



OPEN A contribution to the Italian validation of the occupational hardiness scale and its role in work engagement and emotional exhaustion

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Workplace stress is a global issue across different occupations. Hardiness, a resource characterized by higher levels of challenge, commitment, and control, acts as a protective factor against stress, particularly in the work environment. The aim of this study was twofold: (1) to validate the Italian version of the Occupational Hardiness Scale (OHS), by also considering its invariance across gender (Study 1); (2) to analyze its relationship with work engagement and emotional exhaustion (Study 2). Study 1 included a sample of workers from different sectors ($N = 1152$). Study 2 included all participants of Study 1 that had also completed the scales measuring work engagement and emotional exhaustion ($N = 845$). The results confirmed the original structure of the scale, by identifying a three-factor model (i.e., challenge, commitment, control) with one general, second-order, latent factor (i.e., occupational hardiness). In addition, multi-group confirmatory factor analysis results indicated that the measurement of occupational hardiness, as captured by OHS, was comparable and meaningful for males and females. Finally, occupational hardiness was positively related to engagement, and negatively related to emotional exhaustion. Thus, the Italian version of the OHS is a psychometrically sound measure for assessing occupational hardiness in the Italian working population.

Keywords Hardiness, Personal resource, Engagement, Burnout, Exhaustion, Hardy personality

Workplace stress is a global issue with significant repercussions for individuals and organizations, making the ability to cope with stress increasingly crucial for success¹. Research on individual resources has gained prominence due to their relevance in the ongoing debate about personal variables and their impact on the stress-health relationship. Drawing from research on stress response differences, cognitive appraisal theory, and existential psychology^{2,3}, individual resources emerge as pivotal protective factors. Occupational hardiness, a collection of attitudes and strategies, stands out among these resources, influencing stress perception, promoting mental health, and reducing the risk of burnout and related illnesses⁴. The primary goal of this study is to validate the Italian version of the Occupational Hardiness Scale (OHS) (Study 1). Adapting and validating the OHS for the Italian context ensures the reliability and cultural appropriateness of the instrument in assessing occupational hardiness among Italian speakers. Additionally, the research explores the relationship between occupational hardiness, measured by the OHS, and two contrasting work outcomes: work engagement and emotional exhaustion (Study 2). Investigating these associations aims to provide valuable insights into how individual differences in occupational hardiness may influence employees' engagement levels and susceptibility to burnout in the workplace.

The concept of occupational hardiness was introduced by Kobasa in 1979⁵ as a resource characterized by increased levels of control, commitment, and challenge that empower individuals to cope with the adverse effects of stress on health, particularly in the work environment. This conceptualization originated from the observation that certain individuals displayed resilience against negative symptoms despite exposure to

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high stress levels. Hardy personalities adopt a cognitive style, motivating them to perceive stressful working circumstances as opportunities for development or growth. Individuals high in hardiness tend to interpret stressful events positively, viewing them as challenges and valuable learning opportunities⁵. Central to the construct of occupational hardiness is the perception of job demands as an opportunity for personal growth, known as the “challenge” aspect. This perception encourages active engagement with stress and a positive view of obstacles as normal and beneficial⁷.

Occupational hardiness is defined as a pattern of attitudes and strategies leading individuals to perceive stressful situations as manageable^{8,9}. It comprises three different dimensions (challenge, control, and commitment) crucial for preventing the development and occurrence of tension in stressful situations¹⁰. The challenge dimension involves life energy, seeing obstacles and changes as an opportunity for meaningful experiences and personal growth, encouraging individuals to adopt effective coping strategies.

Control refers to autonomy and the ability to influence one's life effectively, making consequences predictable, and the belief that one can influence the course of events through their actions and decisions. Commitment involves dedication and participation in significant life activities. Committed individuals are typically engaged in work-related tasks and social institutions, experiencing also a sense of community, mutual support, and collaboration.

The theoretical model of hardiness has gained widespread acceptance and integration into personality and adaptation models in response to stress. Despite its acceptance, criticism has arisen regarding the lack of methodological rigor in instruments used to measure the construct. Several hardiness scales, aligned with Kobasa's theory, measure commitment, control, and challenge. Initial attempts, such as Kobasa's comprehensive 18-scale instrument, faced problems in replicating the theoretical three-factor structure. Subsequently, Bartone¹¹ developed the Dispositional Resilience Scale (DRS-15), which showed good reliability and predictive validity. However, the DRS-15 still has limitations, particularly concerning the challenge scale.

A recent review by Sharif Nia and colleagues¹² assessed 33 articles on hardiness personality assessment, concluding that the Occupational Hardiness Questionnaire (OHQ) exhibited superior psychometric properties in measuring employee toughness. Developed in Spain by Moreno-Jimenez and colleagues⁹ the OHQ is recognized as one of the most popular instruments for assessing hardiness due to its psychometric properties. Based on Kobasa's theory, it is a 15-item measure assessing three dimensions of toughness in the work context: commitment, control, and challenge. Respondents use a 4-point Likert scale to indicate their agreement with each item, with higher scores corresponding to higher levels of occupational hardiness.

While the OHQ has been used in various countries, including Italy¹³ the DRS-15 scale remains the only validated instrument in Italy for measuring hardiness¹⁴. Hence, the primary objective of Study 1 is to validate and enhance the OHQ questionnaire for application in the Italian context. Specifically, the psychometric properties of OHQ were examined through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) performed on two random samples. In line with Moreno-Jimenez and colleagues (2014), we hypothesized a three-factor structure with a second-order latent factor called Occupational Hardiness (H1).

One of the most pervasive criticisms found in the occupational hardiness literature concerns whether the construct is equally important for men and women¹⁵. Many concerns regarding gender differences stem from the fact that hardiness research was primarily conducted on male samples, leading to questions about its validity for women (e.g., Kobasa et al., 1982). In later studies that included female participants, inconsistent or equivocal results have been reported.

Research examining female samples or gender comparisons has not replicated the typical buffering effect observed in men, indicating that hardiness may be less relevant as a resilience resource for women¹⁶. The observed disparities may be attributed to gender-specific differences in coping strategies¹⁷, with the possibility that variations in the types of stressors studied, such as a predominant focus on achievement-oriented stressors, rather than social or interpersonal stressors, could contribute to divergent effects of hardiness between men and women¹⁵. Nevertheless, empirical support exists for the positive impact of hardiness on health in both genders¹⁸, with females demonstrating elevated levels in certain dimensions, such as commitment¹⁹. Ensuring measurement equivalence is crucial for a comprehensive understanding of gender disparities in the correlation between hardiness and health. Starting from these premises, the second aim of Study 1 was to examine gender differences in the measure of OHS. Specifically, we hypothesized invariance between males and females in the use of this coping strategy (H2).

Occupational hardiness and opposite outcomes of work experience

A noteworthy meta-analysis conducted by Eschleman and colleagues²⁰ underscored hardiness as a pivotal stress-resiliency resource, impacting physical strain, psychological well-being, and performance. Research consistently associates hardiness with diverse resilient outcomes, including psychological²¹ and general well-being²². Recent empirical evidence accentuates the protective role of occupational hardiness, particularly amidst the Covid-19 pandemic, notably among healthcare workers and high-stress occupations^{1,23}.

Regarding strain and health symptoms, studies on occupational hardiness, especially in emotionally demanding occupations like the military, nursing, and teaching, reveal that higher levels of occupational hardiness correlate with decreased burnout²⁴. Hardiness acts as a critical moderator, buffering the adverse effects of stressors on physical and psychological well-being²⁵.

Hardy individuals exhibit a belief in their control over life events, full engagement in daily activities, and an inclination to view problems as exciting challenges for personal growth. This adaptive mindset is linked to better physical and mental health, providing resistance to stress and protection against burnout²⁶. Specifically, the dimensions of control and commitment within psychological hardiness significantly correlate with lower burnout scores, indicating that individuals with higher levels of psychological hardiness, marked by control and active engagement, experience lower burnout²⁴.

Occupational hardiness, with its control-oriented mindset, allows individuals to perceive stressors as changeable, leading to proactive coping strategies^{27,28}. Those with high occupational hardiness actively cope with stress, whereas an external locus of control, perceiving events as dictated by chance, is linked to higher burnout levels. Broad consensus indicates a positive correlation between occupational hardiness and organizational outcomes such as job performance and commitment, including work engagement^{1,3,29}.

Within the Job Demands-Resources framework, occupational hardiness is conceptualized as a personal resource, positively influencing control and work environment influence, crucial for promoting work engagement^{30,31}. Hardiness enables individuals to overcome challenges, mitigate stress, and employ effective coping strategies, ultimately fostering higher engagement at work³². Work engagement correlates with traits like a proactive personality and positive basic self-evaluation, functioning as personal resources impacting individuals' perspectives and elevating their level of engagement³³. Workers with strong occupational hardiness positively frame events, exhibiting work engagement characteristics, including high commitment, satisfaction, internal locus of control, and low depression, anxiety, and neuroticism levels. It is essential to recognize that hardiness serves as an individual resource that interacts with the organizational context and environmental resources, which can act as catalysts in facilitating its translation into engagement and organizational commitment. A recent systematic review³⁴ underlines the importance of contextual moderating factors, such as social support or workload, that influence the relation between hardiness and work outcomes. The availability of organizational resources can certainly influence the perception of change as an opportunity, the sense of mastery over the situation, and the level of participation in organizational life, with consequences for the worker's motivation and perceived fatigue.

Occupational hardiness predicts and moderates occupational engagement, particularly in the commitment and vitality domains^{35,36}. These findings advocate for promoting personal resources like occupational hardiness to enhance overall health and well-being, particularly in the workplace. Starting from this theoretical background, Study 2 aimed to examine the relationship between occupational hardiness and opposite outcomes of individual work experience, namely work engagement and emotional exhaustion. Particularly, we hypothesized that occupational hardiness positively influences work engagement (H3) and negatively affects emotional exhaustion (H4).

Study 1 Method

This study is part of a broader project on workers' well-being. Ethical approval was obtained from the Board for the Ethics of Non-Medical Research on the Person of the University of Parma (Reb - Research Ethics Committee) under Protocol Number 0032978.

All research was conducted by relevant guidelines and regulations, and in accordance with the latest version of the Declaration of Helsinki (World Medical Association, 2013).

The present study was considered minimal risk, as defined by the National Research Council of the Academies of Science. There was no treatment, including medical, invasive diagnostics, or procedures, causing psychological or social discomfort for the participants. Participation was restricted to adult employees (aged 18 or over) from different organisational contexts, who were fluent in Italian and able to provide informed consent, to ensure that all respondents could fully understand and complete the measures. Prior to data collection, we calculated the required sample size in accordance with the established recommendations for confirmatory factor analysis (e.g. Kline, 2016). These recommendations suggest a minimum of 10 participants per item and 500 cases for complex measurement models. In addition, Comrey and Lee (1992) suggest a graded scale of sample sizes for scale development: 100 = poor, 200 = fair, 300 = good, 500 = very good, $\geq 1,000$ = excellent. To ensure sufficient statistical power for detecting small-to-medium effects and testing measurement invariance across gender, we planned our recruitment to fall well within these guidelines, remaining consistent with the original validation by^{9,37,38}.

Context and participants

To evaluate the psychometric properties of the OHS, data were collected on a total sample of 1152 employees from different organizational sectors who completed an online questionnaire as part of a project to assess work-related psychosocial risks. The link to the online questionnaire was provided by the HR departments of the participating organizations. The questionnaire was accompanied by a cover letter explaining the content and purpose of the study and emphasizing the anonymity of the participants and the confidentiality of the information by the guidelines for the processing of personal data under the Italian Data Protection Act (Legislative Decree DL-196/2003) and the guidelines for personal data treatment defined by the General Data Protection Regulation (GDPR). Informed Consent was obtained from all the participants using the click-box method. The questionnaire was only accessible to participants who ticked the "I agree" box. The letter pointed out that participants were entitled to withdraw from the study at any time without giving reasons and that the employer would not receive any information about the participants' withdrawal.

The total sample was split in half to allow the exploratory factor analysis and confirmatory analysis to be conducted on two random samples that were heterogeneous in terms of professional roles and sectors and also equal in number.

Sample 1 ($N=576$) consisted predominantly of women (50.5%) and the *Mage* was 43.1 years ($SD=11.01$, $\min=19$; $\max=67$). In terms of work sector, 23.6% worked as administrative staff, 16.9% were employees in the commercial sector (i.e., wholesale or retail trade and repairs), 16.1% were healthcare professionals (i.e., nurses, doctors and physiotherapists), 14.6% were marketing and secretarial staff, 13.9% were teachers. In terms of marital status, a slight majority of participants were married or living with their partner (49.6%), 48.8% were single and the remaining 1.6% were widows. The majority of the sample had a permanent employment contract

(88.5%) and a full-time contract (90.8%), and the average length of service in their current organization was 15.17 years ($SD = 10.17$). The average working week was 39.32 h ($SD = 7.49$).

Sample 2 ($N = 576$) comprised mainly women (59.9%) and the *Age* was 42.9 years ($SD = 9.78$, $min = 20$; $max = 66$). Among them, 40.6% were healthcare professionals (i.e., nurses, doctors and physiotherapists), 27.6% were commercial employees (i.e., wholesale or retail and repairs), 16.8% worked as administrative staff and 10% were marketing and secretarial staff. In terms of marital status, most participants were married or living with their partner (60.8%), 37.8% were single and the remaining 1.4% were widows. The vast majority of the sample had a permanent employment (90.1%) and a full-time contract (91.5%). The average length of service at the current job was 15.47 years ($SD = 9.36$). The average working week was 40.31 h ($SD = 6.12$).

Strategy of analysis

Scale translation

The Italian version of the OHS was obtained by performing a conventional translation and back-translation procedure³⁹. The English version of the Scale was translated into Italian by three work psychologists who worked for at least 10 years as academic organizational psychologists. Then, a qualified native-speaker translator with no formal knowledge of the original scale translated them back into English. The original English and the back-translated versions were reviewed to identify any inconsistencies and harmonize them. This resulted in the Italian version of the OHS shown in Appendix A.

Sample 1: exploratory factor analysis

The structure of the OHS was analyzed using a Principal Component Analysis (PCA) with Varimax rotation on Sample 1 ($N = 576$) using SPSS 23. Bartlett's test for sphericity and the Kaiser–Meyer–Olkin (KMO) measure were used as a measure of sample adequacy. The sample was considered adequate if the KMO value was higher than 0.70 and the Bartlett's test was significant ($p < 0.05$). As a rule of thumb, factors reporting an eigenvalue ≥ 1 were retained. Following the advice of Field⁴⁰ we suppressed factor loadings less than 0.30. Scale reliability was assessed using McDonald's Ω , which is recommended when factor loadings are not equal across items, as it provides a robust estimate of internal consistency. Values above 0.70 are generally considered acceptable, values ≥ 0.80 good, and values ≥ 0.90 excellent⁴¹.

Sample 2: confirmatory factor analysis

In order to cross-validate the findings obtained on Sample 1, we examined whether the three-factor structure (i.e., Commitment, Challenge, Control) could be reliably replicated on Sample 2 ($N = 576$) using Confirmatory Factor Analysis with the AMOS software package⁴².

Three analytic models were tested. Model 1 assumes that all items load on one general hardiness factor. Model 2 tested a structure of three independent factors, in which the challenge, control and commitment dimensions were uncorrelated. Model 3 tested a three-factor structure with a second order latent factor called Hardiness. We used several indices to assess the goodness of fit of each model. The goodness-of-fit of the model was evaluated using multiple fit indices, namely, the comparative fit index (CFI), goodness of fit index (GFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Several criteria were considered to assess the goodness of fit, including the χ^2 goodness of fit statistic, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardised root mean square residual (SRMR) and Akaike's information criterion (AIC). A non-significant value of χ^2 indicates that the proposed model fits the data well. RMSEA values less than 0.05 indicate a good fit and values less than 0.08 indicate an acceptable fit. CFI and TLI values greater than 0.90 indicate an acceptable fit and values greater than 0.95 indicate a good fit. The SRMR ranges from 0 to 1, with a cut-off criterion of 0.08 and values less than 0.05 indicating an excellent fit. Concerning AIC, it is considered that a lower value indicates a better fit of the model⁴³. The competing models were compared using the χ^2 difference test and the AIC.

Measurement invariance across gender

In the present study the stability and generalizability of the psychometric properties of the OHS across genders was evaluated by performing a multi-group CFA on the total sample (Sample 1 and 2). Accordingly, we evaluated differences in Satorra-Bentler χ^2 values and variances of the fit indices between the following nested models. Specifically, we tested: 1) the configural invariance model, in which all parameters are freely estimated with no restrictions across groups, to assess whether the theoretical operationalization of the construct was adequate across males and females;

2) the metric invariance model, where the factor loadings were forced to be equal across groups, in order to evaluate whether the perceived meaning of the latent construct was equal across genders; 3) the scalar invariance model, in which both the factor loadings and intercepts constrained to be equal in order to assess whether participants reported equivalent item averages and thus allowed an appropriate comparison between latent variable scores; 4) the strict invariance model, which was derived from the scalar invariance model and further restrict the residual variances of the gender groups to be equal to 1.

Results

Exploratory factor analysis

The results of the Principal Component Analysis showed that the Kaiser-Meyer-Olkin index was 0.90, exceeding the recommended value of 0.60, while Bartlett's test for sphericity was significant at $p < 0.000$, ensuring that the data were sufficiently correlated to justify the use of EFA.

Items	Communalities	Factors		
		Challenge	Commitment	Control
Chal5	0.66	0.78		
Chal1	0.59	0.75		
Chal4	0.61	0.73		
Chal2	0.51	0.64	0.31	
Chal3	0.51	0.63		
Comm3	0.61		0.72	
Comm4	0.53		0.70	
Comm2	0.51		0.68	
Comm1	0.41		0.57	
Comm5	0.44		0.50	0.39
Contr4	0.56			0.73
Contr5	0.58			0.72
Contr3	0.56			0.70
Contr1	0.43			0.58
Contr2	0.38		0.35	0.51

Table 1. Factors, items, communalities and loadings for the occupational hardiness scale ($N=576$).

	χ^2	df	p	CFI	TLI	RMSEA	SRMR	AIC	BIC
M_1	571.89	91	<0.001	0.756	0.719	0.096 (0.088, 0.103)	0.104	629.89	756.21
M_2	601.10	90	<0.001	0.741	0.698	0.099 (0.092, 0.107)	0.189	661.10	791.79
M_3	231.29	87	<0.001	0.927	0.912	0.054 (0.045, 0.062)	0.046	297.29	441.04

Table 2. Results of CFA, alternative models ($N=576$). M_1 . 1-factor model. M_2 . 3-factor model, no co-variations between factors. M_3 . Second-order model. df = degree of freedom; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residuals; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.

Moreover, the results showed a three-factor structure, which accounted for 52.5% of the total variance (F1 Variance = 18.82; F2 Variance = 16.86; F3 Variance = 16.84). Finally, all items of the scale presented satisfactory high factor loadings, reaching at least 0.50 (see Table 1).

Model fit assessments

As shown in Table 2, the first two models did not provide an adequate fit to the data. In contrast, M_3 showed an acceptable fit to the data. The robust fit indices for the hierarchical model were CFI=0.93, TLI=0.91, RMSEA=0.05, and SRMR=0.04. The results confirmed that the hierarchical model provided the best fit to the data, superior to M_1 ($\Delta\chi^2 = 29.21$; $\Delta df = 1$; $p < 0.001$) and M_2 ($\Delta\chi^2 = 369.81$; $\Delta df = 3$; $p < 0.001$).

Therefore, we selected M_3 , the model with the second-order factor, as the best model, which is graphically represented in Fig. 1. These results provided support to H1.

Reliability analysis

To verify the internal consistency of each OHS dimension, McDonald's Ω was used, as it provides a robust estimate of reliability when item loadings differ. In Sample 1, results indicated adequate to good reliability: $\Omega = 0.75$ for the commitment subscale, $\Omega = 0.74$ for the control subscale, and $\Omega = 0.80$ for the challenge subscale. Similar findings emerged in Sample 2, with $\Omega = 0.72$ for commitment, $\Omega = 0.72$ for control, and $\Omega = 0.74$ for challenge. Overall, these results support the adequacy of the OHS subscales across samples.

Multiple group confirmatory factor analyses

We conducted a comparative analysis to assess measurement invariance across genders, ensuring consistency in the psychometric characteristics of the OHS. The chi-square difference test between the configural invariance model and the metric invariance model was not significant ($\Delta\chi^2 = 19.609$, $\Delta df = 12$, $p = 0.1$), indicating equivalent construct meaning between males and females. For scalar invariance, the chi-square difference test between M_3 and M_2 was not significant ($\Delta\chi^2 = 3.126$, $\Delta df = 2$, $p = 0.25$). Likewise, the chi-square difference between M_3 and M_4 was not statistically significant ($\Delta\chi^2 = 1.095$, $\Delta df = 1$, $p = 0.25$), demonstrating identical structural relationships for both genders. In summary, these results confirm that the measurement of occupational hardiness, as captured by OHS, is comparable for both males and females (Table 3), supporting H2.

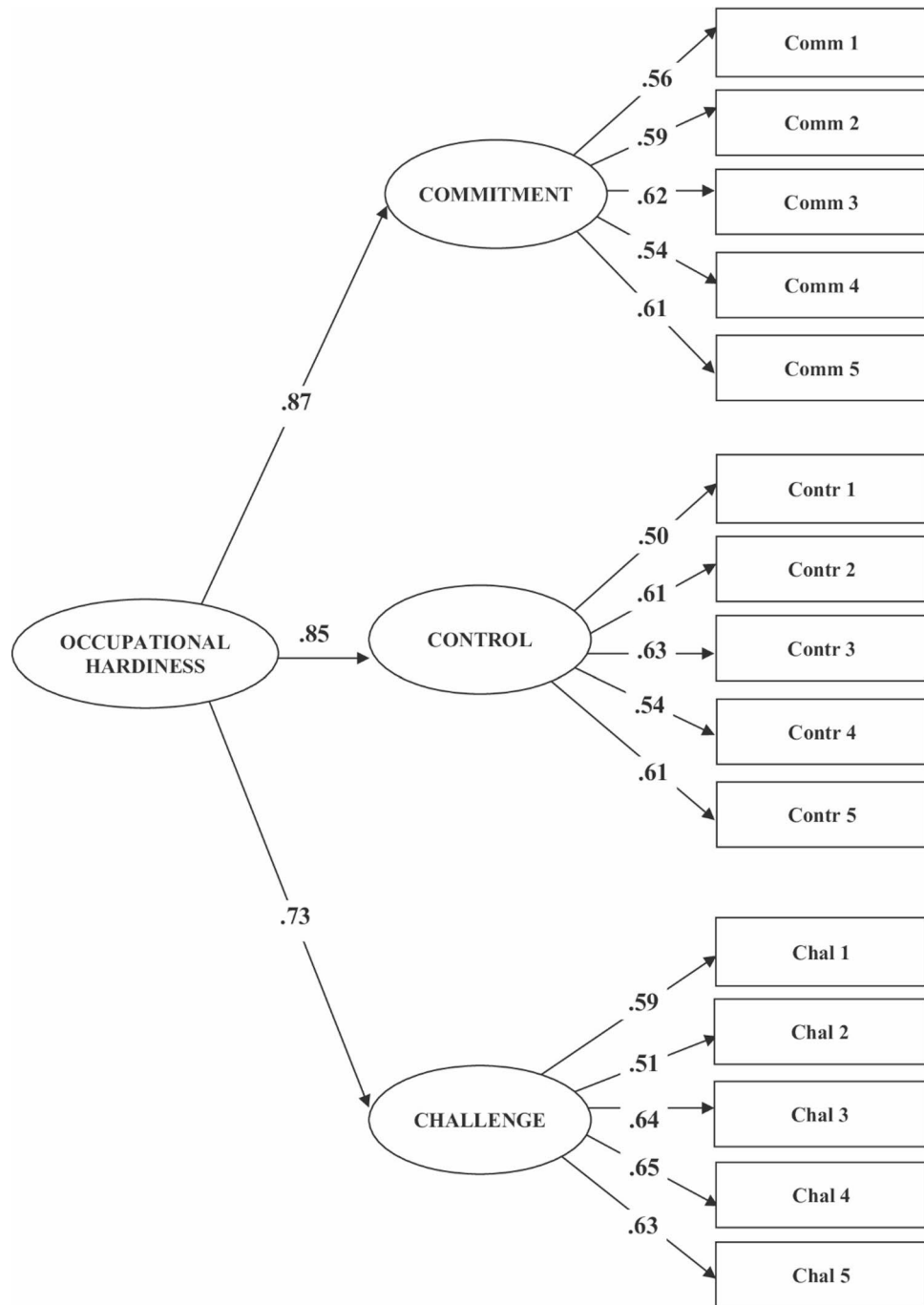


Fig. 1. Results of Confirmatory Factor Analysis for the second-order model.

	χ^2	df	p	CFI	TLI	RMSEA	SRMR	AIC	BIC
Configural invariance	515.938	174	<0.001	0.924	0.908	0.041 (0.037, 0.045)	0.468	647.938	651.763
Metric invariance	535.547	186	<0.001	0.922	0.912	0.040 (0.036, 0.044)	0.483	643.547	646.676
Scalar invariance	538.673	188	<0.001	0.922	0.913	0.040 (0.036, 0.044)	0.494	642.673	645.687
Strict invariance	539.768	189	<0.001	0.922	0.913	0.040 (0.036, 0.044)	0.495	641.768	644.723

Table 3. Multigroup invariance across genders (N=516).

	Min	Max	M	SD	ω	1	2	3	4	5
1. Commitment	1	4	3.17	0.48	0.74					
2. Control	1	4	3.28	0.47	0.73	0.54**				
3. Challenge	1	4	3.17	0.50	0.77	0.50**	0.46**			
4. Occupational Hardiness	1	4	3.18	0.40	0.84	0.83**	0.81**	0.81**		
5. Work engagement	0	6	4.42	1.09	0.88	0.49**	0.30**	0.34**	0.45**	
6. Emotional Exhaustion	0	6	2.53	1.60	0.87	-0.11**	-0.11**	-0.11**	-0.14**	-0.26**

Table 4. Means, standard deviation, internal consistency, range of the likert response scale (Min; Max) and bivariate correlations among the variables ($N = 845$). $\Omega =$ McDonald's Omega coefficient; ** $p < 0.001$.

Study 2 Method

Participants and procedure

In Study 2, we aimed to further investigate the construct validity of occupational hardiness by examining its association with work engagement and emotional exhaustion. Accordingly, we included all participants in Study 1 who had also completed the scales measuring work engagement and emotional exhaustion. In doing so, the sample of Study 2 consisted of 845 participants out of the total of 1152. Most of them were females (59.1%) and the mean age was 41.47 years ($SD = 10.51$, $min = 19$; $max = 67$). Most of the sample had permanent (93.2%) and full-time (87.3%) employment contracts. The average length of service in the current organization was 13.31 years ($SD = 9.4$). The average work week was 38.74 h ($SD = 6.76$).

Strategy of analysis

To test the relationship between occupational hardiness and the three subdimension, on the one hand, and work engagement and exhaustion, on the other hand, bivariate correlations were computed in Study 2. To this purpose, the strength of Pearson's r coefficients was named according to the thresholds proposed by Dancey and Reidy⁴⁴. Accordingly, coefficients between ± 0.01 and ± 0.03 suggest a weak correlation, a moderate correlation corresponds to values between ± 0.04 and ± 0.06 , and a strong correlation is suggested by coefficients between ± 0.07 and ± 0.09 .

Measures

Occupational Hardiness. Occupational hardiness was assessed using the Italian version of the OHS validated in Study 1, which includes three subscales of five items each: Commitment (e.g., "My own excitement is what makes me go ahead with the completion of my activity"), Challenge (e.g., "In my job I feel attracted to tasks and situations involving a personal challenge"), and Control (e.g., "I do everything I can to make sure I control the results of my work"). All items were rated on a four-point Likert scale ranging from 1 (*completely disagree*) to 4 (*completely agree*).

Work engagement was assessed through the nine-item version of the Utrecht Work Engagement Scale⁴⁵, which includes three subscales corresponding to the underlying dimensions: vigor, dedication, and absorption. All subscales contained three items: for example, "At my job, I feel strong and vigorous" (vigor); "I am proud of the work that I do" (dedication), and "I get carried away when I'm working" (absorption). All items were scored on a seven-point rating scale ranging from 0 (*never*) to 6 (*every day*).

Emotional exhaustion. Workers' level of burnout was assessed using the exhaustion subscale of the Maslach Burnout Inventory-General Survey (MBI-GS; Schaufeli et al.⁴⁶). The scale consisted of five items, for instance "I feel burned out from my work". Each item was scored on a seven-point frequency scale ranging from 0 (*never*) to 6 (*every day*).

Results

The results showed a moderately positive and significant association both between the overall index of Occupational Hardiness and engagement, and between the subdimensions and engagement, suggesting that individuals with a strong hardiness personality type are more present and involved in their work. Conversely, although with a weak Pearson value, the hardiness global index and the three dimensions were negatively and significantly associated with emotional exhaustion, suggesting that those with strong hardiness traits are less likely to experience emotional exhaustion (see Table 4). Therefore, H3 and H4 were supported.

Discussion

The current study significantly enriches the occupational hardiness literature by providing robust empirical evidence supporting the psychometric validity of the Italian version of the OHS. Ensuring the reliability and validity of instruments measuring hardiness across diverse cultures is essential¹². Building on Kobasa's pioneering work⁵ and subsequent research by Maddi and colleagues⁴⁷, Study 1 employed exploratory and confirmatory approaches, confirming the instrument's reliability and validity in capturing key hardiness subdimensions - commitment, control, and challenge - within the Italian cultural context. Our results affirm that the translated scale maintains reliability in assessing resilience and adaptive coping mechanisms within occupational hardiness, aligning with previous studies on the original scale. This underscores the cross-cultural applicability

of the Italian version, enhancing its credibility as a measurement tool and paving the way for further research on hardiness in the Italian occupational context.

Our results indicate that the proposed three-factor model, which includes a second-order latent factor, provided a significantly better fit compared to alternative models. This structure allows for the calculation of a global hardy personality index, as well as individual assessments of each contributing dimension. This suggests that there is a unified index of Occupational Hardiness with multiple facets and this approach aligns with the concept of a hierarchical personality model. Depending on the research question, it is possible to use either the global factor or the subdimensions.

In line with the growing emphasis on measuring invariance across gender groups, Study 2 underscores the importance of establishing gender invariance. This ensures the consistent measurement of occupational hardiness across both male and female respondents, strengthening the instrument's generalizability and utility. The finding supports the scale's consistent operation for individuals of different genders, enhancing its applicability in diverse populations and ensuring fair assessments within the context of occupational hardiness research. Study 2 elucidates the relationship between Hardy Personality and work engagement, revealing that perceiving job demands as challenges and opportunities for personal growth enhances motivation. Individuals with occupational hardiness exhibit a strong sense of values, goals, abilities, and attitudes, actively engaging in life activities with confidence. This suggests that hardiness serves as a personal resource, acting protectively for employees facing demanding situations and promoting adaptive behavior and intrinsic motivation for work engagement⁴⁸. Hardy individuals proactively seek possibilities to improve their environment, fulfilling needs and promoting intrinsic motivation and engagement. Simultaneously, Study 2 shows that Hardy Personality is negatively associated with emotional exhaustion. However, this correlation is relatively weak ($r = -0.14$), suggesting that although hardiness may contribute to buffering against burnout symptoms, its protective role in this area should be interpreted with caution. The lower correlation between hardiness and emotional exhaustion, compared to engagement, suggests that mediating variables related to a different interpretation of stressful stimuli, where hardiness plays a crucial role, contribute to symptom manifestation. The presence or absence of job resources—such as support, autonomy, and interpersonal relationships—can interact with coping strategies, including occupational hardiness, in shaping the interpretation of the situation and, consequently, the worker's experience of strain. Therefore, future research is needed to clarify the interplay of hardiness with other personal and contextual resources in mitigating emotional exhaustion. These findings have profound implications for interpreting occupational stress. They suggest that personal resources, such as hardiness, can affect the outcomes of job demands, although their impact is not consistent across all indicators of well-being. Rather than a linear process between stressors and strain, the results indicate a more complex interplay, where resources may play a variable role in shaping potential outcomes, probably also in relation to the particular organizational and social context in which workers operate.

Limitations

This study has limitations that warrant acknowledgment. Firstly, the participants are confined to specific work sectors, limiting the generalizability of findings. Expanding the scale's application to a broader range of occupational domains could enhance generalizability. Secondly, for a comprehensive exploration of measurement invariance, variables beyond gender—such as age, length of service, and organizational roles—could be incorporated. Thirdly, the cross-sectional design precludes causal inferences between hardiness and health outcomes. A more robust longitudinal approach, collecting health measures at subsequent time points, would enable better understanding of hardiness's predictive validity. Lastly, the study does not explore the convergent validity of hardiness. Future research could investigate the relationship between hardy personality and other constructs, including coping style, self-efficacy, and resilience.

Practical implications

Recognizing the crucial role of interventions to enhance occupational hardiness, especially in the post-pandemic era, it is imperative to provide researchers and practitioners with a highly valid and reliable measure of hardiness. Hardiness is a dynamic, multidimensional construct shaped by the interplay between individuals and their environment (e.g., Green et al.⁴⁹). This trait is open to development and adaptable through targeted training interventions^{27,47}. The measurement of occupational hardiness offers an opportunity to design training programs that equip individuals with personal resources to confront the challenges in today's professional landscape, where altering job demands is often unfeasible. Furthermore, supervisors and leaders can foster hardiness by granting employees greater control over their work environments. As a proactive measure, strengthening coping skills and emphasizing personal control, along with perceiving stressful situations as challenges to overcome and learn from, can help mitigate the risk of chronic stress, particularly in high-risk occupations such as the health sector. This strategic approach not only guards against burnout but also cultivates a mindset of resilience, which is essential for navigating the demands of contemporary workplaces.

In conclusion, the dynamic nature of hardiness underscores its potential as a transformative force, offering individuals the tools to not only endure but thrive in the face of adversity. Its adaptability and transferability through targeted interventions make hardiness a key component in fostering well-being and fortitude, especially in the challenging landscape of the post-pandemic world.

Data availability

The data that support the findings of this study are available on Open Science Framework (OSF) website at the following link: [https://osf.io/cegv7/?view_only=1cdd5ff1d22f44f28a10e8bee7ed3acc](https://osf.io/cegv7/?view_only=1cdd5ff1d22f44f28a10e8bee7ed3acc) (view-only link).

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Author contribution: Conceptualization, CP, GM, EL, DG and SS; methodology, CP, GM, DG and SS; software, GM, DG and SS; validation, CP, GM, EL, DG and SS; formal analysis, GM and SS; investigation, CP, GM, DG and SS; resources, CP, GM, DG and SS; data curation, GM, DG and SS; writing—original draft preparation, CP, GM, EL, DG and SS; writing—review and editing, CP, EL, DG; visualization, CP; supervision, CP, GM, and SS; project administration, CP All authors have read and agreed to the published version of the manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Informed consent Statement

The first page of the online questionnaire reported a Participant Information Sheet and Participation Consent form. The consent was provided by click-box method.

Additional information

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