasure axis was not included due to redundancy with existing measures of job satisfaction (e.g., De Jonge & Schaufeli, 1998). With its short length (requiring no more than two minutes to be filled in), contextual specificity (see Menghini & Balducci, 2021), robust theoretical basis, and consistent psychometric properties across different languages and cultures, the W-JAWS represents a promising candidate measure to aid standardization and cross-cultural comparisons of job strain assessment in both research and applied contexts. Moreover, by covering all the four quadrants of the affective space, the W-JAWS allows scholars and practitioners to overcome the strain/well-being dichotomy, providing indices of both negative affective states to be prevented (e.g., anxiety), and positive motivational states to be promoted (e.g., enthusiasm). In the vitamin model, such states are conceptualized as opposite, but in practice frequently coexisting, poles of the job-related affective well-being continuum, whose emerging dimensions are all essential for the understanding of workers' mental health (Warr, 1994).

The W-JAWS has been already widely used also with Italian samples (e.g., Acquadro Maran et al., 2020; Guglielmetti et al., 2014; Marucci et al., 2018; Toderi et al., 2015), although, to our knowledge, a full validation study is still lacking, and no previous evidence has been reported on its factor structure in the Italian context. Unsurprisingly, previous studies conducted in Italian organizations differed in terms of item wording and number of conceptualized dimensions to be measured with W-JAWS items (i.e., either four correlated dimensions, two positive/negative dimensions, or a single global factor), with implications for the validity and comparability of their results. Although some of these studies reported substantial relationships

between Italian adaptations of the W-JAWS and job characteristics (e.g., Toderi & Balducci, 2018), an Italian shared and validated version of the questionnaire is clearly needed.

The Present Study

In the present study, we evaluated the construct validity of the Italian adaptation of the W-JAWS, its linear and curvilinear relationships with workplace psychosocial hazards, and the suitability of the scale as a standardized job strain indicator to be used in conjunction with the HSE-MS approach.

As a first research goal, we assessed the factorial validity and factor structure of the Italian adaptation of the W-JAWS by comparing the hypothesized 2-factor model (Model 1: Anxiety-Comfort and Depression-Enthusiasm) with four alternative models tested by previous studies (e.g., Laguna et al., 2017; Mäkikangas et al., 2007): a 4-factor (Model 2: Anxiety, Comfort, Depression, and Enthusiasm), a 3-factor (Model 3: Positive Affect, Negative Affect, and Pleasantness; Daniels et al., 1997), an alternative 2-factor (Model 4: Positive and Negative Affect; in line with Watson et al., 1988), and a single-factor model (Model 5: Global Affective Well-being). Whereas Model 1 was empirically supported by Warr (1990a), more recent cross-linguistic and longitudinal studies favored Model 2 (e.g., Gonçalves & Neves, 2011; Laguna et al., 2017; Mäkikangas et al., 2007; Mielniczuk & Łaguna, 2018). Both models are coherent with the affective space postulated by the vitamin model, and with the latent constructs attributed to W-JAWS item scores by most studies (e.g., Jeurissen & Nyklíček, 2001; Salanova et al., 2011). In contrast, evidence supporting the alternative Models 3-5 would denote a limited standardization in the use of Warr's scale between the Italian and other linguistic contexts. Thus, our first hypothesis was the following:

H1: Either the 2-factor (M1) or the 4-factor measurement model (M2) of W-JAWS item scores will show acceptable fit with the observed data, and a better fit than the alternative measurement models.

As a second research goal, we aimed at quantifying the relationships between the latent dimensions measured with the W-JAWS and the perceived exposure to the psychosocial hazards (job stressors) indexed by the MSIT. First, we examined the patterns of differential relationships highlighted by previous research using the W-JAWS. According to Warr (1990a, 1990b, 1994), Job Demands and Contact with Others are expected to be more related to the Anxiety-Comfort than to the Depression-Enthusiasm axis, whereas the opposite is predicted for Opportunity for Personal Control. This is because, as argued by the author, Anxiety and Comfort tend to be more reactive to threating and dangerous situations (as in the case of extremely high or low job demands and social contact and support), whereas Depression and Enthusiasm are likely to be more associated with deprivation and loss of resources (as in the case of lack of personal control). As done in previous studies (e.g., Mäkikangas et al., 2007), we primarily examined the relationships between W-JAWS dimensions and the MSIT indicators that most resemble the job characteristics identified by Warr, namely Demand (matching with "Externally Generated Goals"), Control (matching with "Opportunity for Personal Control"), and Peer Support (matching with "Contact with Others"). Second, we evaluated the curvilinear relationships predicted by the vitamin model, based on which the three aforementioned work characteristics are expected to show an additional-decrement curvilinear relationship with job-related affective well-being, resulting in an U-shaped relationship with negative W-JAWS dimensions, and an inverted-U-shaped association with positive dimensions (Warr, 1994, 2007). Finally, to further evaluate the suitability of the W-JAWS as a standardized tool to be integrated with the HSE-MS approach, we examined the incremental contribution of the remaining MSIT indicators (i.e., Managerial Support, Role, Relationships, and Change) in predicting W-JAWS scores, over and beyond the linear and curvilinear effects of Demand, Control, and Peer Support. In summary, the following hypotheses were tested:

H2a: W-JAWS scores will be linearly associated with the Demand, Control, and Peer Support MSIT indicators, such that respondents perceiving higher Demand, lower Control, and lower Peer Support will also report lower job-related affective well-being than respondents perceiving lower Demand, higher Control, and higher Peer Support.

H2b: W-JAWS scores will be curvilinearly associated with the Demand, Control, and Peer Support indicators included in the MSIT, such that an increase in Demand, and a decrease in Control and Peer Support beyond a certain level will be associated with a decrease in job-related affective well-being.

H2c: The MSIT psychosocial risk indicators Demand, Control, and Peer Support will be differentially associated with W-JAWS dimensions, such that Demand and Peer Support will be more strongly associated with Anxiety-Comfort than Depression-Enthusiasm dimensions, and the opposite is expected for Control, both linearly and curvilinearly.

H2d: The inclusion of additional MSIT indicators (i.e., Managerial Support, Relationships, Role, and Change) will substantially and uniquely predict W-JAWS scores, after controlling for the effects of Demand, Control, and Peer Support.

Materials and Method

Participants and Procedure

Data were collected between March and April 2018 from a municipality located in the North of Italy as part of a survey planned in compliance with an organizational policy on well-being at work. The assessment involved 747 civil servants, of which 542 (53.7% women, 25.8% unspecified gender) voluntarily and anonymously responded to an online self-report questionnaire requiring about 20 minutes to be filled in. Participants were preliminary informed about the study aim and consented to the use of their data for the current research. Respondents were mainly employed in the organization and management of cultural, educational and sport activities (39.5%), computer and financial services (21.1%), public construction, mobility, logistic, and environment (18.6%), with less respondents being involved in governance, organizational and administrative activities (10.5%), and in social/psychological services (10.3%). Because the survey also contained an assessment of the supervisors' management competencies, no further personal information (e.g., age, work experience, organizational tenure, etc.) was asked to ensure data anonimity. One participant that did not respond to any of the W-JAWS items was not considered in the following analyses.

Measures

Job-related affective well-being was measured with the 12-item W-JAWS (Warr, 1990a), consisting of a list of 12 affective adjectives rated with a Likert scale response format from 1 (*never*) to 5 (*all of the time*)[1], and presented in the following order: relaxed ("distesa/o, rilassata/o")[2], worried ("preoccupata/o"), depressed ("depressa/o"), calm ("calma/o, tranquilla/o")[2], contented ("serena/o"), gloomy ("giù di morale"), optimistic ("ottimista"), tense ("tesa/o"), enthusiastic ("piena/o di entusiasmo"), cheerful ("allegra/o"), miserable ("triste"), and uneasy ("agitata/o") (see Appendix A). No labels were provided for the response scale intermediate point. The scale was introduced by the instruction: "Thinking of the past few weeks, indicate how much of the time your job made you feel each of the following." The Italian version of the W-JAWS was initially adapted by Toderi, Sarchielli, et al. (2013), and used on a sample of 120 nurses.

Psychosocial working conditions were evaluated using the short version of the MSIT (Houdmont et al., 2013), adapted and validated in Italian by Balducci et al. (2017). The scale includes 25 items rated with a 5-point Likert scale response format, with some items using frequency-related response labels (1 = *never* to 5 = *always*, with no label for the intermediate point), and other items using agreement-related labels (1 = *strongly disagree* to 5 = *strongly agree*, with no label for the intermediate point) to measure seven categories of job-related psychosocial hazards: Demand, four items, for example, "I have unachievable deadlines"; Cronbach's α = .73, 95% CI [.70, .76]; Control, four items, for example, "I have some say over the way I work"; α = .83, 95% CI [.81, .85]; Managerial Support, five items, for example, "I am given supportive feedback on the work I do"; α = .86, 95% CI [.85, .88]; Peer Support, four items, for example, "If work gets difficult, my colleagues will help me"; α = .86, 95% CI [.85, .88]; Relationships, two items, for example, "I am subject to bullying at work"; α = .84, 95% CI [.82, .86]; Role, three items, for example, "I am clear about the goals and objectives of my department"; α = .77, 95% CI [.74, .80]; and Change, three items, for example, "The staff is always involved on work-related changes"; α = .76, 95% CI [.73, .78].

Data Analysis

All analyses were conducted using R 4.0.3 (R Core Team, 2018), and particularly the *lavaan* (Rosseel, 2012) and the *lme4* R packages (Bates et al., 2014) (see Appendix B).

As we firstly aimed at evaluating the factor structure of the W-JAWS, we conducted a set of confirmatory factor analyses (CFAs) in line with the five alternative models described above. Despite the ordinal nature of the 6/5-point W-JAWS items, previous studies exclusively employed principal component analysis (e.g., Warr, 1990a) or CFA with maximum likelihood estimator (e.g., Laguna et al., 2017; Mäkikangas et al., 2007). Here, we accounted for the ordinal nature of W-JAWS items by using the diagonally weighted least squared (DWLS) robust estimator (see Flora & Curran, 2004), while we also replicated previous works using maximum likelihood. Model fit was evaluated and compared across models by using the root-mean-square-error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the standardized root-mean-square residual (SRMR). "Regular" rather than robust (i.e., corrected for nonnormality) RMSEA and CFI were considered. RMSEA $\leq$ .06, CFI and TLI $\geq$ .95, and SRMR $\leq$ .08 were considered as indicative of satisfactory fit (Hu & Bentler, 1999). Moreover, we computed the weighted root-mean-square residual (WRMR), rejecting models with WRMR > 1 (DiStefano et al., 2018).

Then, to achieve our second aim, we conducted a hierarchical regression of the weighted factor scores predicted by the CFA model selected in the previous step. Linear mixed-effects regression was used to account for the nonindependence between respondents working in the same team (i.e., participants were grouped into 57 teams of coworkers sharing the same supervisor/manager, and a random intercept was included in each model). For each W-JAWS latent dimension, a first parsimonious model including the linear term for Demand, Control, and Peer Support (M1: linearity) was compared with a null model (M0: intercept-only), a second model also including the quadratic term for the same predictors (M2: curvilinearity), and a third model also including the additional MSIT indicators Managerial Support, Relationships, Role, and Change (M3: incremental contribution). As a robustness check, we also specified a fourth model including gender as a covariate (M4: covariates). Models were compared by using the Akaike weights (Aw), quantifying the strength of evidence (likelihood and parsimony) of each model from 0 to 1, conditional to the set of considered models (see Wagenmakers & Farrell, 2004), and the likelihood ratio test (LRT), testing the null hypothesis of no differences between the likelihoods of two nested models (significance level set at $p < .05$).

RESULTS

Factorial Validity of the W-JAWS

Only the hypothesized 4-factor Model 2 showed an acceptable and satisfactory fit on the observed data, whereas all other alternative models, including the 2-factor Model 1, were rejected (see Table 1). Similar results were obtained by using alternative estimators (i.e., weighted least squares-mean, mean-and-variance-adjusted weighted least squares), including the maximum likelihood estimator, all of which showed convergence problems (i.e., nonpositive definite model-implied covariance matrix) for the 3-factor Model 4. Moreover, although missing responses were infrequent (ranging from 4 to 13, with a total of 26 missing responses to one or more W-JAWS items), we replicated the analyses with the full information maximum likelihood estimator, obtaining again the same pattern of results. As shown in Figure 2, the standardized factor loadings estimated by Model 2 were all positive and significantly higher than .70, with correlations among latent factors ranging from |.62| to |.78|. Model 2 also indicated a satisfactory reliability for the four associated W-JAWS subscales, with CFA-based α and ω coefficients ranging from .83 to .91 and from .80 and .88, respectively (see Appendix B).

TABLE 1
Fit of the considered factor models fitted on W-JAWS item scores using the DWLS robust estimator

	No. par.	χ^2 (*df*)	RMSEA	CFI	TLI	SRMR	WRMR
Model 1 (Anx.-Comf . + Dep.-Ent.)	61	575.40 (53)	.138	.984	.980	.083	2.247
Model 2 (Anx. + Comf. + Dep. + Ent.)	66	88.81 (48)	.041	.999	.998	.032	0.883
Model 3 (Pos. Aff. + Neg. Aff. + Pleas.)	61	593.38 (53)	.141	.983	.979	.080	2.281
Model 4 (Pos. Affect + Neg. Affect)	63	837.46 (51)	.173	.975	.968	.092	2.710
Model 5 (Global Affective Well-being)	60	1,057.12 (54)	.190	.969	.962	.106	3.045

Note. No. par. = number of estimated parameters; *df* = degrees of freedom; RMSEA = root-mean-square error approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root-mean-square residual; WRMR = weighted root-mean-square residual.

Relationships between W-JAWS and MSIT indicators

Table 2 shows the descriptive statistics of, and the correlations between, the considered variables. Overall, the sample was characterized by relatively low scores in those scales measuring negative constructs (e.g., Anxiety, Demand, and Relationship), and relatively high scores in those scales measuring positive constructs (e.g., Comfort, Control, and Support). Intraclass correlation coefficients (ICCs) ranged from .11 to .30, with most coefficients being lower than .20, indicating the most variance in items scores to be located at the individual level, but variance between teams of coworkers was not negligible. At both levels, zero-order Pearson correlations were moderate ($r > .30$) or strong ($r > .50$ in most cases), and in the expected directions, with slightly lower coefficients at the individual than at the group level. Correlations between variables of the same category (stressors or strain) were overall stronger than stressor-strain correlations, suggesting a degree of discriminant validity. At the group level, strong stressor-strain correlations were only observed for the Demand and Control subscale of the MSIT, and between Enthusiasm and all MSIT indicators, with the exception of Relationships.

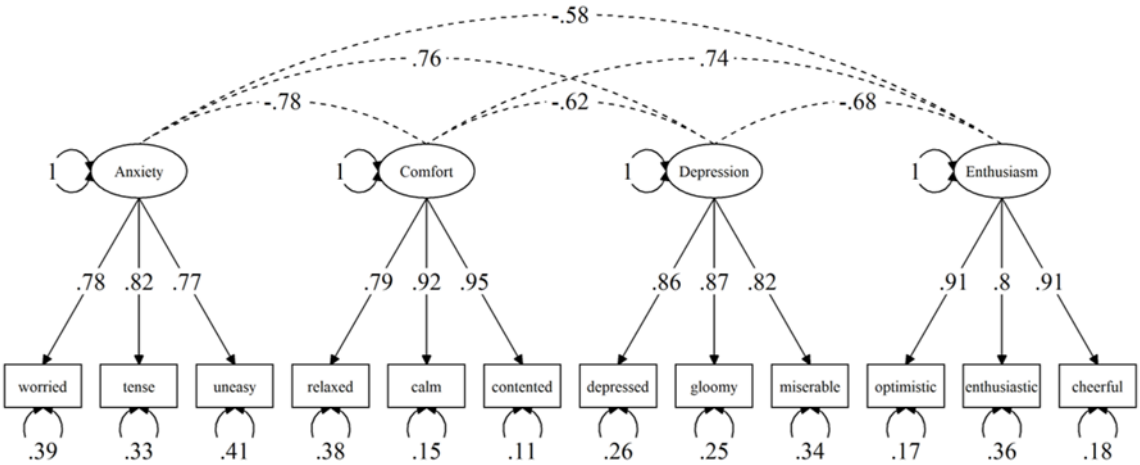

FIGURE 2
Fully standardized solution estimated by the selected CFA model fitted on W-JAWS item scores using the DWLS robust estimator

TABLE 2
Descriptive statistics and zero-order Pearson correlation coefficients between all considered variables

	N	Mean (*SD*)	ICC	1	2	3	4	5	6	7	8	9	10	11
1. Anxiety	538	2.64 (0.8)	.17		–.65	.59	–.46	.46	–.30	–.26	–.28	.29	–.30	–.35
2. Comfort	540	3.23 (0.84)	.19	–.78		–.52	.61	–.45	.39	.39	.40	–.32	.36	.42
3. Depression	538	1.96 (0.81)	.14	.74	–.74		–.56	.40	–.38	–.35	–.38	.37	–.36	–.39
4. Enthusiasm	537	3.33 (0.9)	.18	–.57	.73	–.60		–.32	.46	.36	.47	–.25	.48	.52
5. Demand	542	2.05 (0.67)	.17	.71	–.61	.67	–.43		–.34	–.30	–.36	.38	–.31	–.37
6. Control	542	3.61 (0.79)	.16	–.50	.58	–.53	.59	–.41		.47	.57	–.46	.52	.57
7. Peer support	542	3.96 (0.74)	.11	–.35	.47	–.45	.57	–.41	.58		.66	–.55	.36	.49
8. Manag. support	542	3.77 (0.79)	.17	–.42	.49	–.46	.60	–.47	.63	.80		–.50	.52	.72
9. Relationships	541	1.41 (0.78)	.22	.34	–.34	.40	–.36	.38	–.55	–.53	–.55		–.28	–.39
10. Role	542	4.03 (0.76)	.30	–.42	.42	–.48	.60	–.51	.62	.61	.74	–.34		.59
11. Change	542	3.43 (0.81)	.21	–.40	.43	–.45	.62	–.37	.64	.70	.77	–.57	.70	

Note. *N*= number of nonmissing responses; *SD* = standard deviation; ICC= intraclass correlation coefficient. Individual-level correlations are showed above the main diagonal, whereas correlations between group-level aggregates are shown below the main diagonal. Shaded cells highlight correlations among categories of indicators: job strain in the top-left quadrant, and job stressors in the bottom-right quadrant.

Multilevel modelling conducted on the subsample of complete responses (N = 516) showed adequate fit for the normal distribution on both model residuals and random effects (see Appendix B). Model comparison suggested stronger evidence for model M1 (linearity) than the alternative models specified for Anxiety (Aw = .99), Comfort (Aw = .98), and Depression (Aw = .99), whereas model M3 (incremental contribution) showed the strongest evidence for Enthusiasm (Aw = .98). Model M3 was also selected as the best model based on the likelihood ratio test for Anxiety, $\chi^2(4) = 15.40$, $p = .004$, Depression, $\chi^2(4) = 19.20$,

$p < .001$, and Enthusiasm, $\chi^2(4) = 53.07$, $p < .001$, and it was associated with significantly incremental likelihood compared to M2 (curvilinearity) when used to predict Comfort, $\chi^2(4) = 19.89$, $p < .001$.

Although the quadratic term for Demand and Peer Support (model M2) initially showed substantial effects on Anxiety, Comfort, and Enthusiasm, the analysis of influential cases suggested that these effects were driven by three individual responses with extreme scores (see Appendix B). Thus, the following models (M3 and M4) were respecified by excluding those influential cases ($N = 513$), and without including any quadratic term (see Appendix B).

As shown in Table 3, the parameters estimated by model M3 indicated that Demand was positively associated with both Anxiety and Depression, while negatively predicting Comfort and Enthusiasm, with a weaker effect on Enthusiasm compared to the other W-JAWS dimensions (i.e., the estimated coefficient was about 50% higher, with comparable standard errors). A similar but inverse pattern was found for Peer Support and Change, both showing positive relationships with Comfort and Enthusiasm, and negative associations with Anxiety and Depression. Whereas Peer Support was more strongly related to Comfort than other W-JAWS dimensions, Change showed the strongest relationship with Enthusiasm. Control showed substantial relationships in the expected directions with Comfort, Depression, and Enthusiasm, but not Anxiety, whereas Role was only positively associated with Enthusiasm. All these linear relationships were consistent across the four models specified for each W-JAWS dimension, including those accounting for respondents' gender (i.e., M4) (see Appendix B), whereas none of the W-JAWS dimensions was substantially associated with Managerial Support or Relationships.

As a check for multicollinearity, we inspected the variance inflation factors (VIFs) of each model, observing relatively high VIFs (from 2.07 to 2.96) for Managerial Support and Change. Thus, the analyses were replicated by dropping out either one or the other predictor. All models specified without Managerial Support showed acceptable VIFs < 2.10 and confirmed the pattern of results reported in Table 3, whereas models specified without Change still showed VIFs > 2.50 (for Managerial Support) while highlighting additional relationships between Role and both Comfort and Depression. Finally, the exclusion of two-to-five influential groups of coworkers ($N = 80$-114) associated with extreme Cook's distances led to substantial reductions in the effect estimated for Change on Anxiety, and that estimated for Control on Comfort, questioning the generalizability of these effects (see Appendix B).

Discussion

The present study aimed at evaluating the psychometric properties, and particularly the construct validity, of the Italian adaptation of the W-JAWS, and its suitability as a standardized job strain indicator tool to be related with a set of job stressor indicators (i.e., the MSIT). Whereas the HSE-MS (Cousins et al., 2004; MacKay et al., 2004) and further methodological approaches (e.g., Kristensen, Hannerz, et al., 2005) have demonstrated theoretical and practical utility in quantifying job-related psychosocial risks, more standardized approaches to the measurement of job-related strain/well-being are needed. Warr's (1987, 1994, 2019) vitamin model represents a promising unified framework with this aim, and the W-JAWS is a promising measure to aid comparison across studies, countries, and organizational settings. To our knowledge, this is the first study examining the construct validity of the W-JAWS in Italian organizational contexts.

The results obtained from a cross-sectional survey conducted with a relatively large sample of Italian civil servants were in line with recent multilinguistic studies (for a review, see Mielniczuk & Łaguna, 2018)

TPM Vol. 29, No. 3, September 2022
309-325

TABLE 3
Unstandardized coefficients estimated by the selected multilevel models predicting W-JAWS factor scores by the aggregate MSIT indicators

	Anxiety				Comfort				Depression				Enthusiasm			
	Coeff. (*SE*)	$\chi^2(1)$	*p*	Aw	Coeff. (SE)	$\chi^2(1)$	*p*	Aw	Coeff. (SE)	$\chi^2(1)$	*p*	Aw	Coeff. (SE)	$\chi^2(1)$	*p*	Aw
Intercept	0.53 (0.35)				–1.74 (0.35)				1.27 (0.35)				–2.83 (0.34)			
Demand	**0.46 (0.06)**	**117.42**	**< .001**	**.99**	**–0.37 (0.06)**	**97.99**	**< .001**	**.99**	**0.31 (0.06)**	**78.34**	**< .001**	**.99**	**–0.16 (0.06)**	**51.15**	**< .001**	**.99**
Control	–0.09 (0.06)	31.02	< .001	.99	**0.13 (0.06)**	**51.34**	**< .001**	**.99**	**–0.12 (0.06)**	**49.83**	**< .001**	**.99**	**0.19 (0.05)**	**86.61**	**< .001**	**.99**
Peer Support	**–0.16 (0.06)**	**16.86**	**< .001**	**.99**	**0.25 (0.06)**	**32.75**	**< .001**	**.99**	**–0.14 (0.06)**	**19.47**	**< .001**	**.99**	**0.13 (0.06)**	**20.88**	**< .001**	**.99**
Manag. Support	0.08 (0.07)	1.07	.301	.09	–0.003 (0.07)	4.61	.032	.36	0.004 (0.07)	5.08	.024	.42	0.10 (0.07)	20.11	< .001	.99
Relationship	0.08 (0.05)	1.53	.216	.01	0.03 (0.05)	0.62	.430	.02	0.08 (0.05)	1.72	.190	.05	0.06 (0.05)	2.45	.118	.14
Role	–0.06 (0.06)	3.25	.072	.01	0.06 (0.06)	4.08	.043	.01	–0.09 (0.06)	5.63	.018	.04	**0.13 (0.06)**	**12.67**	**< .001**	**.79**
Change	**–0.18 (0.06)**	**8.52**	**.003**	**.01**	**0.20 (0.06)**	**10.43**	**.001**	**.09**	**–0.17 (0.06)**	**6.91**	**.009**	**.06**	**0.25 (0.06)**	**16.60**	**< .001**	**.99**

Note. *SE* = standard error; $\chi^2(1)$ = likelihood ratio test statistic associated with the inclusion of each predictor; *p* = *p*-value associated with the $\chi^2(1)$ statistic; Aw = Akaike weight associated with the inclusion of each predictor (i.e., compared to the null model and all previous models not including that predictor). Bold types indicate those predictors showing substantial estimates across all the models specified for a given W-JAWS dimension.

supporting a correlated 4-factor structure for W-JAWS items (coherently with hypothesis H1), with Anxiety, Comfort, Depression, and Enthusiasm being identified as distinguished but interrelated latent factors. Coherently with previous studies (e.g., Gonçalves & Neves, 2011; Laguna et al., 2017; Mäkikangas et al., 2007; Mielniczuk & Łaguna, 2018), all alternative models, including the 2-factor model originally conceptualized by Warr (1990a), were rejected, but the correlations estimated among the four latent dimensions suggested a likely co-occurrence of high levels of job-related Comfort and Enthusiasm and low levels of Anxiety and Depression, and vice versa.

Further evidence of construct validity was provided by the relationships observed between W-JAWS dimensions and MSIT indicators. However, whereas substantial linear relationships were observed in the expected directions between W-JAWS dimensions and Demand, Control, and Peer Support (in line with our hypothesis H2a), the curvilinear relationships with the same job characteristics were not substantial, being mainly driven by a few influential observations, in contrast to hypothesis H2b, and contrarily to Warr (1990b) and following studies (e.g., De Jonge & Schaufeli, 1998). Although this result might be partially due to the low frequency of observations with extremely high Demand, low Control, and low Peer Support scores, it is also in line with more recent cross-sectional (Jeurissen & Nyklíček, 2001) and longitudinal studies (Mäkikangas et al., 2007) that failed to corroborate the additional decrement hypothesis on W-JAWS item scores. Both these and the present study only highlighted linear relationships between desirable job characteristics and job-related affective well-being, supporting the recommendation of interventions aiming at maximizing such characteristics, even "beyond a certain level." This recommendation is also in line with the HSE-MS approach (Cousins et al., 2004; MacKay et al., 2004), whose rationale mainly focuses on the general aim to prevent workplace stress by reducing job stressors and reinforcing positive job characteristics.

Finally, our results only partially supported the differential relationships predicted by the vitamin model (Warr, 1990a, 1990b, 1994) (hypothesis H2c), and the incremental contribution expected for the additional MSIT indicators (hypothesis H2d). On the one hand, the patterns of results approximated the stronger associations expected between Anxiety-Comfort W-JAWS dimensions and both Demand (i.e., showing the weakest relationship with Enthusiasm) and Peer Support (i.e., showing the strongest association with Comfort), compared to Depression-Enthusiasm dimensions. Similarly, the patterns of relationships showed by the Control indicator (i.e., associated with all W-JAWS dimensions but Anxiety) was partially in line with the differential relationships expected for this variable, although these results were less consistent across our sample. On the other hand, our results suggested an incremental contribution of two among the four additional indicators included in the MSIT, namely Change (a highly operative indicator reflecting the perceived quality of organizational change management and communication) and Role (matching with the Environmental Clarity dimension, and being only related with Enthusiasm), providing additional evidence on the W-JAWS sensitivity to psychosocial working conditions.

Strengths and Limitations

The present study is characterized by several strengths, including the involvement of a large sample of public employees working in different departments of the same municipality, implying substantial variability in the nature and content of work. Moreover, the factor structure of W-JAWS was evaluated by accounting for the ordinal nature of its 5-point items. To the best of our knowledge, this is the first study evaluating the W-JAWS structure by using such an approach, and the convergence of our results with those of previous studies (e.g., Gonçalves & Neves, 2011; Laguna et al., 2017; Mäkikangas et al., 2007) using the

maximum likelihood estimator represents valuable evidence in support of Warr's (1994) model of job-related affective well-being. Finally, to our knowledge this is also the first study investigating both the vitamin model's linear and quadratic relationships in the Italian context, although curvilinearity was not supported by our data.

The main limitations of the present study include its cross-sectional design, the risk for common method bias implied by the exclusive use of self-report data, and the lack of information on potentially important participants' demographics (e.g., age), occupational indicators (e.g., salary and position), and other confounders that were not recorded due to privacy concerns. Also, despite the multilevel data structure, CFA were conducted using single-level techniques. This was done due to the small sample size at Level 2, and because the considered scales were mainly used, and are commonly used, to evaluate individual-level relationships. Finally, we did not include any measure of trait affect, which would have helped disambiguating job stressor effects from spurious relationships due to common covariates of stressful appraisals and job-related affect, such as negative affectivity (see Spector et al., 2000).

Future Directions and Conclusions

Future studies should build from our results by using longitudinal designs to collect MSIT and W-JAWS measures at multiple time points, by including further demographic and occupational covariates, and by evaluating the measurement invariance of the Italian adaptation of the W-JAWS across genders, age, occupational groups, and over time. Previous studies conducted in other linguistic contexts supported both scalar invariance across genders (Laguna et al., 2017) and longitudinal invariance of factor loadings and residual variance, as well as temporal stability and test-retest reliability (Mäkikangas et al., 2007; Mielniczuk & Łaguna, 2018). The convergent and predictive validity of the Italian adaptation of the W-JAWS should be also investigated by evaluating its associations with long-term outcomes, by using both subjective (e.g., self-reported burnout) and physiological indicators (e.g., blood pressure) to evaluate and reduce common method variance. Moreover, multilevel CFA techniques with adequate power at Level 2 should be used to investigate whether the W-JAWS factor structure is equivalent at both individual and group level (see Stapleton et al., 2016).

In conclusion, this study corroborates previous evidence identifying the W-JAWS as a valid and reliable index of job strain/well-being, while extending the validity of its application to the Italian context, and by considering item scores as ordinal measures. The main implication of the present study is that the W-JAWS can be used as a useful and standardized tool in both routine and research-oriented workplace stress assessment, in the Italian as in other linguistic contexts, and meaningfully integrated with structured methodological frameworks such as the HSE-MS.

Notes

1. In contrast to the original W-JAWS scale (Warr, 1990a) and previous studies on its factor structure (e.g., Laguna et al., 2017; Mäkikangas et al., 2007), we reduced the scale's response levels from six to five. This was done to match the W-JAWS and the MSIT response format (as noted above, the latter is the most commonly used tool for the assessment of work-related stress in the Italian context) while adopting a standard 5-point Likert scale response format, and due to difficulties in discriminating the original response categories 4 (*Much of the time*) and 5 (*Most of the time*) in Italian.
2. Two W-JAWS items (i.e., "relaxed" and "calm") were translated by using two separate synonym

adjectives each (i.e., "distesa/o, rilassata/o" and "calma/o, tranquilla/o", respectively) instead of using one-to-one matches as done for all other items. This was done in order to reinforce the meaning of item wording.

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APPENDIX A

Instructions, items [English translation], and response scales of the Italian adaptation of Warr's (1990a) Job-related Affective Well-being Scale

Indichi quanto spesso, durante le ultime settimane, il suo lavoro l'ha fatta sentire in ciascuno dei seguenti modi [Thinking of the past few weeks, indicate how much of the time your job made you feel each of the following]:

		Mai [Never]				Sempre [All of the time]
1.	Distesa/o, rilassata/o [relaxed]	①	②	③	④	⑤
2.	Preoccupata/o [worried]	①	②	③	④	⑤
3.	Depressa/o [depressed]	①	②	③	④	⑤
4.	Calma/o, tranquilla/o [calm]	①	②	③	④	⑤
5.	Serena/o [contented]	①	②	③	④	⑤
6.	Giù di morale [gloomy]	①	②	③	④	⑤
7.	Ottimista [optimistic]	①	②	③	④	⑤
8.	Tesa/o [tense]	①	②	③	④	⑤
9.	Piena/o di entusiasmo [enthusiastic]	①	②	③	④	⑤
10.	Allegra/o [cheerful]	①	②	③	④	⑤
11.	Triste [miserable]	①	②	③	④	⑤
12.	Agitata/o [uneasy]	①	②	③	④	⑤

Note. The original W-JAWS items reported in squared brackets (Warr, 1990a) are copyrighted by John Wiley & Sons Inc. and reproduced based on a personal licence granted by John Wiley & Sons for the unique purpose of publishing the present work.

APPENDIX B

Data analysis code and outputs

The full R code used for data processing, data reduction, and data analysis, including the full data analysis output, is available from the following public repository: https://osf.io/jyzgf/