ORIGINAL ARTICLE

Psychometric Properties of a Brief Version of the Perception of Risk of Heart Disease Scale in an Italian Sample

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Abstract

Introduction The number of Italian citizens unaware of their risk of cardiovascular disease it is still very high.

Aim This study aimed to translate and preliminarily validate a brief Italian version of the Perception of Risk of Heart Disease Scale (PRHDS).

Methods PRHDS was culturally adapted to the Italian context. Then, the scale was administered to 772 healthy adults. By randomly dividing the sample into two subsamples, we tested the scale dimensionality through Exploratory Factor Analysis (EFA) followed by Confirmatory Factor Analysis (CFA). Finally, we evaluated internal consistency.

Results Psychometric properties of the scale were appropriate. EFA and CFA evidenced a unidimensional structure of a brief version of the scale, composed of six items. Internal consistency was adequate.

Conclusions Italian version of the brief PRHDS is a promising self-report questionnaire to measure cardiovascular risk perception among Italian adults.

1 Introduction

Cardiovascular diseases (CVD) still represent the leading cause of death globally. The burden of CVD represented by the number of disability-adjusted life years (DALY) and deaths, continues to increase as well as the burden attributable to modifiable risk factors [1].

Despite efforts to increase the awareness of modifiable cardiovascular risk factors in primary and secondary prevention, the number of patients with unknown arterial hypertension, one of the most relevant risk factors for CVD, is still on the rise [2, 3]. Thus, there is room for further improvement in the awareness and knowledge of the subjects'

cardiovascular risk profile to prevent the development of target organ damage and, ultimately, CVD.

Data from the REduction of Atherothrombosis for Continued Health Registry in Europe showed that the patients' awareness of their risk factor profile is positively related to better control of their cardiovascular risk factors [4]. However, data on awareness are conflicting: some studies have highlighted that patient underestimate their risk profile [5, 6] but other studies did not confirm this evidence. For example, the Patient and Provider Assessment of Lipid Management Registry data showed that most patients overestimate their 10-year CV risk [7].

Using validated self-reported questionnaires would make it possible to record patients' perception of cardiovascular risk in a simple, fast, and reliable way however, the subjects' perceived cardiovascular risk is often self-assessed without adopting validated questionnaires. Several questionnaires are available in the literature: the Heart Disease Fact Questionnaire [8], a 25-item questionnaire to evaluate the respondents' knowledge of major risk factors for the development of heart disease; the Health Beliefs Related to Cardiovascular Disease, a 25-item designed to measure beliefs related to cardiovascular disease risk and diet and exercise in adults

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with diabetes and the Attitudes and Beliefs about Cardio-vascular Disease Risk Questionnaire, a 26 items scale developed for Health Check programmes in United Kingdom [9].

We elected to evaluate a 20-item tool that estimates the subjects' perceived risk of developing CVD, the Perception of Risk of Heart Disease Scale (PRHDS) [10] that was preferred because of the lower number of items that could be more easily administered with a web-based platform.

As this scale was not validated in Italian, this study aimed at validating the PRHDS in the Italian language, administering its translation to a sample of healthy adults, and investigating its preliminary psychometric properties, thus making it available for Italian epidemiologic studies investigating CVD risk.

2 Materials and Methods

2.1 Participants

The data were collected via an anonymous online survey generated with the Google Form platform using a snow-ball sampling method between February and July 2022. The volunteers were recruited from the researchers' pool of acquaintances, word of mouth, and online social networks. All individuals with the following characteristics were eligible for enrollment: adults aged at least 18 years and individuals who could answer the online questionnaire independently. This second criterion translated into the ability to read and understand written Italian and the ability to use the computer to answer the questionnaire. Individuals diagnosed with cardiovascular disease were excluded from study participation for consistency with the original validation study [10].

People could access the questionnaire through an anonymous link without having to authenticate. The study was conducted following the American Psychological Association [11] ethical standards for treating human experimental volunteers and with the understanding and the written consent of each participant in compliance with the indications of the Declaration of Helsinki. Indeed, the participants were informed about the purposes of the study and gave informed consent electronically, and they could abandon completing the questionnaire without consequences. Privacy and anonymity were guaranteed to all participants. The data collected were stored electronically and managed only for scientific research, according to Italian Legislative Decree No. 101 of 10 August 2018, which regulates the protection of individuals concerning the processing of personal data.

2.2 Translation of the PRHDS Dread Risk

After obtaining the authors' written consent for the instrument's use and translation, PRHDS was culturally adapted to the Italian context. The adaptation of Brislin's model was used as a guide [12]. According to this methodology, a team approach was used during the retranslation process, which guaranteed high accuracy in the various stages of the cultural adaptation process. Two bilingual authors translated the text from English into Italian independently. A third investigator retranslated each version of the Italian text into the original (English) language.

Subsequently, all authors met in a consensus meeting to discuss the forward translation and find the best solution for the Italian context. A native speaker translated the final version of the instrument back into English. Finally, the instrument was submitted to the original author, who approved the new text formulation.

Following the recommendations of Polit and Beck [13], the face and content validity of the PRHDS were tested. Six panelists from outside the research group were involved: two nurses, two physicians, and two lay people. The panel of experts consisted of four women and two men. All experts had a university degree, and three had a Ph.D. Three open-ended questions were submitted to the panel to assess the instrument's face validity. We first asked these experts to rate each item's relevance to the conceptual definition. Then, we asked them to critique the clarity of each item in terms of content and style. Finally, we asked them to evaluate items' comprehensiveness on dichotomous and 4-point scales ranging from 1 (not relevant) to 4 (very relevant).

One of the most widely used measures to define content validity is the content validity index (CVI) [14]. The CVI includes the calculation of the Item Content Validity Index (I-CVI) and the Scale Validity Index (S-CVI).

The I-CVI is the index of inter-rater agreement [14] regarding the content validity of an individual scale item by simply expressing the proportion of agreement [15]. Content experts are asked to rate each item of the assessment instrument in terms of its relevance to the construct [15]. This is usually calculated by summing the number of experts who gave each item a rating of 3 or 4 on a 4-point Likert scale (1 = not relevant, 2 = somewhat relevant, 3 = fairly relevant, 4 = very relevant) [14] divided by the total number of experts involved in the rating [14, 15]. According to Lynn [16], the minimum acceptable value of I-CVI is closely related to the number of experts involved in the evaluation [14]. In fact, Lynn states that with a number of experts of six, the minimum acceptable I-CVI is 0.83 [14, 15], i.e. only one dissenting opinion (<4 on the Likert scale) [15]. Researchers have used the information on the I-CVI to guide them in the revision, deletion or replacement of items [15].

The S-CVI indicates the content validity of the overall scale [15]. To validate the PRHDS, the researchers used the Scale Validity Index Average (S-CVI/AVE), which is the average of the I-CVI for all items in the scale being assessed [15]. According to the literature, the standard criterion for acceptability when calculating the S-CVI/AVE is 0.80 [14]. This parameter has been calculated as the sum of the values of the individual I-CVIs divided by the number of items under analysis [14, 15].

2.3 Assessment of Other Indicators

In addition to the Italian version of the PRHDS, the online questionnaire collected demographic (i.e., age, gender, education, working status, marital status) and anthropometric (body mass index, BMI) information. Moreover, it collected clinical information (family history of cardiovascular diseases) and information about the presence of cardiovascular risk factors (hypertension, hypercholesterolemia, and diabetes). Age and BMI were treated as continuous variables. All the other variables were treated as dichotomous variables (Table 1).

Perceived Health was assessed through a single question. Participants had to complete the sentence "Would you say your health is" by marking an adjective on a 5-point Likert scale, where 1 was "bad", and 5 was "excellent".

2.4 Statistical Analysis

The items of the Brief PRHDS were preliminarily submitted to analyses to check the normal distribution by calculating mean, standard deviation, and indices of skewness and kurtosis; West and colleagues [17] recommend concern if skewness > |2| and kurtosis > |7|.

We used a brief version of the original scale. Therefore, using two different samples, we tested its dimensionality through Exploratory Factor Analysis (EFA) followed by Confirmatory Factor Analysis (CFA). This approach is the most common to scale development and validation [18]. Our sample size (772 individuals) was sufficient to use EFA in a random split-half of the sample and CFA in the second split-half. The minimum sample size for carrying out the factorial analysis was established following the indications of Nunnally [19], who suggested that the minimum ratio between the number of subjects and the number of variables is 10:1. In the case of the present study, the minimum number of subjects for conducting the analyses was 140. Therefore, the total sample was randomly divided into two samples of 386 individuals.

Regarding EFA, we ran the Kaiser Meyer Olkin (KMO) and Bartlett's test of sphericity to be sure that the correlation matrix could be subjected to analyses. KMO should be > 0.6, and Bartlett's test of sphericity should be

Table 1 Sample sociodemographic and health status characteristics. Total Sample; *n* = 772

Sociodemographic characteristics		
Age	Mean (SD)	40.67 (13.76)
	Range	18–83
Gender: *n* (%)	Female	447 (57.9%)
	Male	325 (42.1%)
Education: *n* (%)	13 years or less	343 (44.4%)
	More than 13 years	429 (55.6%)
Working Status: *n* (%)	Working	646 (83.8%)
	Not working	125 (16.2%)
Marital Status: *n* (%)	Married, civilly united, or in a stable relationship	469 (62.2%)
	Single	227 (30.1%)
	Separated/Divorced	50 (6.6%)
	Widowed	8 (1.1%)
Health status characteristics		
BMI	Mean (SD)	23.93 (3.90)
	Range	16.76–39.18
Familiarity with CVD: *n* (%)	No	421 (55.0%)
	Yes	345 (45.0%)
Hypertension: *n* (%)	No	675 (87.4%)
	Yes	97 (12.6%)
Hypercholesterolemia: *n* (%)	No	650 (84.2%)
	Yes	122 (15.8%)
Diabetes: *n* (%)	No	764 (99.0%)
	Yes	8 (1.0%)

significant. The criterion of eigenvalue greater than one, analysis of the scree plot, explained variance and theoretical sense determined the best-fitting factor solution. In the first stage, all items were included. Subsequent factor analyzes were conducted iteratively, eliminating one item at a time until a stable factor solution was found. Items with a factor loading < 0.32 were progressively excluded. After the first step, items loading at > 0.32 on more than one factor were excluded. Loadings in the 0.32 range or above are generally considered the cut-off on substantial loadings [20].

Regarding CFA, we used the Maximum Likelihood (ML) estimation method. A unidimensional factor model was tested to examine the factorial structure of the Brief PRHDS. The model loaded all items onto a single latent factor, assuming that all items tap into the same underlying latent construct (i.e., Cardiovascular Risk Perception). The model was initially run without specified error correlations. The potential modification of this model was based on the modification indices and content-based considerations. The goodness of fit of the model was evaluated using the χ^2, the Tucker–Lewis incremental fit Index (TLI) [21], the Comparative Fit Index (CFI) [22], the standardized root-mean-square residual (SRMR; Pavlov et al., 2020), and the Root Mean Square Error of Approximation (RMSEA) [23]. Values close to 0.06 for the SRMR and RMSEA indicate a good fit; between 0.06 and 0.08 a moderate fit and values larger than 0.10 indicate a poor fit [24]. For the CFI and TLI, values of 0.95 or above indicate a good fit, whereas values of 0.90 and < 0.95 are taken as marginally acceptable fit [24].

The reliability of the Brief PRHDS was assessed based on internal consistency, calculating Cronbach's alpha (1971), McDonald's omega (1999), and the item's inter-correlation coefficients. Cronbach's alpha and McDonald's omega above 0.60 are acceptable, and the item's inter-correlation coefficients higher than 0.30 are adequate [25].

Finally, we investigated the association of the Brief PRHDS scores with sociodemographic variables (i.e., age, gender, education, marital status), health status indicators (i.e., BMI, family history of cardiovascular diseases, hypertension, hypercholesterolemia, and diabetes) and the perceived health measure.

The association between the Brief PRHDS scores and continuous variables (i.e., age, BMI, and perceived health) was evaluated by correlations. Following guidelines by Cohen (1988), we interpreted correlations as measures of effect size. Correlations were considered weak ($|0.10| < r < |0.29|$), moderate ($|0.30| < r < |0.49|$), or strong ($|0.50| < r < |1|$). The association between the Brief PRHDS scores and categorical variables (i.e., gender, education, marital status, familiarity with cardiovascular diseases, hypertension, hypercholesterolemia, and diabetes) was evaluated by

a series of independent sample t-tests. Assumption checks were performed before each t-test by evaluating skewness and kurtosis to check the normal distribution of the variables and Levene's test to check the variances' homogeneity. Based on the assumption checks results, t-tests were performed using Welch's Test (unequal variances) or Student's Test (equal variances).

All statistical tests were two-tailed, and a $p \leq 0.05$ was considered statistically significant. Data analyses were performed using the IBM SPSS Statistics for Windows, version 26.0, and Jamovi, version 2.2.5.

3 Results

Participants were 772 native Italian adults ranging in age from 18 to 83 years (M_{age} = 40.7 years; SD = 13.7 years). They were equally distributed for gender, with 447 women (57.9%), and for education, with 429 participants (55.6%) who earned at least a bachelor's degree. Most participants were workers (83.8%) and were married, civilly united, or in a stable relationship (62.2%). Regarding their health, their BMI ranged from 17 to 39 (M_{BMI} = 23.93; SD = 3.90). About half of the participants had a family history of CVD (45%). The sample included subjects with low cardiovascular risk as only 12.6% had hypertension), 15.8% hypercholesterolemia, and 1% diabetes. The complete description of the participants concerning sociodemographic and health status characteristics is reported in Table 1.

3.1 Translation, Face and Content Validity of the PRHDS

The six panelists eliminated four items after the first round because they had a very similar meaning after translation into Italian (items 7 and 9 of the original scale had a similar meaning to item 1; items 15 and 16 had a similar meaning to item 11). Furthermore, the experts suggested rewriting the items that contained a negation (items 3, 10, 12, 14, 17, 19) to make them more understandable.

Once the requested changes had been made, the scale was sent to the experts. At the end of the second round, all I-CVI indices were above 0.70, except for items 14 and 19 (I-CVI = 0.66, see Table 2). After careful evaluation by the research team and the panelists, these items were removed from the Italian version of the scale due to their lack of representativeness with respect to the construct they were intended to measure in the Italian text. The final CVI for the overall scale was 0.97.

Table 2 Content validity. Panelists (*n = 6*)

Item description	I-CVIs
Item 1	0.83
Item 2	1
Item 3	1
Item 4	1
Item 5	1
Item 6	1
Item 8	1
Item 10	1
Item 11	0.83
Item 12	0.83
Item 13	1
Item 14	0.66
Item 17	0.83
Item 18	0.83
Item 19	0.66
Item 20	0.83

3.2 Descriptive Statistics and Preliminary Analyses

Table 3 illustrates descriptive statistics of the PRHDS items resulting from the content validity analysis. All items met the criteria to assume their normality (i.e., skewness < |2| and kurtosis < |7|).

The participants randomly assigned to EFA or CFA did not significantly differ in age [t(df = 770) = 0.13, p = 0.894], gender [$\chi^2(1,772)$ = 2.57, p = 0.109], education [$\chi^2(1,772)$ = 0.08, p = 0.772], working status [$\chi^2(1,771)$ = 1.41, p = 0.235], and marital status [$\chi^2(1,754)$ = 0.96, p = 0.328].

3.3 Factor Structure of the Brief PRHDS: Exploratory Factor Analysis

Data from the first sample were used in this analysis. The Bartlett's sphericity test (χ^2 = 1335.48, p < 0.001) and the KMO (equal to 0.80) ensured that the correlation matrix could be subjected to factor analysis. The analysis indicated that a single-factor solution was the most appropriate. After subsequent factor analyses were conducted stepwise, the initial pool of fourteen items was reduced to six (factor loadings of the initial 14 items are listed in the Appendix). Table 4 reports the pattern of factor loadings from the exploratory measurement model for the final six items. No item displays a loading lower than 0.32. The total variance explained by the factor extracted was 39.95%.

3.4 Factorial Validity of the Brief PRHDS: Confirmatory Factor Analysis

Confirmatory factor analysis was conducted separately on data from the second sample using the final six items of EFA. The model provided a not fully acceptable fit to the data [$\chi^2(9, 386)$ = 89.26; p < 0.001; TLI = 0.795; CFI = 0.877, RMSEA = 0.152; SRMR = 0.060]. The magnitude of the modification index between items 4 and 5 was high, indicating additional covariance of item pair after controlling for cardiovascular risk perception. Therefore, a model with correlated residuals between items 4 and 5 was specified and tested against the first model. The resulting model provided a good fit to the data and fitted significantly better than a model without correlated residuals [$\chi^2(8, 386)$ = 35.365; p < 0.001; TLI = 0.921; CFI = 0.958, RMSEA = 0.094; SRMR = 0.042]. All factor loadings were substantial.

Table 3 Descriptive statistics of the Brief PRHDS items

	N	Mean	SD	Min–Max	Skewness	S.E.	Kurtosis	S.E.
Item 1	772	2.567	0.714	1–4	−0.388	0.088	−0.117	0.176
Item 2	772	2.223	0.709	1–4	0.220	0.088	−0.081	0.176
Item 3	772	2.452	0.760	1–4	−0.006	0.088	−0.359	0.176
Item 4	772	1.986	0.781	1–4	0.401	0.088	−0.366	0.176
Item 5	772	1.956	0.747	1–4	0.520	0.088	0.109	0.176
Item 6	772	2.282	0.871	1–4	0.176	0.088	−0.672	0.176
Item 7	772	2.168	0.774	1–4	0.255	0.088	−0.321	0.176
Item 8	772	2.557	0.798	1–4	−0.126	0.088	−0.428	0.176
Item 9	772	2.098	0.708	1–4	0.341	0.088	0.103	0.176
Item 10	772	2.715	0.732	1–4	−0.294	0.088	−0.063	0.176
Item 11	772	3.106	0.746	1–4	−0.757	0.088	0.714	0.176
Item 12	772	2.648	0.789	1–4	−0.288	0.088	−0.284	0.176
Item 13	772	2.075	0.800	1–4	0.488	0.088	−0.093	0.176
Item 14	772	1.929	0.727	1–4	0.679	0.088	0.700	0.176
Mean score	772	2.197	0.525	1–4	0.153	0.088	0.161	0.176

Table 4 Pattern of standardized factor loadings from AFE and AFC

	AFE sample	AFC sample
Item 7: Sono a rischio di avere una malattia cardiaca *I am at risk for getting heart disease*	0.760	0.794
Item 2: C'è una buona possibilità che io abbia una malattia cardiaca nei prossimi 10 anni *There is a good chance I will get heart disease during the next 10 years*	0.671	0.694
Item 5: Se mantengo il mio stile di vita avrò di sicuro una malattia cardiaca *I feel sure that I will get heart disease*	0.636	0.508
Item 4: Ho un'alta probabilità di avere una malattia cardiaca a causa dei miei comportamenti passata *I have a high chance of getting heart disease because of my past behaviors*	0.624	0.570
Item 1: È possibile che io mi ammali di una malattia cardiaca *There is a possibility that I have heart disease*	0.619	0.690
Item 6: È difficile mantenere uno stile di vita sano *Healthy lifestyle habits are unattainable*	0.438	0.363

Table 4 presents the standardized factor loadings in the CFA sample.

3.5 Internal Consistency of the Brief PRHDS

The reliability analysis performed on the data collected from all 772 participants showed that the scale has adequate internal consistency. Cronbach's alpha and McDonald's omega were adequate: $\alpha = 0.788$, $\omega = 0.796$. Moreover, the intercorrelations coefficients of items were all larger than 0.39, indicating adequate internal consistency.

3.6 Associations Between the Brief PRHDS and Sociodemographic and Health Status Indicators

The Brief PRHDS score computed as average items' score met the criteria to assume their normality (i.e., skewness < |2| and kurtosis < |7|).

Regarding sociodemographic variables, the correlation between the Brief PRHDS and age was not significant ($r = 0.066$, $p = 0.067$). The group differences were not significant for gender [$t(770) = 0.054$, $p = 0.957$], education [$t(770) = -0.330$, $p = 0.741$], and marital status [$t(752) = 0.285$, $p = 0.776$]. The group differences were significant for working status [$t(769) = -2.951$, $p = 0.003$]. Working participants scored significantly higher on the Brief PRHDS (mean = 2.22, SD = 0.54) compared to not working participants (mean = 2.07, SD = 0.51), with a small effect size (Cohen's d = −0.29).

Regarding health status indicators, the correlation between the Brief PRHDS and BMI was positive but rather weak ($r = 0.233$, $p < 0.001$). The group differences were significant for family history of CDV [$t(764) = -4.798$, $p < 0.001$]. Participants with family history of CDV scored significantly higher on the Brief PRHDS (mean = 2.30, SD = 0.52) than participants without family history of CDV (mean = 2.12, SD = 0.53), with a moderate effect size (Cohen's d = −0.35). The group differences were also significant for the presence of hypertension [Welch $t(117) = -3.888$, $p < 0.001$]. Participants with hypertension scored significantly higher on the Brief PRHDS (mean = 2.42, SD = 0.60) than participants without hypertension (mean = 2.17, SD = 0.52), with a moderate effect size (Cohen's d = −0.45). The group differences were not significant for the presence of hypercholesterolemia [Welch $t(159) = -1.611$, $p = 0.109$]. The group differences for the presence of diabetes were not calculated due to the low number of participants who reported having this risk factor (1.0%).

The correlation between the Brief PRHDS and the perceived health measure was negative and of moderate size ($r = -0.340$, $p < 0.001$), indicating that higher cardiovascular risk perception scores were associated with lower scores on perceived health.

4 Discussion

In the present study, we translated the English version of the PRHDS into Italian and analyzed its preliminary psychometric properties by administering it to a sample of Italian adults. Overall, the results suggest that the brief PRHDS is a promising instrument for assessing cardiovascular risk perception among healthy Italian adults with a lower number of items compared to the original version of the scale. However, this scale deserves to be further evaluated in different cohorts, given the high variability of CV risk factor prevalence in different populations [26], and can represent a useful tool for Italian epidemiological studies evaluating the patient's CVD risk perception.

An instrument that can assess the perception of the risk of heart disease is helpful for healthcare institutions to plan educational and awareness interventions on cardiovascular prevention, coherently with the evidence that people often underestimate their CV risk profile [5, 6, 27]. Nevertheless,

adopting a tool developed for a different cultural and linguistic context can lead to misinterpretation [28]. Therefore, it is essential to check whether a tool is equivalent to the original in both semantic and cultural forms following appropriate methodology.

In our study, the content validation process showed some critical points concerning the adaptation of some items from English to Italian. In fact, during the CVI, the panel of experts pointed out that some items translated into Italian had a similar meaning. Therefore, such items were deleted by the authors, thus reducing the scale from 20 to 16 items. In addition, the panelists requested that the negative items be transformed into positive ones to have a better and unambiguous understanding of the scale. During this process two additional items were eliminated.

Exploratory and confirmatory factor analyses revealed a good fit to a unidimensional model loading a reduced set of six items onto one latent factor. Cronbach's alpha and McDonald's omega were good and suggested that the Brief PRHDS has acceptable internal consistency.

The original scale consists of 20 items, measuring three dimensions: Dread Risk (7 items), Risk (6 items), and Unknown Risk (6 items) [10]. These three dimensions seem to be mainly an expression of how high or low the subjects' risk perception is. Therefore, in our opinion, the original items could be reduced to one dimension only, as found in the Italian version of the scale. Furthermore, the authors of the original scale were of the opinion that the dimensions of the scale had to be modified in order to be in line with the authors' choice of reference conceptual framework [29–32]. The original scale is based on the conceptual framework that adopts the psychometric paradigm of measuring perceived risk by asking people to make their own judgements or beliefs about the risk. In the psychometric paradigm, people make quantitative judgments about the riskiness of different hazards and the desired level of preventing them from occurring [32]. Interestingly, the six items of the Italian version describe the first dimension (dread risk) of the original scale. The PRHDS obtained after the validation process in Italian consists of six items. The brevity of the Italian version could be a point of strength in the administration of the scale. A high number of items to be administered through a questionnaire in a clinical setting is often unfeasible. Short questionnaires are more suitable than longer ones because they are less onerous and much quicker to complete. Prior research [33] showed that administering too-long tools could lead to a high non-response rate to questions. The latter can result in both difficulties in data analysis and a reduction in sample size. Nevertheless, such a relevant item reduction compared to the original scale can represent a limitation as shorter scale can have a limited accuracy in detecting risk perception compared to the original one.

The analysis of the association between the brief PRHDS and sociodemographic indicators showed that workers tend to have a higher risk perception compared to non-workers [2, 3]. This finding is of interest and, although potentially mediated by other confounders such as the socioeconomic status, of public health interest as non-workers, compared to workers employed by a company for instance, are not subject to regular and systematic CV screenings. In a cross-sectional study conducted in China among 692 subjects, individuals who were older, had a higher monthly income, and had diabetes were more prone to perceive higher CVD risk [3]. However in this study a different questionnaire was adopted for CVD risk perception (the Attitude and Beliefs about Cardiovascular Disease (ABCD) Risk Questionnaire) making it difficult to compare the findings with our results.

As expected, risk perception was significantly associated with BMI, family history for CVD and arterial hypertension. Interestingly, when examining the association between the brief PRHDS and health status indicators we found that the greater the CV risk perception, the lower the overall health perception suggesting an inverse correlation.

4.1 Limitations

We must acknowledge some limitations of the present study. Our data were primarily collected in a non-probabilistic sample of subjects living in one specific Italian region (Lombardy) in Italy. Thus, our results could be affected by this selection bias. Moreover, we did not collect test-retest data or evaluate convergent and discriminant validity. Future studies should investigate these specific reliability dimensions of the PRHDS. Nevertheless, our preliminary study offers encouraging results regarding the validity and reliability of a short and easy-to-administer version of the PRHDS in the Italian context but needs further confirmation.

5 Conclusion

In conclusion, our study suggests that the Italian version of the brief PRHDS is a promising self-report questionnaire to measure cardiovascular risk perception among Italian adults. These findings represent a starting point for overcoming some significant concerns of previous literature [5, 6] particularly the limited number of psychometrically sound questionnaires on cardiovascular risk perception. If further validated in other cohorts such tool can become a useful tool in both research and clinical settings to investigate the perceived CV risk and help tailoring CV screening programs.

Appendix

1. Pattern of Standardized Factor Loadings of the Initial 14 Items from AFE

	Factor loading
Item 7	0.744
Item 5	0.674
Item 2	0.647
Item 4	0.645
Item 1	0.588
Item 6	0.461
Item 8	−0.365
Item 12	−0.257
Item 3	0.195
Item 10	0.174
Item 14	0.174
Item 13	0.095
Item 11	0.064
Item 9	0.052

2. Final Version of the Brief Italian Perception of Risk of Heart Disease Scale (PRHDS)

	Forte-mente in disaccordo (*Strongly Disagree*)	In disac-cordo (*Dis-agree*)	D'accordo (*Agree*)	Fortemente d'accordo (*Strongly Agree*)
1. È possibile che io mi ammali di una malattia cardiaca	1	2	3	4
2. C'è una buona possibilità che io abbia una malattia cardiaca nei prossimi 10 anni	1	2	3	4
3. Ho un'alta probabilità di avere una malattia cardiaca a causa dei miei comportamenti passati	1	2	3	4
4. Se mantengo il mio stile di vita avrò di sicuro una malattia cardiaca	1	2	3	4
5. È difficile mantenere uno stile di vita sano	1	2	3	4
6. Sono a rischio di avere una malattia cardiaca	1	2	3	4

Declarations

References

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