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Assessing Work Addiction: Validity of the Italian Version of the Work Addiction Risk Test

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Abstract

Background: *Work addiction is a contemporary addiction affecting 8.3% to 22% of individuals in Europe, leading to detrimental effects on relationships, work-family balance, and overall well-being. Given its prevalence and impact, standardized assessment tools are crucial for distinguishing between work addiction and healthy work engagement.* **Methods:** *This study evaluated the psychometric properties of the Italian version of the Work Addiction Risk Test (WART). A convenience sample of 700 workers from Northeastern and Southern Italy completed the Italian version of the WART along with other well-being at work and personality measures.* **Results:** *Exploratory factor analysis revealed a five-factor structure of the WART, partially overlapping with the original version. Despite some weaknesses in the factor structure, the WART demonstrated satisfactory psychometric properties, including internal consistency and associations with organizational and personality correlates of work addiction.* **Conclusions:** *The Italian version of the WART is a reliable tool for assessing work addiction risk among Italian workers. This tool can aid in identifying individuals at risk and facilitating early intervention and support. Future research should focus on further validating the factor structure and exploring the utility of the WART in different cultural and occupational contexts.*

1. Introduction

Work addiction (WA) is one of the so-called new addictions, which raises particular concerns for public health due to its high prevalence, estimated to be between 8.3% [1] and 22% [2] in European countries. According to current definitions, WA manifests as an "obsessive, irresistible inner drive to work excessively hard" [3] (p. 219). The most evident behavioral symptom of work addiction is spending more time on work than necessary, according to explicit and implicit norms [4, 5]. Obsessive and ceaseless work-related thoughts represent a further distinctive component of WA, leading to compulsive working. Work addicts are characterized by uncontrollable concerns for work, feeling compelled to work hard even when they dislike it, and experiencing guilt when taking breaks [2].

Given that time is a limited resource, several studies have shown that WA has negative effects on marital relationships [6], family relationships, work-family balance [7], and life satisfaction [8]. WA also has negative effects on individuals' mental and physical health. Work addicts are at higher risk for

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depression, insomnia, and burnout [9], and report a higher prevalence of physical disorders, including metabolic syndrome [10] and increased systolic blood pressure [11], compared to non-addicts.

Regarding the etiology of WA, research has mainly focused on two risk factors: personality traits and organizational factors [4]. Specifically, personality characteristics oriented towards goal achievement, such as perfectionism and Type A personality, are strongly associated with WA [12]; higher-order dispositional variables such as conscientiousness, neuroticism, and narcissism are at higher risk of WA as well [13]. Individuals with high scores on perfectionism have difficulty delegating tasks to others at work [5] and generally set very high standards; as a result, they perceive their current performance as far from ideal and thereby invest more time and energy on work compared to non-perfectionists [12]. Type A personality is characterized by aggressiveness, competitiveness, ambition, impatience, and a persistent pursuit of personal goals, with an overall drive to work that goes beyond workplace or financial requirements [14]. Conscientious individuals are meticulous and take their obligations towards others seriously, being systematic and strongly committed to work, sometimes to an excessive or even compulsive extent [15]. Individuals with higher levels of neuroticism tend to be ineffective in their emotional regulation, feel insecure and anxious, and experience persistent concerns about both daily life management and work commitments [16]. Lastly, narcissistic individuals, with their typical self-importance and pursuit of power, may become obsessed with work success and spend excessive hours working at the expense of other life activities [17].

Regarding organizational factors, following the Job Demands-Resources model [18], empirical research has revealed that antecedents of WA include high demands, such as excessive workload and role conflicts, and lack of support from colleagues and managers [12]. Work addicts tend to overburden themselves and complicate their work unnecessarily, being reluctant to delegate and seek help [19]. Job satisfaction seems to be preserved in work addicts [4], whereas the impairment of work-family balance weakens their life satisfaction [8].

WA assessment and diagnosis are challenging because the most distinctive indicator of WA, namely working a lot, is usually socially desirable and common also among non-work addicts. Non-addicts may invest a lot of time in work for strategic purposes, such as seeking promotions or due to high engagement in their work [3]. However, unlike transient excessive work investment, work addiction leads to negative consequences with clinical relevance for mental health and well-being. Standardized assessment tools are essential for validly discriminating between work-addicted individuals and those healthily engaged in their work.

1.1. The Work Addiction Risk Test

The Work Addiction Risk Test (WART), developed by Robinson [20], is a widely used tool that assesses the diagnostic core symptoms of WA, such as a tendency towards perfectionism, feelings of guilt when not working, and impairment of personal relationships. The questionnaire consists of 25 items, with responses on a 4-point Likert scale (ranging from 1 = never true to 4 = always true). Traditionally, the WART is used as a unidimensional scale, with an overall WA risk score calculated by summing responses to all items, yielding a score between 25 and 100. Scores from 67 to 100 indicate a high risk of WA; scores from 57 to 66 indicate a moderate risk; and scores below 57 indicate negligible WA levels [20].

Several studies have demonstrated satisfactory psychometric properties for the WART. Reliability, as measured by Cronbach's alpha, ranges from 0.85 to 0.90 [2, 21], and test-retest reliability has been reported as r = 0.83 [22]. In terms of external validity, WART scores have been shown to correlate with lower psychological well-being [23], as well as higher work-related stress [2], anxiety disorders [20], and personality variables such as neuroticism, negative affectivity, narcissism, perfectionism, and Type A behaviors [12, 20]. In addition to the expected unidimensional structure, a five-factor structure of the WART has also been proposed, including Compulsive Tendencies, Control, Impaired communication/Self-absorption, Inability to delegate, and Self-worth [24]. However, the factors

of Inability to delegate and Self-worth were psychometrically weak, being loaded by only one and two items, respectively, and were not effective in distinguishing work addicts from a control group [24]. Furthermore, this five-factor structure has not been replicated in subsequent studies [2, 17, 25, 26], raising questions about the utility of subscale scores compared to an overall score [13].

Despite the instability of its multi-dimensional factor structure, the WART remains a widely used tool for assessing WA, mainly due to its ease of application and scoring. This enables a proper WA risk assessment by considering both the dysfunctional components related to addiction (Compulsive Tendencies and Impairment of social and work functioning) and personality dimensions associated with WA, such as control and self-esteem [2]. Although an Italian version of the WART has been used in work settings [27, 28], it has not been validated systematically. Moreover, other translations in the grey literature lack adherence to established translation and cultural adaptation guidelines, such as professional translation and back-translation procedures. To address these limitations and provide a reliable tool for scholars and professionals, this study aims to validate a newly translated Italian version of the WART using a large sample of Italian workers.

2. Methods

2.1. Participants

A total of 700 adult workers, recruited as a convenience sample, participated in the study, with 264 participants from Northeastern Italy and 436 (62.3%) from Southern Italy. Table 1 provides an overview of the main descriptive characteristics of the sample, showing a balanced distribution in terms of gender, demographic, and occupational variables. The significant gender differences were in terms of working hours, with a higher rate of part-time employment among females, and type of employment, with a higher rate of self-employment among males. Additionally, 66 participants (34 men) completed the WART and other instruments for a second time 8 ± 1 weeks after the initial completion. When respondents from Northeastern and Southern Italy were compared based on their socio-demographic characteristics, the results indicated that they were statistically comparable in terms of gender, age, qualification, type of contract, type of employment, and working hours. Respondents from Southern Italy reported a higher prevalence of shift work compared to those from Northeastern Italy ($p < 0.001$).

2.2. Procedures and Measures

Participation was voluntary, and a snowball sampling procedure was employed. From November 2018 to May 2019, University students were invited to administer the paper-and-pencil questionnaire to two male and two female workers of different ages and occupations. These respondents, in turn, could suggest additional voluntary participants. Eligibility criteria required participants to be 18 years old, fluent in Italian, and currently employed. Participants were informed about the purpose of data collection and data treatment and were assured of complete data anonymity and confidentiality. By returning the questionnaire, participants indicated their informed consent. The completed questionnaires were returned in sealed envelopes, which were collected by two co-authors who then prepared the raw data set.

In addition to demographic and work-related information, all participants completed the WART. To minimize questionnaire length and reduce respondent fatigue, thus limiting missing data, improving response rates, and enhancing the reliability of answers, different subsamples were invited to further report on one or more of the other instruments described below. The 25 items of the WART were translated and back-translated from the original English version. After resolving any discrepancies in meaning, the final version reported in Supplementary Material (Table S1) was developed. This study was reported following the STROBE guidelines to ensure comprehensive and transparent reporting.

2.2.1. Well-Being at Work Measures

Maslach Burnout Inventory (MBI). This self-report questionnaire comprises 22 items rated on a 6-point Likert scale (1 = never, 6 = always) and

Table 1. Descriptive characteristics of the study sample.

		Full sample	Men	Women	Statistical Test (df)
N		700	338	361	
Age ± SD		43.05±13.97	43.13±14.77	43.00±13.20	0.21 $_{(1, 696)}$
Geographical area	North-Est	264	134	130	0.98 $_{(1)}$
	South	435	204	231	
Qualification	Vocational school or lower	93	50	43	
	High school	246	121	125	
	Bachelor's degree (1st level)	104	41	63	
	Master's degree or single-cycle degree (2nd level)	150	74	76	
	Postgraduate degrees	48	19	29	
Type of contract	Fixed term	223	106	117	0.05 $_{(1)}$
	Permanent	471	228	243	
Working hours	Full-time	563	294	269	17.31* $_{(1)}$
	Part-time	136	44	92	
Shift work	Yes	290	129	161	2.98 $_{(1)}$
	No	409	209	200	
Type of employment	Employee / Subordinate	524	227	294	21.92* $_{(1)}$
	Self-employed	174	111	63	
Work seniority	0-1	79	33	46	19.43 $_{(5)}$
	2-5	123	63	60	
	6-10	76	41	35	
	11-20	109	43	66	
	21-30	132	52	80	
	30 or more	176	105	71	

Note. F-test for comparison between men and women for age, χ2 for the remaining qualitative variables.
** $p \leq 0.001$*

assesses burnout along three dimensions according to Maslach's theory [29]: Emotional Exhaustion, Depersonalization, and reduced Personal Accomplishment. In this study, 160 participants completed this instrument. Cronbach's alpha coefficients were 0.87 for the Emotional Exhaustion scale, 0.77 for the reduced Personal Accomplishment scale, and 0.53 for the Depersonalization scale, which was not considered in subsequent analyses due to its low internal consistency. Participants who completed the MBI were generally older ($p < 0.001$) and showed a higher prevalence of female gender, full-time contracts, and permanent work contracts ($p < 0.001$) compared to the remaining sample. However, the effect sizes for these differences were marginal (i.e., Pearson's r and Cramer's V < 0.16).

Health and Safety Executive Management Standards Indicator Tool (HSE-MS IT) evaluates exposure to seven organizational stressors: Demands, Control, Roles, Relationships, Managers'

support, Peer Support, and Change. Responses are reported on a 5-point Likert scale (1 = never, 5 = always) [30]. Higher scores indicate effective management of these areas, while lower scores signify inadequate management, which exposes workers to the risk of work-related stress. In this study, four additional organizational stressors were included [30]: Physical work environment (3 items, e.g., "The climate control in the environment is comfortable"), Workload distribution (3 items, e.g., "The amount of work is evenly distributed among all my colleagues"), Relationship with users/clients (6 items, e.g., "Users behave inappropriately or incomprehensibly in their requests"), and Tools (2 items, e.g., "Work tools are adequate for their frequency of use"). This extended version of the HSE-MS IT was administered to 238 participants. Cronbach's alpha coefficients ranged from 0.57 (Workload distribution) to 0.91 (Managers' support). Respondents who completed the HSE-MS IT reported a slightly higher prevalence of permanent job contracts ($p = 0.008$) compared to those who did not complete this instrument.

Perceived Occupational Stress Scale (POS). This 4-item scale measures the perception of stress at work on a 5-point Likert scale (1 = not at all, 5 = very much) [31]. It complements scales measuring exposure to stressors at work, as, according to the transactional stress model, the relationship between stressors and strain is mediated by the perception of being stressed [32]. The POS scale was completed by 632 participants. Cronbach's alpha coefficient was 0.83. No differences ($p \leq 0.01$) were found in the sample composition between those who completed the POS and those who did not.

2.2.2. Personality and Personal Well-Being Measures

Satisfaction with Life Scale (SWLS). Proposed by Diener and colleagues [33], this five-item scale assesses subjective well-being in terms of overall life satisfaction, with responses measured on a five-point Likert scale (1 = not at all, 5 = very much). In the present study, 572 participants completed this scale. Cronbach's alpha coefficient was 0.78. No differences ($p \leq 0.01$) were found in the sample composition between those who completed the SWLS and those who did not.

Rosenberg Self-esteem Scale (RSES). Developed by Rosenberg [34], this 10-item self-report scale is widely used in research to assess global self-esteem in terms of self-satisfaction and self-acceptance. In this study, 161 participants completed this scale. The Cronbach's alpha coefficient was 0.79. Respondents who completed the HEXACO-PI generally reported a higher percentage of full-time employment and permanent job contracts than the remaining participants ($p < 0.001$, Cramer's $V < 0.20$).

HEXACO Personality Inventory. In its abbreviated form, the instrument consists of 60 items, 10 for each of the following personality dimensions evaluated according to the model developed by Ashton and Lee [35]: Honesty-Humility (sincerity, loyalty, and modesty), Emotionality (emotional fragility, sentimentality, and dependence on others), Extroversion (self-esteem, sociability, and social boldness), Agreeableness (kindness, helpfulness, and patience), Conscientiousness (organization, prudence, orderliness), and Openness to Experience (creativity, unconventionality, curiosity). Responses are provided on a 5-point Likert scale (1 = completely disagree, 5 = completely agree). In the present study, 343 participants completed the self-report questionnaire. Cronbach's alpha levels range from 0.66 (Honesty-Humility) to 0.73 (Conscientiousness). Respondents who completed the HEXACO-PI generally reported a higher percentage of full-time jobs and permanent job contracts compared to the other participants ($p < 0.001$, Cramer's $V < 0.20$).

Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS). Developed by Zung [36, 37], these two diagnostic screening tools each consist of 20 items that assess symptomatic markers of anxiety and depression, respectively. Responses are provided on a 4-point scale (1 = rarely, 4 = very often). Participants (N = 124) reported their prevailing emotional states over the last three months. Cronbach's alpha levels were 0.79 for SAS and 0.76 for SDS in the present sample. No differences ($p \leq 0.01$) were found in the sample composition between those who completed the SAS and SDS and those who did not.

Short Dark Triad (SD3). Developed by Jones and Paulhus as part of the dark triad personality model [38], this self-report instrument consists of 27 items,

with nine items for each of the three scales: Machiavellianism, Narcissism, and Psychopathy. The SD3 questionnaire was administered to a subsample of respondents (N = 124), consistent with recent studies that show a relationship between the dark triad personality traits and addictive behaviors [39], as well as counterproductive behaviors in the workplace [40]. For the present dataset, Cronbach's alphas ranged from 0.62 (Narcissism) to 0.74 (Machiavellianism). No significant differences ($p \leq 0.01$) were found in the sample composition between those who completed the SD3 and those who did not.

2.3. Statistical Analyses

A priori power analysis indicated that a sample size of 150 would be sufficient to detect true correlations ≥ 0.25 (alpha = 0.05, beta = 0.80), reflecting modest concurrent associations between WART and external criteria. We established a minimum sample size ten times larger than the number of WART items. To ensure rigorous testing of the structural invariance of the WART items, we doubled the sample size. Data were not inspected before the overall data collection was concluded.

The factor structure of the WART was examined using exploratory factor analysis (minimum residuals method, Varimax rotation) and multigroup confirmatory factor analysis to assess measurement invariance across different participant groups. The Root Mean Square Error of Approximation (RMSEA) and Tucker-Lewis Index (TLI) served as quantitative fit indices of the factor structure, with $0.05 < RMSEA \leq 0.08$ representing an acceptable fit, $RMSEA \leq 0.05$ indicating an excellent fit, and $TLI \geq 0.90$ indicating a satisfactory fit.

Pearson correlation analysis, regression analysis, and factor analysis were conducted to explore the external validity of the overall WART scores. Additionally, factor scores of the WART subcomponents or facets and the scale scores of the external correlates were analyzed. Reliability was assessed using Cronbach's alpha for internal consistency and Pearson correlation for test-retest reliability. Differences between participant groups were examined using t-tests and analysis of variance (ANOVA). Listwise deletion of cases was applied.

All statistical analyses have been conducted using IBM SPSS Statistics 23 and IBM AMOS 23 (IBM Corporation, USA).

3. Results

3.1. Factor Structure of the WART

Preliminary inspection showed that the missing values for the WART items (< 0.01%) occurred randomly. Little's MCAR test was statistically non-significant, confirming that the missing values were missing completely at random.

An exploratory factor analysis was conducted to identify the sub-components of the WART. Parallel analysis suggested seven factors, but two were hyper-specific, each loaded by only two items. The same limitation was observed with the six-factor solution. Therefore, a five-factor solution was explored and favored over other solutions due to its clear interpretability and satisfactory fit index values: RMSEA = 0.04 (90% CI 0.033-0.044) and TLI = 0.89. Solutions with a lower number of factors, ranging from a single general factor to four varimax-rotated dimensions, yielded adequate but less robust RMSEA fit indices ($0.05 \leq RMSEA \leq 0.07$) and inadequate TLI indices ($0.68 \leq TLI \leq 0.85$), with significant model fit change indices ($\Delta\chi^2_{(90)} > 135$, $p \leq 0.001$) demonstrating they were weaker solutions compared to the five-factor solution. The five-factor solution (after varimax rotation, reported in Supplementary Material Table S2) accounts for 30.3% of the total variance. It presents the following factors: 1) Compulsive Tendencies (accounting for 8.4% of the total variance), loaded by items reflecting an intense need to work and a low tolerance for mistakes; 2) Impatience (5.9% of the total variance), with items expressing a need to accomplish tasks quickly and low tolerance for interferences or obstacles; 3) Internal Drive/Urging (5.8% of the total variance) collecting statements indicating a constant tension towards future outcomes; 4) Egocentrism (5.5% of the total variance) reflecting how individuals prioritize work over social relationships; 5) Overworking (4.7% of the total variance) representing individuals who simultaneously engage in multiple projects and endure burdensome workloads.

Table 2. Fit indices and model comparisons for invariance based on gender, geographic origin, and shift work.

Model	$\chi 2$(gdl)	RMSEA	TLI
Invariance by gender (M *vs*. F)			
1. Structural invariance	857.95 (504)	0.03	0.86
2. Metric invariance	884.38 (528)	0.03	0.87
Difference 2 vs. 1	26.43 (24), P = 0.33		
3. Scalar invariance	905.63 (543)	0.03	0.87
Difference 3 vs. 2	47.68 (39), P = 0.16		
Invariance by geographic areas			
1. Structural invariance	916.15 (504)	0.03	0.84
2. Metric invariance	949.44 (528)	0.03	0.84
Difference 2 vs. 1	33.29 (24), P = 0.10		
3. Scalar invariance	968.90 (543)	0.03	0.85
Difference 3 vs. 2	52.75 (39), P = 0.07		
Invariance by shift work (yes *vs*. no)			
1. Structural invariance	899.71 (504)	0.03	0.85
2. Metric invariance	922.48 (528)	0.03	0.85
Difference 2 vs. 1	22.78 (24), P = 0.53		
3. Scalar invariance	933.95 (543)	0.03	0.86
Difference 3 vs. 2	34.24 (39), P = 0.69		

Additionally, we assessed the invariance of the WART across gender, geographic area (Northeastern vs. Southern Italy), and the presence/absence of shift work. Table 2 presents fit indices for the different main invariance models (structural, metric, and scalar invariances) we tested. The fit indices were statistically comparable, with $\Delta\chi^2$ indicating no significant differences between structural/metric or metric/invariance models. Therefore, the factorial structure of the WART is robust across gender, geographic areas, and the presence/absence of shift work.

3.1.1. External Concurrent Correlates of the WART.

No substantial associations were found between demographic and descriptive variables of work conditions and the overall WART scores. Regarding its facet scales, Egocentrism scores were higher in older individuals ($r = 0.15$, $p \leq 0.001$), in respondents working fixed hours (vs. shift work, $t_{(678)} = -3.65$, Cohen's $d = -0.30$) and with full-time jobs (vs. part-time jobs, $t_{(679)} = 3.87$, Cohen's $d = 0.38$). Moreover, self-employed workers scored higher on the Internal drive/Urging component than employees ($t_{(678)} = 3.52$, Cohen's $d = 0.31$).

Table 3 presents simple correlations between the overall WART and facet scores and the study variables assessing work-related risk and personality. Higher levels of the overall WART correlated with higher perceived stress at work (POS), higher Emotional Exhaustion and lower Personal Accomplishment (MBI), and higher risk in the organizational areas of Demand, Peer Support, Relationships with colleagues, and Relationships with users/customers. Perceived stress at work and the Demand risk factor were associated with each WART facet.

Regarding individual personality differences, respondents with higher overall WART scores reported lower self-esteem (RSES) and life satisfaction (SWLS), as well as increased levels of anxiety (SAS) and depression (SDS). They exhibited higher withdrawal and hostility in interpersonal relationships, evidenced by lower HEXACO Extroversion

Table 3. Observed simple correlations between WART (overall score and factor scores at facet level) and work context and personality variables.

Study variables (number of participants in brackets)	WART facets					WART Overall score
	Compulsive Tendencies	Impatience	Internal drive/Urging	Egocentrism	Over-working	
Age (680)	-.05	-.01	-.12*	.15**	.05	-.02
Work context variables						
MBI EE (160)	.18 (.19)	.24* (.24*)	.01 (.05)	.19 (-.17)	.00 (-.03)	.21* (.21*)
MBI PA (159)	-.12 (-.12)	-.22* (-.22*)	-.31** (-.28**)	-.17 (-.20)	.18 (.15)	-.24* (-.24*)
POS (621)	.17** (.21*)	.19** (.20**)	.20** (.23**)	.26** (.23*)	.13** (.11**)	.34** (-.36**)
HSE D (235)	-.17* (-.18)	-.24** (-.26**)	-.24** (-.22**)	-.32** (-.28**)	-.28** (-.26**)	-.44** (-.43**)
HSE C (236)	-.05 (-.05)	.08 (.04)	-.02 (-.01)	-.08 (-.11)	.07 (.09)	.01 (-.01)
HSE PS (235)	-.03 (-.03)	-.21** (-.20*)	-.15 (-.15)	-.18* (-.18)	.10 (.10)	-.18* (-.17*)
HSE MS (231)	-.05 (-.05)	-.18* (-.18)	-.02 (-.03)	-.16 (-.16)	.11 (.11)	-.11 (-.12)
HSE RE(236)	-.17* (-.20*)	-.13 (-.17*)	-.16 (-.15)	-.28** (-.23**)	-.09 (-.06)	-.30** (-.29**)
HSE RO(236)	-.03 (-.04)	.08 (.03)	-.27** (-.23*)	.01 (-.02)	.22** (.21**)	-.02 (-.02)
HSE CH(232)	-.07 (-.07)	-.08 (-.09)	-.15 (-.15)	-.13 (-.13)	.06 (.06)	-.13 (-.14)
HSE PWE (236)	-.04 (-.06)	-.02 (-.07)	-.09 (-.06)	-.16 (-.11)	.06 (.07)	-.09 (-.07)
HSE UC (237)	-.14 (-.15)	-.17* (-.21*)	-.13 (.12)	-.13 (-.09)	-.06 (-.04)	-.23** (-.22**)
HSE WD (235)	.03 (.02)	-.06 (-.08)	-.13 (-.12)	-.20* (-.16)	-.13 (-.10)	-.17* (-.16)
HSE T (234)	-.06 (-.07)	-.01 (-.05)	-.16 (-.14)	-.03 (.02)	.07 (.10)	-.08 (-.06)
Personality variables						
HEXACO-PI H (335)	-.10 (-.09)	-.22** (-.22**)	-.33** (-.31**)	-.03 (-.03)	.05 (.02)	-.25** (-.24**)
HEXACO-PI E (334)	.29** (.32**)	.07 (.10)	.06 (.11)	-.11 (-.04)	.12 (.06)	.16* (.21**)
HEXACO-PI X (335)	-.17* (-.15)	-.12 (-.12)	-.22** (-.21**)	-.36** (-.34**)	.16* (.14)	-.25** (-.24**)
HEXACO-PI A (333)	-.31** (-.30**)	-.33** (-.31**)	-.07 (-.04)	-.09 (-.08)	-.02 (-.04)	-.29** (-.28**)
HEXACO-PI C (335)	-.12 (-.12)	-.02 (-.05)	-.43** (-.42**)	-.03 (-.06)	.19** (.18**)	-.17* (-.17*)
HEXACO-PI O (334)	-.01 (-.01)	-.07 (-.06)	-.09 (-.08)	-.02 (-.01)	.18** (.17*)	-.02 (-.01)
RSES (158)	-.34** (-.31**)	-.05 (-.08)	-.39** (-.36**)	.03 (-.06)	.11 (.10)	-.30** (-.32**)
SWLS (554)	-.21** (-.20*)	-.10 (.11)	-.22** (-.21**)	-.21** (-.24**)	.00 (.00)	-.28** (-.28**)
SAS (124)	.37** (.34**)	.26* (.27**)	.26* (.29**)	.05 (.06)	.14 (.15)	.47** (.47**)
SDS (124)	.37** (.34**)	.12 (.14)	.25* (.31**)	.09 (.10)	-.06 (-.07)	.36** (.36**)
SD3-M (124)	.24* (.25**)	.27* (.27**)	.27* (.19)	.18 (.21)	-.02 (.05)	.41** (.41**)
SD3-N (124)	.12 (.14)	.26* (.26**)	.06 (-.02)	-.02 (.00)	.12 (.18)	.23* (.23)
SD3-P (124)	.07 (.10)	.28* (.28**)	.32** (.25*)	-.03 (-.02)	.09 (.14)	.32** (.32**)

Note. The sample size varies: N = 680 for age; N = 160 for MBI; N = 621 for POS; N = 231-237 for HSE; N = 333-335 for HEXACO; N = 158 for RSE; N = 554 for SWLS; N = 124 for SAS, SDS, SD3. Semi-partial correlations are presented in parentheses, after controlling for differences in gender, age, type of contract, and working hours.

*Legend: MBI EE = Emotional exhaustion, PA = Personal Accomplishment; POS = Perceived Occupational Stress; HSE D = Demand, C = Control, PS = Peer Support, MS = Managers' Support, RE = Relationships, RO = Role, CH = Change, PWE = Physical Work Environment, UC = Users/Clients, WD = Workload Distribution, T = Tools; HEXACO H = Honesty- Humility, E = Emotionality, X = Extroversion, A = Agreeableness, C = Conscientiousness, O = Openness to Experience; RSES = Rosenberg Self-esteem Scale; SWLS = Satisfaction with Life Scale; SAS = Self-rating Anxiety Scale; SDS = Self- rating Depression Scale; SD3 M = Machiavellism, N = Narcissism, P = Psychopathy. * $p \leq 0.01$ ** $p \leq 0.001$.*

and Agreeableness scores. Additionally, they scored significantly higher in areas indicating a tendency to view others as tools to achieve their goals at any cost, reflected in elevated scores on SD3 Machiavellianism, Narcissism, and Psychopathy, coupled with lower scores on HEXACO Honesty and Humility.

The associations between the WART and personality and work context variables were investigated using multiple regression analysis (critical p value equal to 0.001) and factor analysis. Firstly, the HEXACO-PI dimensions, along with SWLS, were entered as independent variables, controlling for working fixed hours vs. shift, which was the only significant estimator (β = -0.17, $p \leq 0.001$) among the demographic and work condition variables in this study (n = 332). The results showed that higher overall WART scores are uniquely associated with lower scores in HEXACO Agreeableness (β = -0.21, $p \leq 0.001$) and Honesty-Humility (β = 0.21, $p \leq 0.001$) and life satisfaction (β = -0.18, $p \leq 0.001$). These four estimators account for 18% of the total WART variance ($R^2_{ADJ} = 0.18$, $p \leq 0.001$). When examining how SAS Anxiety, SDS Depression, and SD3 scales predicted overall WART scores (n = 124), the results reveal that individuals at higher risk of work addiction also report higher levels of anxiety (β = 0.44, $P \leq 0.001$) and SD3 Machiavellianism (β = 0.38, $P \leq 0.001$), accounting for $R^2_{ADJ} = 0.35$ ($P \leq 0.001$). No demographic and work condition variables accounted for additional variance. Among the work context variables (i.e., POS, HSE, and MBI), regression analysis showed that individual differences in work addiction are associated with job stress (POS, β = 0.48, $P \leq 0.001$, n = 157) and working fixed hours vs. shift (β = -0.24, $P \leq 0.001$), with a $R^2_{ADJ} = 0.27$ ($P \leq 0.001$). Since the respondents varied across the instruments, we also examined the associations between WART scores and predictors, controlling for differences in gender, age, type of contract, and working hours. The results in Table 3 (semi-partial correlations) show that the associations remained substantially invariant.

Regarding factor analysis, factor scores for the five sub-components of the WART were simultaneously entered along with personality variables and, separately, work environment variables. Table 4 presents results from factor analyses (principal axis method), using the Kaiser criterion to determine the number of factors to extract and rotate (Varimax). When the WART facets were factor analyzed together with the MBI, HSE and POS scales, the eigenvalues indicated a 4- factor solution (56.8% of accounted variance). The results showed that the WART components of Impatience, Egocentrism, Compulsive Tendencies, and Internal drive/Urging (Factor 3) are primarily associated with work conditions characterized by higher perceived work-related stress (POS) and emotional exhaustion (MBI), and lower relationships with colleagues and users/clients (HSE), and personal achievement (MBI). Conversely, the WART facet of Over-working (Factor 4) is associated with lower personal achievement (MBI) and higher perceived role (HSE).

When the WART facets were factor analyzed along with personality variables, 4 factors emerged (56.3% of explained variance). The results suggest that WART Internal drive/Urging is more prevalent among less organized and conscientious individuals (Factor 1); WART Impatience and Compulsive Tendencies are especially reported by less cooperative, honest, and modest workers (Factor 2).

WART Egocentrism is generally reported by introverted individuals and those less satisfied with their lives (Factor 3). Higher WART Over-working and Compulsive Tendencies are generally associated with higher emotionality and openness to experience (Factor 4).

3.2. Descriptive Statistics and Reliability Coefficients

The mean values of the WART and its five facets were compared across geographical area, gender, shift work, type of contract (permanent vs. fixed term), and working hours (part-time vs. full-time). ANOVA revealed marginal differences (effect sizes $\eta^2 \leq 0.02$) when subgroup differences were statistically significant ($p \leq 0.001$). Regarding geographical area, a significant difference emerged for the WART Internal Drive/Urging facet, with higher mean values in Southern Italy (M = 11.8) compared to Northeastern Italy (M = 11.2, $F_{(1,694)} = 7.34$, $\eta^2 = 0.01$). Full-time workers reported higher mean levels for WART Egocentrism (M = 6.16 vs. M = 5.58 for

Table 4. Factorial solutions including WART sub-components and personality and work context variables.

	Factor 1	Factor 2	Factor 3	Factor 4
		Work context variables		
HSE PS	**0.77**	0.14	-0.08	0.19
HSE MS	**0.66**	0.17	-0.07	0.17
HSE C	**0.55**	0.23	0.03	0.16
HSE CH	**0.50**	**0.38**	-0.03	**0.31**
HSE RE	**0.50**	0.26	**-0.37**	-0.16
HSE PWE	0.19	**0.75**	-0.04	0.19
HSE T	**0.33**	**0.71**	0.11	0.16
HSE WD	**0.46**	**0.50**	-0.16	-0.08
MBI EE	-0.21	**-0.48**	**0.47**	-0.01
HSE UC	0.23	**0.43**	**-0.36**	-0.10
POS	-0.24	**-0.42**	**0.73**	0.25
WART I	-0.05	-0.03	**0.48**	0.00
WART E	-0.01	-0.04	**0.47**	0.03
WART TC	0.01	0.05	**0.45**	-0.11
WART SI	-0.02	0.02	**0.33**	-0.32
HSE RO	**0.36**	0.21	0.00	**0.66**
MBI PA	0.09	0.21	**-0.35**	**0.51**
WART OW	0.12	-0.05	0.22	**0.43**
		Personality variables		
HEXACO-PI C	**0.75**	-0.02	-0.09	-0.01
WART ID	**-0.50**	-0.16	0.23	0.11
HEXACO-PI A	0.00	**0.64**	-0.10	-0.02
WART I	-0.03	**-0.49**	0.12	0.16
HEXACO-PI H	**0.34**	**0.46**	-0.03	0.18
WART E	0.03	-0.05	**0.81**	0.00
HEXACO-PI X	**0.37**	0.19	**-0.45**	0.09
SWLS	0.19	0.15	**-0.36**	-0.13
HEXACO-PI E	-0.10	-0.05	-0.07	**0.51**
WART CT	-0.13	**-0.41**	0.21	**0.46**
HEXACO-PI O	0.29	0.22	0.01	**0.34**
WART OW	0.25	-0.06	0.12	**0.32**

Note. For the WART components, factorial scores calculated based on the solution presented in Table 2 are included in the factorial analysis. For work-related risk variables, N = 157; for personality variables, N = 330.
Legend: MBI EE = Emotional exhaustion, PA = Personal Accomplishment; POS = Perceived Occupational Stress; HSE D = Demand, C = Control, PS = Peer Support, MS = Managers' Support, RE = Relationships, RO = Role, CH = Change, PWE = Physical Work Environment, UC = Users/Clients, WD = Workload Distribution, T = Tools; HEXACO H = Honesty-Humility, E = Emotionality, X = Extroversion, A = Agreeableness, C = Conscientiousness, O = Openness to Experience; WART I = Impatience, E = Egocentrism, CT = Compulsive Tendencies, ID = Internal drive/Urging, OW = Over-working.

part-time workers, $F_{(1,695)} = 7.74$, $\eta^2 = 0.01$) and WART Over-working (M = 11.32 vs. M = 10.67 for part-time workers, $F_{(1,692)} = 10.12$, $\eta^2 = 0.01$). No differences emerged based on working fixed hours vs. shift work or on permanent vs. fixed-term contracts. Women reported higher levels of both Egocentrism (M =6.38 vs. M = 5.74 for men, $F_{(1,694)} = 15.15$, $\eta^2 = 0.02$) and Internal drive/Urging (M = 12.00 vs. M = 11.30 for men, $F_{(1,692)} = 7.39$, $\eta^2 = 0.01$). Although the differences are negligible, Table 5 presents the descriptive values and the corresponding points for potentially critical levels for the total WART and subscales, separately for men and women. Conversion tables from raw scores to T scores can be requested from the authors.

Table 5 also presents reliability levels as internal consistency (Cronbach's alpha, overall sample) and as test-retest reliability, observed from a subset of participants (n = 66) who completed the WART again 8 ± 1 weeks after the initial administration. The values indicate adequate internal consistency for the overall WART ($\alpha = 0.83$) and weaker internal consistency for the facets, ranging from $\alpha = 0.45$ for WART Over-working to $\alpha = 0.74$ for WART Compulsive Tendencies, each scale comprising 3 to 7 items only. Test-retest reliability is high for both the overall WART ($r = 0.79$) and its facets ($r = 0.67$ for WART Egocentrism to $r = 0.89$ for WART Compulsive Tendencies).

A final analysis was conducted on the test-retest data. In addition to the WART, participants also completed the RSES, SWLS, and POS scales at retest. Cross-lagged regression analysis showed that initial levels of work-related stress (POS) do not predict changes in WA risk levels a few weeks later when controlling for initial levels of addiction. However, changes in the two variables are correlated, with a partial correlation of $pr = 0.71$ ($p \leq 0.01$) between POS and WART at the second measurement occasion when controlling for initial levels of both scales. This indicates that increases in work-related stress are associated with increases in WA risk levels.

4. Discussion

The present research aims to test the psychometric properties of the Work Addiction Risk Test, one of the most widely used tools for assessing work addiction in both applied and research settings. Exploratory factor analysis revealed a five-factor structure consistent with the theoretical components of the higher-order work addiction construct, although it only partially aligns with those originally reported by Flowers and Robinson [24]. Nevertheless, the WART was initially developed as a unidimensional measurement tool and is generally utilized as such, while a set of WART subscales was identified later, but their adequacy and clinical utility remain subjects of debate. Indeed, numerous studies have failed to replicate the original multidimensional structure [2, 17, 25, 26], which is somewhat weak, including a factor with just two items, a factor with a single item, and an item that did not load on any factor. Apart from potential cultural and linguistic differences, a possible reason for the instability in the WART's factor structure is that several studies, including the original by Flowers and Robinson [24], collected data from samples with large percentages of students to psychometrically investigate a construct that, by definition, applies only to individuals predominantly engaged in work activities. In the current study, we involved only adult workers and successfully tested the structural invariance of the WART across gender, geographical area, and working shifts or fixed hours. In addition to the current assessment of structural validity, several additional psychometric properties of the WART were found to be more than adequate. These include internal consistency and test-retest reliability for the overall WART scores. Moreover, the WART scores at higher-order and middle-order (facet) levels showed meaningful associations with external organizational and personality-related criteria, which we investigated as theoretically relevant for work addiction risk [2, 10, 12, 13, 20, 22]. Consistent with previous studies on work addiction, assessed using the WART [23] or other instruments [1], we found no significant differences across gender or work conditions (type of contract, working hours, and presence of shifts).

While the overall WART score demonstrated stronger correlations with related criteria than the subscales, which exhibited weaker associations, both the total score and the subscales ought to be

Table 5. Descriptive statistics, percentile ranks, and reliability for WART (overall and facets).

				Men				Women			
	Reliability				Percentiles				Pecentiles		
	Alpha (n)	**Test-retest**	**Range**	**Mean (SD)**	**85**	**90**	**95**	**Mean (SD)**	**85**	**90**	**95**
WART Overall	0.83 (25)	0.79	25-100	58.14 (10.87)	69	72	76	57.02 (9.92)	66	68	73
Compulsive Tendencies	0.74 (7)	0.89	7-28	15.78 (4.25)		21	23	16.00 (4.15)	20	21	24
Impatience	0.62 (5)	0.72	5-20	12.91 (3.19)		17	18	12.55 (2.84)		16	17
Internal Drive /Urging	0.60 (6)	0.87	6 - 24	11.97 (3.38)		16	18	11.31 (2.98)		15	17
Egocentrism	0.62 (3)	0.67	3-12	6.38 (2.22)	9		10	5.74 (2.13)	8	9	10
Over-working	0.45 (4)	0.83	4-16	11.05 (2.18)		14	15	11.33 (2.14)		14	15

Note. (n) Number of items; N = 66 for test-retest; PR = percentile rank (reported for the subscales where possible); N= 327-337 for men, N = 335 – 361 for women.

considered. The total score provides a comprehensive measure of the severity of work addiction risk, while the subscales can reveal the specific components underlying work addiction. For instance, two individuals with the same overall score might show distinct profiles when their subscales are analyzed: one might score higher in Overwork and Urging, while another could score higher in Egocentrism and Compulsive tendencies, highlighting entirely different types of issues. Therefore, examining the subscales alongside the total score is valuable for obtaining a more detailed understanding of work addiction, allowing for more tailored assessments and interventions.

The strengths of this study include the involvement of a large sample of workers from both Northeastern and Southern Italy. This study is also the first to link the WART with multidimensional tools for assessing organizational well-being (HSE-MS IT) and personality (HEXACO-Personality Inventory and SD3). Specifically, it was observed that, in addition to narcissism, a dimension already known in the literature to predispose individuals to work addiction [17], the other two components of the dark triad of personality (Machiavellianism and psychopathy) were also significantly associated with work addiction risk, consistent with studies linking these personality dimensions to addictive behaviors regarding work [39, 40]. Furthermore, the use of cross-lagged regression analysis allowed for a dynamic assessment of the relationship between work-related stress and work addiction over time. This analysis revealed a significant partial correlation between changes in perceived work-related stress and work addiction risk, highlighting the reciprocal relationship between these variables and underscoring the importance of considering temporal changes in work-related stress when assessing the risk of work addiction.

One limitation of this study is that only an exploratory factor analysis was conducted on the collected sample without a subsequent confirmatory factor analysis. Although we demonstrated the invariance of the structure concerning some demographic and work-related variables, further studies are needed to assess the robustness of the identified factorial structure. Another limitation is the sampling method, which utilized a snowball procedure. While this allows reaching many participants, it does not guarantee complete control over the sampling process. Additionally, using a convenience sample limits the generalizability of the findings, as the sample may not fully represent the broader population of Italian workers.

5. Conclusion

In conclusion, the WART proves to be an agile and reliable tool for assessing the risk of WA, even in the Italian context. The robustness of its factorial structure remains open and should be addressed in further studies. A better understanding of its components would allow for a more in-depth investigation of this construct. Highlighting the compulsive component, for example, could be particularly useful for discriminating between WA and work engagement, constructs that share the component of excessive work but with entirely different clinical and organizational implications [3]. Additionally, exploring the role of various personality traits and work-related stressors in predicting WA over time could provide valuable insights for developing targeted interventions to mitigate the risk of work addiction and promote healthier work environments.

Supplementary Materials: The following are available online: Table S1: Work Addiction Risk Test – Italian version, Table S2: Exploratory factor analysis of WART items.

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Institutional Review Board Statement: The study was conducted in accordance with the guidelines of the Declaration of Helsinki and the ethical code of the Italian Association of Psychology (AIP). Ethics committee approval was not required, as the study posed no risks to participants. All data were collected anonymously, ensuring participant confidentiality. Data were handled in compliance with privacy laws and following European Union Regulation 679/2016 (GDPR).

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