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Research Article

Perrotta-Marciano Burnout Risk Interview 1 (Bori-1-V2): Validation Study of A Psychometric Instrument Investigating The Risk Of Burnout In The Military And Public Safety Population

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Abstract

Introduction: Burnout syndrome is widely studied in literature but there is still no questionnaire capable of combining the evaluation of both the risk of burnout and the associated suicidal risk. Materials and methods: The validation study was conducted by administering both BORI-1-v2 and BAT, to the selected population sample belonging to the Public Safety.

Results: In this study, a population of 167 individuals (150 m / 17 f), exercising military activities (aged 25-61 years; M: 44.5, SD: 7.6), were selected. KMO and EFA all show values above 0.500. Statistical comparison between BORI-1 and BAT showed good significance (p=0.021 and W=0.981), with a fair correlation matrix (r=0.842).

Conclusions: BORI-1 is effective as an early screening tool for burnout with a particular sensitivity to suicide risk. In the future, this questionnaire will be used with larger population samples, and with extension to other occupational types, such as health care, transportation, and night workers.

Running head. Validation study of BORI-1-v2

Keywords: burnout; burnout syndrome; suicide risk; military; police; public security forces; professional service

Abbreviations

Perrotta-Marciano Burnout Risk Interview 1 (BORI-1). Burnout Assessment Tool (BAT). Maslach Burnout Inventory (MBI). Griffiths' Work Organization Assessment Questionnaire (WOAQ). Shirom-Melamed-Burnout-Measurement (SMBM).

Key Points. 1. BORI-1 is a psychometric instrument that, for the first time, investigates both the clinical and socio-affective, cultural and family dimensions of the interviewee, emphasizing all individual life dimensions. 2. BORI-1 investigates the clinical dimension of the interviewee, emphasizing the symptomatologic rationale described through personality traits according to the PICI-3 model. 3. BORI-1 can identify the risk of burnout, including premature burnout, and suicide risk related to the stressful work condition.

1. Background

The term "burnout" literally means "exhaustion", thus describing the lack of energy, fatigue and unproductivity at work that a person develops in the workplace. It has been considered a clinical syndrome since the studies of Herbert Freudenberger, who defined it as a condition of mental and physical exhaustion that wears a person down due to chronic exposure to interpersonal stresses in the workplace (Maslach, 1976). Beginning with his studies, Maslach and Cherniss focused their research, arriving at the packaging of a psychometric questionnaire dedicated first to social and health care workers, and then spread to other fields, such as the military (Rodrigues et al., 2018; Cherniss, 1986). In the ICD-11 (with code QD85), burnout is defined as "a state of vital exhaustion due to work-related stress", although in several clinical contexts this construct is challenged as being confounding with work-related stress, if not characterized by emotional exhaustion, depersonalization and cynicism, ineffectiveness, and unsatisfactory job accomplishment (WHO, 2019; Korczak et al., 2010; Borgogni & Consiglio, 2005), as indicated by Maslach himself (Golonka et al., 2019; Maslach & Leiter, 2016). The presence or absence of this syndrome, therefore, can only be verified through batteries of tests (Magnavita, 2018), in addition to the analysis of personal and work dynamics, in the clinical interview, such as excessive workload, reduced decision-making autonomy, diminished or absent rewards, poor sense of belonging, inequity, and lack or absence of values and ties to the organization and colleagues (Leiter et al., 2016; Maslach, 2012). In particular, the most widely used psychometric tests include Burnout Assessment Tool (BAT), Maslach Burnout Inventory (MBI), Griffiths' Work Organization Assessment Questionnaire (WOAQ), and Shirom-Melamed-Burnout-Measurement (SMBM) (Borrelli et al., 2022; Michel et al., 2022; Schaufeli et al., 2020; Leiter et al., 2012; Maslach & Leiter, 2008; Griffiths et al., 2006; Cooper, 2002; Maslach et al., 1997; Rees & Cooper, 1994), partly because of the markedly increased suicide risk during a pandemic or the recent Covid-19 pandemic (Galanis et al., 2021; Avallone & Paplomatas; 2004). However, the testing landscape lacks a psychometric tool capable of identifying the risk of burnout (and quantifying it) in relation to the risk of suicide, as already well present in the literature (Perrotta et al., 2023a; Galanis et al., 2021; Rodrigues et al., 2018; Maslach & Leiter, 2016; Korczak et al., 2010); for this reason, BORI-1-v2 (Perrotta et al., 2023a) was designed to respond to this need and fill the literary and clinical-instrumental gap, in order to be able to offer not only the clinical picture but also the socio-affective, cultural and family one of the interviewee, structuring the clinical component according to a symptomatic logic described through personality traits. The objective of this study is to validate BORI-1-v2, using a representative population sample, related to the Public Safety and Defense sector (as data in this sector seem to be more swamped) (EI, 2015). The study aims to lay the groundwork for more in-depth and detailed research on a national scale, as well as including other professional categories, investigating the starting hypothesis whether it is possible to validate a psychometric tool capable of predicting burnout syndrome and the related suicidal risk from the symptoms described.

2. Methods and materials

2.1. Methods

The methods used for this study, limited to the selected population sample, consist of the administration via Google Forms of the BORI-1-v2 and the Burnout Assessment Tool (BAT), Italian version, a psychometric tool with ideal characteristics for comparison with the first questionnaire, and therefore functional to proceed with data analysis for validation purposes. The following statistical analyses were performed: descriptive profile, comparison of means, KMO (measure of sampling adequacy - MSA), χ^2 (Barlett's test of sphericity), EFA (exploratory factor analysis, using the "maximum likelihood" extraction method in combination with a "promax" rotation), Pearson's r (BORI-BAT correlation matrix), W (Shapiro-Wilk normality test), paired T-test (with 95% confidence interval) and multivariate regression model. IBM SPSS software (28th edition) was used. $P<0.05$ was considered statistically significant. The results are consistent and in accordance with the rules of the Standards for Educational & Psychological Testing (2014 Edition). The 12 variables studied were: Age (1), years of work (2), gender (3), work time devoted to assignments or transfers throughout working life (4), place of residence (5), geographic work-home distance (6), type of work (7), and personal status (8), presence of essential services near the home (9), presence of disabled family members in one's family status (10), presence of economically dependent minor or adult children in one's family status (11), suicide risk (12). The stages of the research were divided as follows: 1) Selection of the population sample, according to the parameters given in the specific section; 2) Administration of the BORI-1-v2 and BAT - Italian version (33 items) tests, via Google Forms; 3) Data processing and comparison of the results obtained; 4) Clinical interview with subjects who show discordance in responses between the BORI-1-v2 and the BAT, in order to assess the validity of the BORI-1-v2.

2.2. Materials

Two questionnaires were used for this research: the BORI-1-v2, for validation purposes, and the BAT (Italian version), for comparison with the first questionnaire. BORI-1 (Perrotta et al., 2023a) is structured into 6 sections, with a total of 50 items, usable for a population aged 18 to 75 years old. Section A consists of 15 items and is devoted to biographical information. Section B consists of 7 items and is devoted to personal information regarding neurotic symptoms suffered, in terms of anxiety, somatization, obsessions and behavioral addictions. Section C consists of 7 items and is devoted to personal information related to the dramatic symptoms suffered, in terms of depression, maniacally, theatricality, instability and attachment. Section D consists of 7 items and is devoted to personal information related to psychotic symptoms, in terms of delirium, paranoia, dissociation and hallucinations. Sections B, C and D are in line with Perrotta Integrative Clinical Interviews - 3 (PICI-3) (Perrotta, 2024ab; Perrotta, 2023b; Perrotta, 2023) and Perrotta Human Emotions Model - 2v2 (PHEM-2v2) (Perrotta et al., 2023cd), in that the BORI model argues that burnout syndrome is characterized by symptoms that by their nature are nurtured by the structure and personality function of the subject. These last two models refer to the investigation of the functional and dysfunctional personality profile, in a clinical key (PICI-3) and in an emotional key (PHEM-2v2) according to the studies of Giulio Perrotta (Perrotta et al., 2024ab, 2023abcd, 2022). Therefore, despite the presence of specific symptoms, each syndrome differs in its subjective manifestation and the impact of symptoms on quality of life (for example, a subject with a psychotic tendency will manifest more psychotic burnout symptoms, such as dissociation and paranoia). Section E consists of 11 items and is devoted to occupational information about one's own or others' behavior in the specific workplace, with indications of different daily dynamics. Finally, section F consists of 3 items and is devoted to personal information related to one's experiences with suicidal tendencies. Scoring involves a partial calculation of individual sections and an overall

calculation, to detect burnout risk (and related suicidal risk) (Perrotta, 2020), with a minimum-maximum score of 0-240 points. The questionnaire can be viewed as an attachment to the publication by Perrotta, Marciano & Fabiano (2023a). BAT (Borrelli et al., 2022) is structured into 33 items (Italian version), divided into primary symptoms (exhaustion, mental distance, loss of cognitive control, and loss of emotional control) and secondary symptoms (psychological disorders and psychosomatic disorders), both on a scale of 5 possible different choices (never, rarely, sometimes, often, and always).The BAT was chosen to compare the data from BORI-1-v2, and perform the validation analyses, because it is a self-report questionnaire developed using a combination of a deductive (theoretical) method and an inductive (empirical) approach. Burnout is understood as a mental state of exhaustion that manifests itself both as an inability to perform one's job properly due to chronic fatigue ("I can't do my job anymore"), and as an unwillingness to apply oneself due to mental distance to one's job ("I don't want to do my job anymore"). Two other aspects related to Burnout are emotional and cognitive impairment, which can manifest, for example, in sudden bursts of anger and with poor concentration. Thus, the scales investigated by the BAT are exhaustion, mental distance, emotional impairment and cognitive impairment, but it also investigates secondary symptoms of a psychological nature. BORI-1 uses the same methodological combination, but delves into the suffered symptomatology according to a multidisciplinary logic, which first investigates the identity, socio-affective and socio-familial component (age, gender, sexual orientation, personal and family status, people with disabilities and children in family status) and the subjective characteristics related to the employment status (years of service, living quarters, geographic distances, types of service, missions and travel). Subsequent sections examine the symptom structure of burnout modeled on the trait theory of Perrotta Integrative Clinical Interviews 3 (PICI-3), with a section devoted entirely to suicide risk-related burnout.

Table 1 shows the structural and functional clinical differences between BORI-1 and BAT.

Variable: N_items indicates the number of questions; type_items indicates the type of questions; type_answer indicates the type of answers; neurotic symptoms represent the group of questions with neurotic features (anxious, phobic, obsessive, somatic); dramatic symptoms represent the group of questions with dramatic features (depressive, bipolar, theatrical, borderline, narcissistic, antisocial); psychotic symptoms represent the group of questions with psychotic features (delirium, paranoia, dissociation); primary symptoms represent the group of questions related to the main symptoms of burnout (exhaustion, mental distance, loss of cognitive control and loss of emotional control); secondary symptoms represent the group of questions related to the psychological symptoms of burnout; negative consequences in the work environment represent the group of questions related to the specific negative consequences related to one's work activity; suicidal tendency indicates the group of questions about this specific risk; risk of burnout indicates the overall risk detected by the questionnaire score.

	BORI-1		**BAT**	
Variable	*Structure*	*Functioning*	*Structure*	*Functioning*
N_Items	50	1 + 5sections	33	2 sections
Type_Items	General + Clinical	A + (B/C/D/E/F)	Primary + Secondary	1 + 1
Type_Answer	6 response hypotheses	specific quantification (timing)	B+C+D (5 choices) E (4 choices) F (6 choices)	general quantification (temporal adverbs)
Neurotic symptoms	7 items	Section B	The questionnaire is not structured to assess symptoms according to a pattern of personality traits	
Dramatic symptoms	7 items	Section C		
Psychotic symptoms	7 items	Section D		
Primary symptoms	The questionnaire is structured to assess symptoms according to a pattern of personality traits and not to assess only descriptive symptoms		Exhaustion, mental distance, loss of cognitive control and loss of emotional control	
Secondary symptoms			Psychological disorders and psychosomatic disorders	
Negative consequences in the work environment	11 items	Section E	The questionnaire investigates this variable in several items without, however, giving it specific emphasis	
Suicidal tendency	3 items	Section F	The questionnaire does not investigate this risk	
Risk of burnout	35 items	B/C/D/E/F	23 items	Section on primary symptoms

Table 1: Structural and functional differences between BORI-1-v2 and BAT.

(Source: Authors)

2.3. Setting and participants

The inclusion criteria are: 1) age between 25 and 61; 2) binary gender (male/female); 3) exclusively Italian citizenship; 4) professional membership in the Public Security and/or Military Forces. Exclusion criteria are: 1) age under 25 and over 61; 2) non-binary gender; 3) non-Italian citizenship; 4) professional activity not in the employ of the Public Security Forces and/or Military; 5) absence, withdrawal or incorrect signing of data processing and informed consent. The population sample was selected from a group of volunteers registered online ("*Diritto Militare Scafetta*": https://www.facebook.com/share/g/183uLsZBqr), through Facebook (managed by Antonio Marciano), who were part of the Public Security Forces and military, with questionnaires being administered by special online link creation through Google Forms (as the participants came from all over Italian territory), managed exclusively by

Antonio Marciano. Identity and professional affiliation have been verified by Antonio Marciano; for this reason, the data were not collected anonymously but Antonio Marciano did not personally know any of the participants and the data was passed to Giulio Perrotta, who carried out the statistical analyses, anonymously, first individually and then aggregated. A control group was not selected since the BORI-1 is not administered to a clinical group but to a population to predict the risk of burnout and related suicidal risk.

The present research work was conducted from July 2025 to November 2025, while data analysis was carried out in the last quarter of the same year. The selected population sample, which met the above requirements, initially consisted of 173 participants. However, only 167 were included in the final sample (males: 150; females: 17) [**Table 2**], as some participants (drop-out: 4%) refused to sign the informed consent and privacy data processing agreement. The participants' ages ranged from 25 to 61 years (M = 44.5; SD = 7.6). The informed consent and data processing agreement were signed before the questionnaires were administered.

The table is divided into 3 sub-tables, based on the number of possible responses per single variable (2, 3 or 4 response hypotheses). In the first sub-table, there are 4 response hypotheses, and they are divided into variables that by their nature can be grouped into 4 different percentile groups (0-25%, 26-50%, 51-75%, and 76-100%, with adjustments to have full figures). In this first sub-table, the variables involved are: age, in relation to birth age; work_years, in relation to years of professional service; gender_male_150, in relation to the subgroup of the male gender of the population (150 subjects); gender_female_17, in relation to the subgroup of the female gender of the population (17 subjects); transfers_mission_total_how_much_time, in relation to how long he/she has been performing missions or transfers compared to the total amount of time since he/she has been in public safety or military service.In the second sub-table, there are 3 response hypotheses, and they are divided by three different response hypotheses. In this second sub-table, the variables involved are: residence/domicile, in relation to the geo-location of the private place of residence; geo_distance_work-residence, in relation to the distance in km between the home address and the place of work; performance_work_type, in relation to the type of work he/she permanently performs ("simple" to indicate easy manual technical work, "office" for administrative work, and "operational" for hazardous or complex work); personal_status, in relation to personal-family status. In the third sub-table, there are 2 response hypotheses, and they are divided by positive (yes) or negative (no) responses. In this third sub-table, the variables involved are: optimal_services_near_res_dom, in relation to the presence or absence of utilities, such as supermarkets, pharmacies, and home utilities calculated by distance from the place of living; fam_disabled, in relation to the presence or absence of a disabled family member in one's family status and present in the place of living; children_status, in relation to the presence or absence of a child under the age of 18 or of age 18 who is economically dependent in one's family status and present in the place of living; suicide risk, in relation to the suicide risk revealed by the BORI-1, structured in the intermediate and high risk score.

Descriptive population data for variables with four response hypotheses				
Variable	*0-25%(x): N(%tot)*	*26-50%(x): N(%tot)*	*51-75%(x): N(%tot)*	*76-100%(x): N(%tot)*
Age	25-31y: 10 (6%)	32-41y: 58 (35%)	42-51y: 66 (40%)	52-61y: 33 (19%)
Work_years	5-12y: 13 (8%)	13-21y: 59 (35%)	22-30y: 56 (34%)	31-38y: 39 (23%)
Gender_male_150	25-31y: 8 (5%)	32-41y: 47 (31%)	42-51y: 64 (43%)	52-61y: 31 (21%)
Gender_female_17	25-31y: 2 (12%)	32-41y: 11 (64%)	42-51y: 2 (12%)	52-61y: 2 (12%)
Transfers_missions_total_ How_much_time	Never or less than 1 year: 78 (47%)	1-5 years: 40 (24%)	5-10 years: 27 (16%)	> 10 years: 22 (13%)
Descriptive population data for variables with three response hypothese				
Variable	*Hypothesis 1: N(%tot)*	*Hypothesis 2: N(%tot)*	*Hypothesis 3: N(%tot)*	
Residence/Domicile	North Italy: 33 (20%)	Centre Italy: 53 (32%)	South Italy: 81 (48%)	
Geo_distance_ work-residence	< 5 km: 29 (17%)	6-20 km: 52 (31%)	21-50%: 86 (52%)	
Performance_work_type	Simple: 6 (4%)	Office: 69 (41%)	Operative: 92 (55%)	
Personal_status	Single: 28 (17%)	Partner: 20 (12%)	Married: 119 (71%)	
Descriptive population data for variables with two response hypotheses				
Optimal_services_near_res_dom		Yes 145 (87%)	No 22 (13%)	
Fam_disabled		Yes 31 (19%)	Yes 136 (81%)	
Children_status		Yes 127 (76%)	Yes 40 (24%)	
Suicide risk (intermediate risk)		Yes 16 (10%)	*Data not comparable*	
Suicide risk (high risk)		Yes 30 (18%)	*Data not comparable*	

Table 2. *Descriptive population datawith variables.*

3. Results

Using IBS's software application for statistical analysis (Statistical Package for Social Science, SPSS, version 28.0) the descriptive, frequency and mean comparison analyses (T-Test for paired data) were performed. T-tests were then conducted for paired data and correlation matrix relative for data on the 2 questionnaires administered. Statistical analysis is significant for values of $p<0.05$.

Table 3 shows the descriptive data of the selected population sample, denoted by n/tot (%), in relation to the mean high values of the two questionnaires used and divided according to the variables listed in Table 1.

BORI-1: Perrotta-Marciano Burnout Risk Interview 1 (normal: 0-60; intermediate: 61-104; critic: 105-213). BAT: Burnout Assessment Tool (normal: 33-85; intermediate: 86-105; critic: 106-65). Variables: age, in relation to age of birth, subdivided into 4 subgroups (23-33y, 34-42y, 43-51y, 52-61y); work_years, in relation to years spent working in public safety and military, subdivided into 4 subgroups (5-10y, 11-20y, 21-30y, 31-38y); gender group, in relation to sexual gender, subdivided into male and female; mission_time_total, in relation to the total time spent on missions and travel during the entire professional career, divided into 4 subgroups (less than 1 year, between 1 and 5 years, between 6 and 10 years, and more than 10 years); residence/domicile, with reference to the Italian geographic area of residence, divided into North, Center and South;geo_distance_work-res, referring to the geographical distance between the place of work and the home address, measured in km, and divided into 3 subgroups (less than 5 km, between 5 and 20 km, between 20 and 50 km); work_type, referring to the type of stable job performance, divided into 3 subgroups (simple, office and operational); personal_ status, referring to affective personal status, divided into 3 subgroups (single, partner and married); optimal_ services_near_res_dom_yes, referring to the presence of public services, hospitals, pharmacies, and supermarkets within 1 km of one's place of residence;fam_disabled_yes, referring to the presence of a disabled person in one's family status; children_status_yes, referring to the presence of at least one minor child or adult who is not economically independent, in one's family status.

Descriptive population detain relation to the values of the two questionnaires used

Variable (n)	*BORI-1*			*BAT*		
	Normal	*Intermediate*	*Critic*	*Normal*	*Intermediate*	*Critic*
Age_25-33y (1a)	5/14 (36%)	6/14 (43%)	3/14 (21%)	8/14 (58%)	3/14 (21%)	3/14 (21%)
Age_34-42y (1b)	27/54 (50%)	11/54 (20%)	16/54 (30%)	24/54 (44%)	15/54 (28%)	15/54 (28%)
Age_43-51y (1c)	38/66 (58%)	13/66 (20%)	15/66 (22%)	41/66 (62%)	15/66 (23%)	10/66 (15%)
Age_52-61y (1d)	21/33 (64%)	10/33 (30%)	2/33 (6%)	25/33 (76%)	7/33 (21%)	1/33 (3%)
Work_years_5-10y (2a)	6/11 (55%)	3/11 (27%)	2/11 (18%)	7/11 (64%)	3/11 (27%)	1/11 (9%)
Work_years_11-20y (2b)	24/55 (44%)	14/55 (25%)	17/55 (31%)	23/55 (42%)	14/55 (25%)	18/55 (33%)
Work_years_21-30y (2c)	34/62 (55%)	14/62 (23%)	14/62 (22%)	38/62 (61%)	16/62 (26%)	8/62 (13%)
Work_years_31-38y (2d)	27/39 (69%)	9/39 (23%)	3/39 (8%)	30/39 (77%)	7/39 (18%)	2/39 (5%)
Gender_male_group (3a)	82/150 (55%)	35/150 (23%)	33/150 (22%)	80/150 (53%)	46/150 (31%)	24/150 (26%)
Gender_female group (3b)	9/17 (53%)	5/17 (29%)	3/17 (18%)	7/17 (41%)	6/17 (35%)	4/17 (24%)
Mission_time_total_<2y (5a)	44/78 (56%)	19/78 (24%)	15/78 (20%)	44/78 (56%)	22/78 (28%)	12/78 (16%)
Mission_time_total_1-5y (5b)	21/40 (52%)	12/40 (30%)	7/40 (18%)	24/40 (60%)	9/40 (22%)	7/40 (18%)
Mission_time_total_6-10y (5c)	12/27 (44%)	6/27 (22%)	9/27 (34%)	14/27 (52%)	6/27 (22%)	7/27 (26%)
Mission_time_total_>10y (5d)	14/22 (64%)	3/22 (14%)	5/22 (22%)	15/22 (68%)	4/22 (18%)	3/22 (14%)
Residence/Domicile_North (6a)	22/33 (67%)	6/33 (18%)	5/33 (15%)	25/33 (76%)	2/33 (6%)	6/33 (18%)
Residence/Domicile_Centre (6b)	28/53 (53%)	10/53 (19%)	15/53 (28%)	28/53 (53%)	14/53 (26%)	11/53 (21%)
Residence/Domicile_South (6c)	41/81 (51%)	24/81 (30%)	16/81 (19%)	46/81 (57%)	23/81 (28%)	12/81 (15%)
Geo_distance_work-res_<5km (7a)	20/29 (69%)	7/29 (24%)	2/29 (7%)	24/29 (83%)	5/29 (17%)	0/29 (0%)
Geo_distance_work-res_5-20km (7b)	27/52	13/52	12/52	25/52	17/52	10/52

	(52%)	(25%)	(27%)	(48%)	(33%)	(19%)
Geo_distance_work-res_21-50km (7c)	44/86 (51%)	20/86 (23%)	22/86 (26%)	48/86 (56%)	19/86 (22%)	19/86 (22%)
Work_type_simple (8a)	1/6 (17%)	2/6 (33%)	3/6 (50%)	1/6 (17%)	2/6 (33%)	3/6 (50%)
Work_type_office (8b)	40/69 (58%)	16/69 (23%)	13/69 (19%)	40/69 (58%)	17/69 (25%)	12/69 (17%)
Work_type_operational (8c)	50/92 (54%)	22/92 (24%)	20/92 (22%)	55/92 (60%)	23/92 (25%)	14/92 (15%)
Personal_status_single (9a)	11/28 (39%)	6/28 (22%)	11/28 (39%)	11/28 (39%)	10/28 (36%)	7/28 (25%)
Personal_status_partner (9b)	9/20 (45%)	6/20 (30%)	5/20 (25%)	13/20 (65%)	2/20 (10%)	5/20 (25%)
Personal_status_married (9c)	71/119 (60%)	28/119 (23%)	20/119 (17%)	73/119 (61%)	29/119 (24%)	17/119 (15%)
Optimal_services_near_res_dom_yes (10)	80/145 (55%)	37/145 (26%)	28/145 (19%)	85/145 (59%)	37/145 (26%)	23/145 (15%)
Fam_disabled_yes (11)	18/31 (58%)	6/31 (19%)	7/31 (23%)	16/31 (52%)	11/31 (35%)	4/31 (13%)
Children_status_yes (12)	74/127 (58%)	33/127 (26%)	20/127 (16%)	79/127 (62%)	30/127 (24%)	18/127 (14%)

Table 3: Descriptive population data in relation to the values of the two questionnaires used, divided into 3 severity bands inherent in burnout risk (normal, intermediate and critical, based on the scoring rules of each questionnaire).

Table 4 shows the data for the statistical analyses carried out about KMO (Measure of Sampling Adequacy - MSA), χ^2 (Barlett's Test of Sphericity), EFA (Exploratory Factor Analysis), as indicated in the Methods section, for the BORI-1 items and for the totals of its individual sections (**Figure 1**). BORI-BAT correlation matrix shows the r=0.842 (**Figure 2**), with df=165 and p=<0.001, while the Shapiro-Wilk normality test is W=0.981 with p=0.021; finally, the T-test for paired data shows a p=0.769 with an effect size (Cohen's) of d=0.023 (**Figure 3**). The multivariate regression model showed interesting correlations with registry age (the older the age, the higher the risk of burnout, p=0.004), type of service (operators are at higher risk of burnout, p=0.001), and geographic distance between home and operating location (the greater the distance, the higher the risk of burnout, p=0.002), with discrepancies between the final outcomes of the two questionnaires to the extent of 41/167 (25%) (**Figure 4**), of which 26/41 (63%) show a worse score on the BORI-1 than on the BAT, while 15/41 (37%) show worse scores on the BAT. An interview which followed the administration of the questionnaire has examined these latter subjects and it showed that all 41 subjects agreed more with the result of the BORI-1 than the BAT, and that in the opinion of the respondents the latter did not meet their interpretive expectations, while the subjects who scored higher on the BAT stated that they had completed the questionnaire administration in conjunction with an acute stressful event (personal or family related to the professional sphere) that influenced the outcome of the administration. In second administration, to verify the accuracy of the statements during the interview, the discordant outcome fell in all 15 cases.

Item: the column corresponds to the number of items in BORI-1, showing both the individual items and the total of the 5 individual sections. KMO_MSA: the column corresponds to the value of the sample adequacy measure. χ^2: the column corresponds to the value of Barlett's test of sphericity. p(χ^2): the column corresponds to the p-value related to Barlett's test. EFA: the column corresponds to the exploratory factor analysis.

Item	KMO_MSA	χ^2	p(χ^2)	EFA
B1	0.798	965	<0.001	0.888
B2	0.828	965	<0.001	0.933
B3	0.874	965	<0.001	0.767
B4	0.916	965	<0.001	0.801
B5	0.846	965	<0.001	0.642
B6	0.863	965	<0.001	0.613
B7	0.924	965	<0.001	0.864
B_total	0.869	965	<0.001	0.895
C1	0.889	832	<0.001	0.821
C2	0.922	832	<0.001	0.788
C3	0.952	832	<0.001	0.659
C4	0.871	832	<0.001	0.902
C5	0.837	832	<0.001	0.919
C6	0.907	832	<0.001	0.807
C7	0.955	832	<0.001	0.593
C_total	0.793	832	<0.001	0.975
D1	0.912	946	<0.001	0.806

D2	0.880	946	<0.001	0.795
D3	0.882	946	<0.001	0.817
D4	0.842	946	<0.001	0.837
D5	0.856	946	<0.001	0.876
D6	0.857	946	<0.001	0.876
D7	0.960	946	<0.001	0.698
D_total	0.832	946	<0.001	0.931
E1	0.842	1093	<0.001	0.545
E2	0.880	1093	<0.001	0.626
E3	0.950	1093	<0.001	0.594
E4	0.920	1093	<0.001	0.561
E5	0.903	1093	<0.001	0.681
E6	0.922	1093	<0.001	0.828
E7	0.913	1093	<0.001	0.878
E8	0.936	1093	<0.001	0.774
E9	0.909	1093	<0.001	0.808
E10	0.928	1093	<0.001	0.825
E11	0.939	1093	<0.001	0.659
E_total	0.852	1093	<0.001	0.673
F1	0.537	340	<0.001	0.997
F2	0.540	340	<0.001	0.924
F3	0.871	340	<0.001	0.398
F_total	0.789	340	<0.001	0.512
BORI-1_total (B-F)	0.887	911	<0.001	0.828

Table 4: Results of statistical analysis carried out on the administration of the BORI-1 and the BAT.

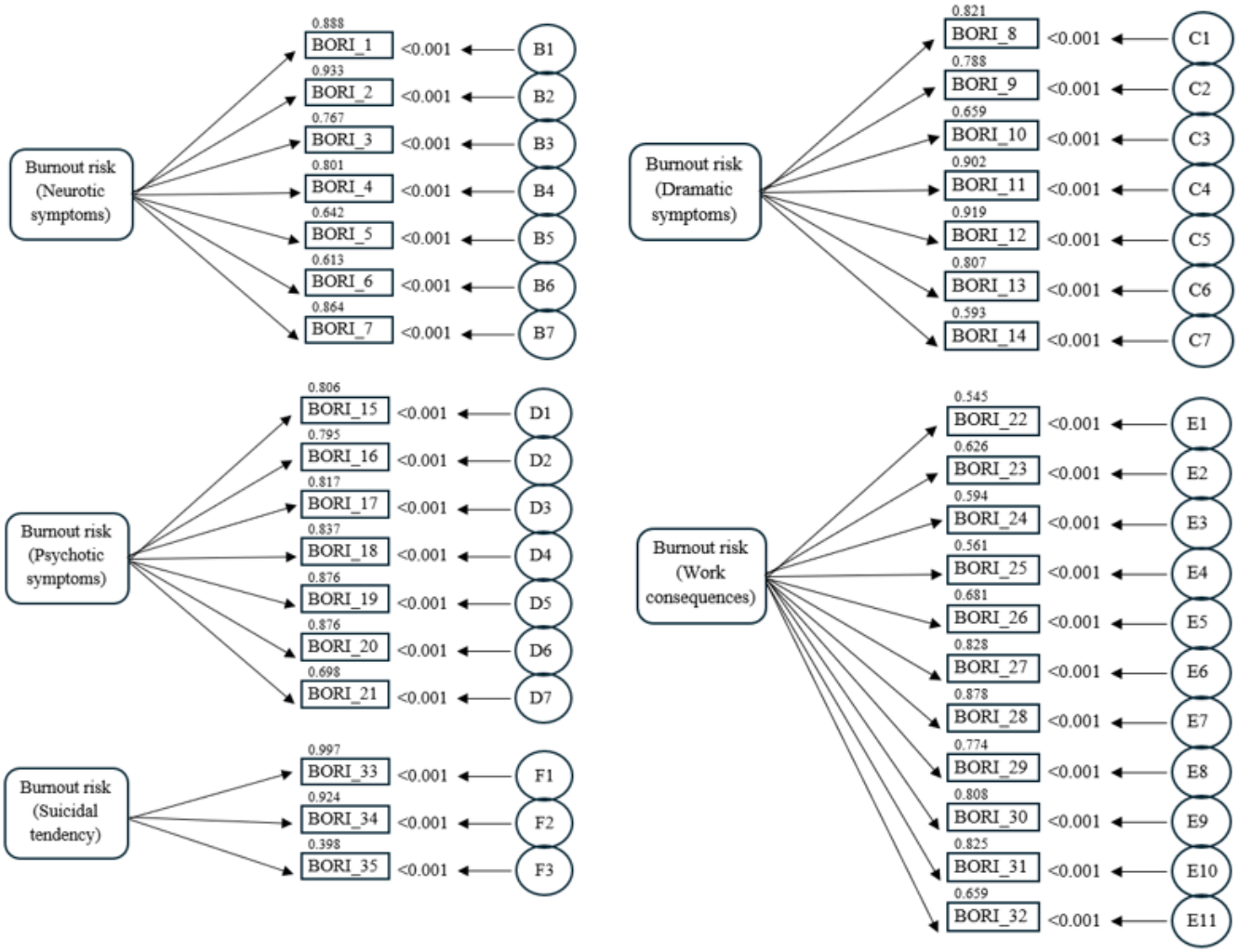

Figure 1: Graphical representation of EFA data relating to BORI-1.

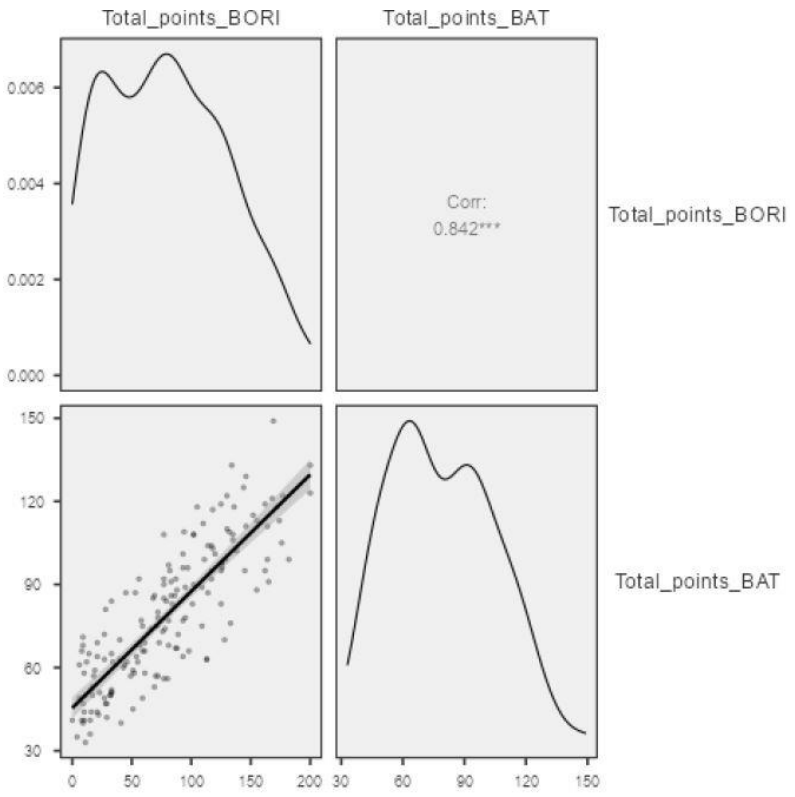

Figure 2: BORI-BAT correlation matrix (r=0.842).

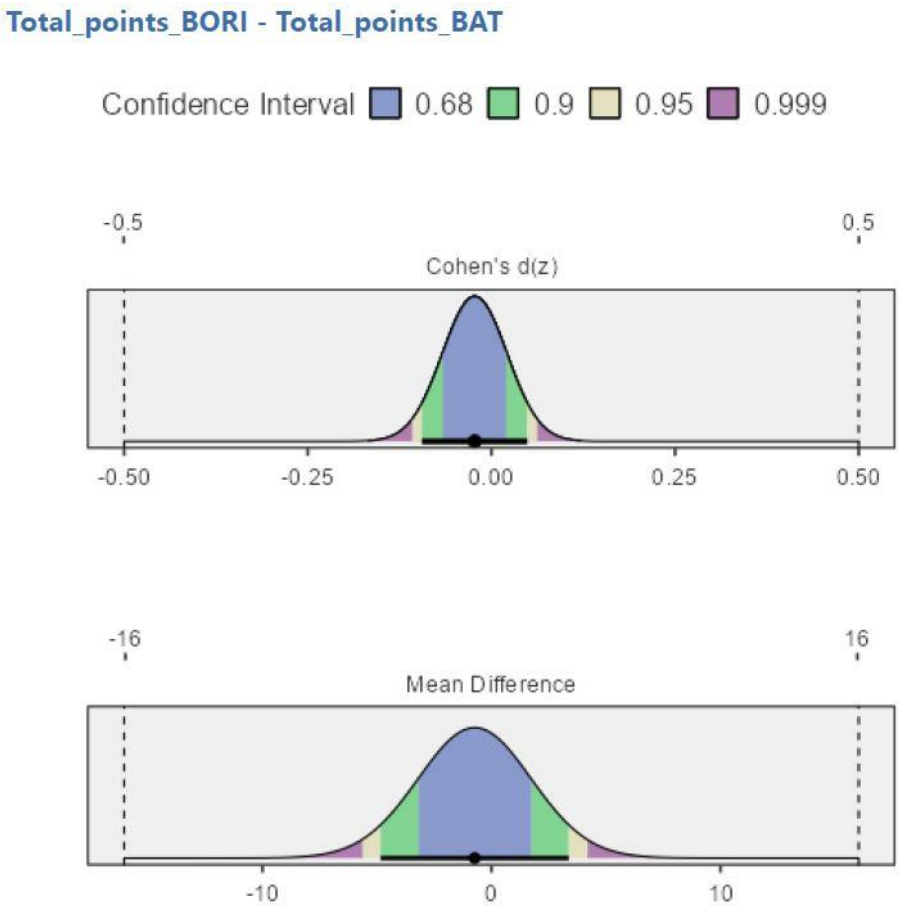

Figure 3: Effect size (Cohen's), in relation to the difference in means.

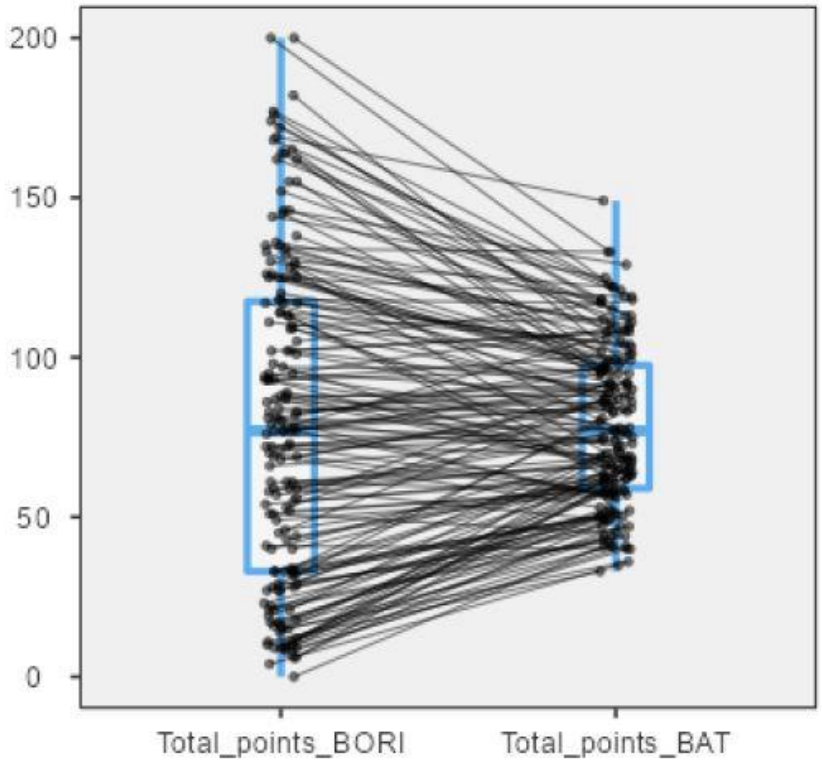

Figure 4: Scoring outcomes between BORI-1 and BAT.

According to the original proposal [21], the total scoring of all 35 items ranged from a minimum of 0 points to a maximum of 240 points, as section F, regarding suicide risk, had a different scoring precisely to emphasize the importance of the issue. During this study, we realized that the proposed scoring rules were not adequate and balanced, and based on the results, a new decalogue for interpreting the scores of sections B-C-D-E-F and BORI-total was drawn up, as shown in **Table 5.**

Title_ Section	N_Section (N_item)	Previous score (min-max)	Rule_ previous score	New score (min-max)	Rule_ new score
Neurotic symptoms	B (7)	0-35	0-5 points per item: 0-7 = Low frequency 8-21 = Medium frequency 22-35 = High frequency	0-35	0-5 points per item: 0-7 = Low frequency 8-21 = Medium frequency 22-35 = High frequency
Dramatic symptoms	C (7)	0-35		0-35	
Psychotic symptoms	D (7)	0-35		0-35	
Negative consequences in the work environment	E (11)	0-60	0-3 points per item + "+ 1" should always be added to the overall numerical summation of this sub-section (E) for each answer given with value 2 and "+2" for each answer given with value 3. If, finally, there are at least 6/11 answers with value 2 or 3 an additional "+5" total should be added: 0-20 = Low frequency 21-40 = Medium frequency 41-75 = High frequency	0-33	0-3 points per item: 0-11 = Low frequency 12-22 = Medium frequency 23-33 = High frequency
Suicidal tendency	F (3)	0-75	0-5 points per item + "+5" should be added for each answer given with value 2 or 3, "+10" for each answer given with value 4 and "+15" for each answer given with value 5:	0-75	0-5 points per item + "+5" should be added for each answer given with value 2 or 3, "+10" for each answer given with value 4 and "+15" for each answer given with value 5: 0-20 = Low frequency

			0-20 = Low frequency 21-40 = Medium frequency 41-75 = High frequency		21-40 = Medium frequency 41-75 = High frequency
BORI-total	B+C+D+E+F (35)	0-240	0-36 = Non-significant frequency (no risk) 37-72 = Low frequency (limited risk) 73-123 = Medium frequency (significant risk) 124-174 = High frequency (marked risk) 175-240 = High frequency (critical threshold)	0-213	0-30 = Non-significant frequency (no risk) 31-60 = Low frequency (low risk) 61-104 = Medium frequency (intermediate risk) 105-175 = High frequency (marked risk) 176-213 = High frequency (critical threshold)

Table 5. *Readjustment of scoring rules proposed in Perrotta-Marciano-Fabiano (2023a)*. Title_ Section: Neurotic symptoms represent the column of section B of BORI-1-v2. Dramatic symptoms represent the column of section C of BORI-1-v2. Psychotic symptoms represent the column of section D of the BORI-1-v2. Negative consequences in the work environment represent the column of section E of the BORI-1-v2. Suicidal tendency represents the column of section F of the BORI-1-v2. BORI-total represents the total score column of the questionnaire.

4. Discussions

The modest selected but still representative population, based on the KMO (Kaiser-Meyer-Olkin is a statistical measure used in psychometrics to assess the adequacy of a data sample for factor analysis or principal components analysis) always exceeding 0.500 which proves its sample adequacy, was studied by administering the BORI-1-v2 and BAT, to validate the first questionnaire, to the Italian population working in the public security sectors and military forces. BORI-1-v2, unlike the BAT, uses a structure more centered on the personality trait model of the PICI-3, and thus the sections that are affected by the partial and total scoring of the questionnaire are subsections B-C-D-E-F, specifically devoted to neurotic symptoms (B), dramatic symptoms (C), psychotic symptoms (D), negative consequences in the work environment (E) and suicidal tendency (F), as well as an overall calculation that measures burnout risk in current time and space, while the responses to section A are instrumental in framing the respondent's personal context and therefore do not have a score to assign. The 12 variables selected and then investigated with BORI-1-v2 show a disturbing descriptive picture in the selected population sample, with intermediate and severe values on burnout risk for 76/167 (46%), of which 36/76 (47%) are at high risk. Suicide tendency is also dramatic and represented by intermediate risk for 32/167 (19%) and high risk for 16/167 (10%), for a total of 48/167 (29%), of which 6/167 (4%) show suicide tendency not directly related to burnout or otherwise burnout syndrome is not the primary cause, while 15/28 (54%) show high scores on suicide risk directly related to burnout risk ($p=<0.001$). Bartlett's test of Sphericity is used to test the null hypothesis, and that the correlation matrix is an identity matrix. In our case, the χ^2 value is always greater than 0.5, with a significance (p) always <0.05, and therefore the model can be considered valid. EFA (Exploratory factor analysis is a statistical technique used to identify and understand the underlying dimensions (or factors) that explain the correlations between a set of observed variables) performed shows all values >0.500, for all individual items and sections, except for item F3, which shows a value of 0.398, which is interpreted as reduced appropriateness, but still above 0.300 (excessively poor index). Again, the multivariate regression model showed interesting correlations with registry age (the higher the age, the higher the risk of burnout, $p=0.004$), type of service (operators are at higher risk of burnout, $p=0.001$), and geographic distance between home and operating location (the greater the distance, the higher the risk of burnout, $p=0.002$), showing that the burnout condition is fueled or otherwise exacerbated by perceived unfair or otherwise stressful living and working conditions compared to the job performance itself. Finally, the outcomes of the correlation matrix ($r=0.842$, $p=<0.001$) of the Shapiro-Wilk normality test ($W=0.981$, $p=0.021$) and the T-test for paired ($d=0.023$, $p=0.769$) confirm the validation of BORI-1 and its ability to investigate burnout risk and related suicidal risk, which in literature are associated and influenced by factors such as stress tolerance and depressive symptoms on a psychopathological basis (Perrotta et al., 2023a). Statistical comparison between BORI-1-v2 and BAT, taking into account the specific limitations of the study, showed good significance, with a discrete correlation matrix and with a share of discordance between the final outcomes of the two questionnaires to the extent of 41/167 (25%), including 15/41 (37%) with worse scores in the BAT, then returned in the second administration due to the presence of a negative influencing element in the compilation of responses. The main purpose of the BORI-1-v2 is not to replace previous tests used in literature, comparing strengths or weaknesses, but to integrate research on the topic of burnout using the symptomatic profile (with clinical matrix) of the subject studied and his/her specific suicide risk. It is therefore a questionnaire that does not replace the use of other questionnaires but integrates them to ensure a greater overall vision when the therapist must diagnose the burnout syndrome and the related suicide risk (investigating it directly).

5. Limitations and future Prospectives

The present study has structural and functional limitations that, in the authors' opinion, do not affect the quality of the results obtained but should be taken into consideration for future research to avoid analytical bias. Structurally, the choice of the population sample suffers from selection biases related to numerosity (which is why the study is classified as "modest" although the sample is representative, based on the statistical data obtained), gender of professional activity (thus grouped by gender but not by type: state police, military police, border police, financial police, army, navy, air force, coast guard, intelligence services), and history of burnout symptoms, determined on the basis of a history prior to the administration of the questionnaire. In addition, the absence of a follow-up assessment of the management of medium to severe symptoms is another limit to be evaluated in future studies. Selection bias related to geographic location could not be avoided, as the population sample did not offer more opportunities and thus selection was strongly influenced

by a massive presence of subjects with Southern Italian backgrounds; finally, the low representation of the female population severely limits the scope of the results. Future studies will analyze the phenomenon starting from the assumption of a selection of both the clinical and control groups. Functionally, the results can be considered functional and applicable to the general reference population, but new studies with larger population samples are underway.

6. Conclusions

BORI-1-v2, considering the limitations of the study, showed good efficiency and effectiveness, to detect burnout risk early or identify the syndrome already in progress, with special attention to the associated suicidal risk. The sectional structure, devoted to clinical symptoms, also offers more insights because of the clinical evaluation in case of positivity in the questionnaire. The validity of the questionnaire is confirmed by statistical analysis, thus offering the therapist a new psychometric tool, not currently present in the literature, capable of investigating the clinical symptoms of burnout syndrome and the related suicide risk. The research stands out for its intent to overcome the limits of the tools used so far, proposing a model that, in addition to identifying the symptoms of burnout, explores the personal and relational dimensions of the individual. BORI-1-v2 is thus proposed not only as an indicator of discomfort, but also as a guide for the interpretation of risk in a predictive and multifactorial way.

In the future, this questionnaire will be used with larger population samples, including both the clinical group and the control group, and with extension to other occupational types, such as health care, transportation, and night workers.

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Ethics profile: Approval by the Ethics Committee (IRB) of the Istituto per lo Studio delle Psicoterapie (ISP), Rome (Italy), dated July 28, 2025, no. ISP-IRB-2025-10.

Informed Consent Statement: Subjects were recruited who gave regular informed consent and treatment of sensitive data; moreover, via Google forms prepared and maintained exclusively by Antonio Marciano.

Data Availability Statement: The data are stored and managed by Antonio Marciano, while Giulio Perrotta processed them exclusively in aggregate and anonymous form.

Authors' contribution: Giulio Perrotta is the creator and sole owner of the questionnaire, and he alone holds the rights of use and exploitation, including economic exploitation, of the invention. He also drafted the manuscript, assuming the role of corresponding during revision, application and publication. Antonio Marciano freely revised, in support of Giulio Perrotta, some items of the questionnaire, prior to administration. He provided data collection, administration of the questionnaires for the present research and statistical analysis of the data. He also contributed to the editing of the "results" section. Stefano Eleuteri contributed to the revision and first publication phase of the final manuscript.

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