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Dimensionality and Accuracy of Measurement Based on Item Response Theory in the Fatalism Scale During the COVID-19 Pandemic in Italy

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Abstract

The Fatalism Scale is a valid and reliable instrument for measuring fatalistic beliefs about health. However, no previous studies have been conducted to verify its psychometric properties across different populations and, most importantly, during a public health emergency. Hence, this study aimed to examine the factorial structure, reliability, construct validity, and accuracy of measurement of the Fatalism Scale during the COVID-19 pandemic among Italian-speaking people. The total sample was comprised of 300 participants. Both exploratory and confirmatory factor analyses were performed. Construct validity was estimated by comparing fatalism scores with two theoretically-related constructs (i.e., optimism, locus of control). The test information function was analyzed to evaluate the accuracy of measurement based on item response theory (IRT). Differences in fatalism scores across gender were examined by performing MANOVAs. Results show a four-factor model: Luck, Powerlessness, Predetermination, and Pessimism with adequate fit indices and satisfactory internal consistency. Data support the expected relationships between fatalism subscales and related measures. The test information function and standard error curve provide the largest amount of information around θ= zero and two standard deviations above the mean in the latent trait. Significant differences across gender are observed in Luck and Pessimism subscales. Our study suggests that the Fatalism Scale is a valuable tool for assessing fatalism during an acute health crisis among Italian-speaking people. This instrument might be useful for assessing fatalism during future waves of the COVID-19 pandemic and other public health crises.

Key words: fatalism, optimism, health, locus of control, COVID-19 pandemic.

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Novelty and Significance

What is already known about the topic?

- The Fatalism Scale is a valid and reliable instrument for measuring fatalistic beliefs about health.
- No previous studies have been conducted to verify its psychometric properties across different populations and, most importantly, during a public health emergency.

What this paper adds?

- This study examined the psychometric properties of the Fatalism Scale during the COVID-19 pandemic among Italian-speaking people.
- This instrument might be useful for assessing fatalism during future waves of the COVID-19 pandemic and other public health crises.

In the last decades, a number of scholars have focused on the role of fatalism in health-related behaviors both as an independent and a dependent variable, as well as a mediator and a moderator (de Dios, Childress, Cano, McNeill, Reitzel, & Vaughan, 2020). This interest has been generated by the fact that fatalistic beliefs are correlated with poor self-care behaviors, low level of health prevention, mistrust in medication, and attitudes towards unsafe and risky activities (Lee & Chae, 2016; Ngueutsa & Kouabenan, 2017; Teye-Kwadjo, 2019).

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As a matter of fact, findings from recent research have outlined the relationship between fatalistic beliefs and a broad range of harmful outcomes linked to several health diseases, as cancer (Amuta, Chen, & Mkuu, 2017; Vrinten, Wardle, & Marlow, 2016), cardio-metabolic dysfunction (De los Monteros & Gallo, 2013), hypertension (Gutiérrez, McCurley, Roesch, Gonzales, Castañeda, Penedo, & Gallo, 2017), substance use (Escobedo, Allem, Baezconde-Garbanati, & Unger, 2018), diabetes (Saidi, Milnes, & Griffiths, 2018; Sukkarieh-Haraty, Egede, Abi Kharma, & Bassil, 2019), and HIV/AIDS (Craig-Kuhn, Schmidt, Lederer, Gomes, Watson, Scott, Martin, & Kissinger, 2020). As many others have pointed out, fatalism was also associated with lower intentions to change behavior (Entwistle, 2020), lacking skills in coping (Shahid, Beshai, & Del Rosario, 2020), higher levels of stress (Zuo, Zhang, Wen, & Zhao, 2020), and a poorer health-related quality of life (Bustillo, McGinty, Dahn, Yanez, Antoni, Kava, & Penedo, 2017). Thus, evaluating fatalistic attitudes in clinical intervention might help increase the likelihood of behavioral change and reduce the health risk.

More importantly, currently, fatalism "accompanies the life of people from individualist cultures, who live in a highly developed, or even opulent, economic context. In this case, fatalism is like some mood of uncertainty, insecurity, and helplessness following the events that characterize the society of global risk" (Blanco & Díaz, 2007, p. 552).

Despite the large amount of studies on this topic, a solid and comprehensive theoretical model of fatalism does not exist, thus generating various conceptualizations and multiple operationalizations. Initially, Ross, Mirowsky, and Cockerham (1983) defined fatalism as the belief that each outcome derives from external forces. Subsequently, Futa, Hsu, and Hansen (2001) argued that having a fatalistic view of life means accepting one's situation without potential for change, since events are fixed in advance.

In line with these definitions, some authors focused on individuals' perceived lack of internal control over situations happening in their lives, and on fate, predetermination, and luck. Hence, regarding the specific association with health, some scholars likened fatalism to external health locus of control, as the belief that health conditions and outcomes depend on external forces, powerful others, and chance (Flórez, Aguirre, Viladrich, Céspedes, De La Cruz, & Abraído-Lanza, 2009; Franklin, Schlundt, McClellan, Kinebrew, Sheats, Belue, Brown, Smikes, Patel, & Hargreave, 2007).

Further, according to early research, being fatalistic means being pessimistic about future outcomes, including feelings of hopelessness and meaninglessness (Powe & Johnson, 1995; Scheier & Bridges, 1995). In this perspective, findings from empirical studies (Joiner, Pérez, Wagner, Berenson, & Marquina, 2001; Piña Watson & Abraído Lanza, 2017) reported some associations between pessimism and fatalism in health self-care behaviors and health conditions. Besides, as regard gender differences in fatalism grades, outcomes are conflicting and inconsistent. Indeed, some research reported weak or non-significant differences between male and female participants (Caplan & Schooler, 2003; Shen, Condit, & Wright, 2009), whereas according to other scholars (Maercker Ben-Ezra, Esparza, & Augsburger, 2019; Welch & Ellis, 2018), females tended to have a more pessimistic view about their own health and life conditions rather than males.

Along with the proliferation of several conceptualizations, a quite large number of scales assessing fatalism have been developed. However, some measures have been developed ad hoc for a specific study, and most of them are not psychometrically sound measures, due to the lack of studies examining reliability and validity of assessments, as well as their factor structure.

Among the fatalism scales, the Powe Fatalism Inventory (PFI; Powe, 1995) is nearly the most widely used measure, though lacking evidence to support its content and construct validity. Furthermore, PFI items are strictly linked to cancer disease and some of them, especially those related to death, may not be appropriate to assess the fatalistic beliefs about other diseases.

The Fatalism Scale (FS; Shen *et alia*, 2009) was developed to overcome the PFI's limitations. The original study aimed to validate a new scale with more robust psychometric properties, applicable across different health conditions and cultures. Authors conceptualized fatalism as a combination of three beliefs: Pessimism, Luck, and Predetermination. After dropping items with low face validity and low levels of understandability, the final version of the measure resulted in a 20-item scale.

The underlying structure of the scale has been tested by performing confirmatory factor analysis. Validity has been examined evaluating the associations with external variables (i.e., genetic determinism, perceived benefits of lifestyle change, intentions to engage in healthy behaviors). Cronbach's alpha coefficients have been estimated, reaching values above .80 for each dimension and the whole scale, as well.

In other words, Shen *et alia* (2009) reported their Fatalism Scale as a valid and reliable instrument for measuring fatalism. Its lack of adherence to a specific disease makes it appropriate to assess fatalistic beliefs about health in general. However, no previous studies have been conducted to verify if the scale dimensionality is consistent across the different languages and, more important, if the scale shows adequate psychometric properties across different populations during a public health emergency.

The present research was undertaken to gather the validation of the Fatalism Scale to measure fatalism during an evolving public health crisis within the Italian population. Indeed, in line with much earlier research suggesting the need to test the factor structure stability across cultures and samples of commonly used instruments in several fields of psychological research, we consider it valuable to report further empirical data regarding the evaluation of the psychometric properties of the measurement scale (Chahin Cosi, Lorenzo Seva, & Vigil Colet, 2010; Faraci, Lock, Wheeler, 2013; Triscari, Faraci, D'Angelo, Urso, 2011).

To this purpose, the study was focused on investigating which factorial structure best explains the data, thus leading a contribution to research on both the cross-cultural applicability of the scale and its employ in measuring fatalism during public health crisis (e.g., COVID-19 pandemic). The study was further aimed at evaluating internal consistency reliability, evidence of validity, examining its correlations with some theoretically related variables, and mean scores comparison across gender.

Based on past literature, we hypothesized significant and negative associations between optimism and fatalism measures (Hayes, Ward, & McGregor, 2016). Besides, we expected that higher scores on fatalism would positively correlate with external locus of control, whereas it was supposed to find significant negative correlations with internal locus of control (Shahid *et alia*, 2020; Shen, 2017).

Method

Participants

The whole sample was composed of 300 participants (60% females), aged from 18 to 70 years (M= 33.91, SD= 10.97). In terms of educational level, 44% declared they had a university degree, 37% reported having a high school diploma, 14.7% were

post-graduated; and 4.3% had a junior school diploma. The total sample was divided in two random subgroups. The first subsample comprised 150 participants (56.7% females), with a mean age of 34.31 (*SD*= 10.13). Their educational backgrounds were: high school education (42%), graduation (42%), post-graduation (13.3%), junior school diploma (2.7%). The second subsample was made up by 150 participants (63.3% females), with a mean age of 33.86 (*SD*= 10.43). Most of them had a high educational level (32% had a high school diploma, 46% were graduated, and 16% were post-graduated), and 6% had an educational level lower than high school.

Translation and Adaptation Process of the Fatalism Scale

The items of the original version of the Fatalism Scale (Shen *et alia*, 2009) were first translated by three independent bilingual experts. Authors produced a synthesis of the three translated versions, resulting in one common translation. Afterward, a back-translation procedure was conducted by another scholar with adequate fluency in both languages. The authors then examined the original and back-translated versions, who considered them grammatically and semantically equivalent. The translated version was thus considered ready to use.

Measures and Instruments

Fatalism Scale (FS; Shen *et alia*, 2009). The FS is a 20-item measure, whose underlying factorial structure was estimated by performing confirmatory factor analysis, yielding a three-factor solution (i.e., Luck, Predetermination, and Pessimism) with adequate fit indices. Responses are on a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5), with higher scores indicating a higher fatalistic attitude.

Life Orientation Test-Revised (LOT-R; Giannini, Schuldberg, Di Fabio, & Gargaro, 2008). The LOT-R is a unidimensional 10-item scale developed to assess individual differences in generalized optimism versus pessimism. Responses are on a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5), with higher scores indicating greater optimism levels.

Health Locus of Control Scale (HLCS; Donizzetti & Petrillo, 2015). The HLCS is a 15-item measure, made up of three subscales: 1) internal locus of control, 2) external locus of control related to God, and 3) external locus of control related to Others (i.e., family members or friends). Responses are on a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). Individuals higher in internal health locus of control perceive themselves as able to control their own health conditions, whereas higher scores in external health locus of control –both God and Others– indicate people believing that their health is due almost entirely to external forces.

Procedure

Participants were recruited via social media, and they were invited to fill in an online questionnaire. They were informed that their participation in the study was voluntary, and they were also assured of the confidentiality of the information obtained. All procedures were performed in compliance with provisions from the Declaration of Helsinki regarding research on human participants. The research project was approved by the Ethics Committee of the Institutions.

Data Analyses

An exploratory principal axis factor analysis (promax rotation) was conducted with the first randomly selected subsample. Factor extraction was ruled following Kaiser's

criterion, along with the inspection of the scree plot. Random parallel analysis using O'Connor's syntax was also examined for agreement. Internal consistency reliability was estimated using Cronbach's ∝ and corrected item-scale correlations were computed for each subscale.

A least-square estimation confirmatory factor analysis was performed with the second random subsample to evaluate the closeness of the proposed model to the empirical data. Several goodness-of-fit indices were used to verify whether the fit was adequate to support the model: the ratio of the chi-square to degrees of freedom (χ^2/df), the Non-Normed Fit Index (*NNFI*), the Comparative Fit Index (*CFI*), the Standardized Root Mean Square Residual (*SRMR*), and the Root Mean Square Error of Approximation (*RMSEA*). *NNFI* and *CFI* values equal or greater than .95, *SRMR* values equal or lower than .10, and *RMSEA* values equal or lower than .08 have served as a rule of thumb for acceptable fit.

The test information function was analyzed on the whole sample to evaluate the accuracy of measurement based on item response theory (IRT). In addition, Pearson correlations with two theoretically-related variables (i.e., optimism and health locus of control) were computed on the second random subsample to investigate the validity related to other measures. Finally, multivariate analyses of variance (MANOVAs) were conducted on the total sample for comparing mean scores regarding gender with respect to the response variables (FS subscales' scores). The assumptions for the application of MANOVAs were firstly examined and the multivariate normality of the dependent variables was tested by the inspection of the Mahalanobis Distance.

RESULTS

Our findings do not show any statistically significant differences in sex (χ^2= 1.389, *df*= 1, *p*= .238), educational level (*U*= 10621.500, *p*= .367), and age (*t*= .669, *df*= 298, *p*= .504) between the two randomly selected subgroups, thus suggesting that the observed socio-demographic variables were equally distributed across the two examined subsamples.

Bartlett's Test of Sphericity (χ^2= 1963.200, *df*= 190, $p < .001$) and Kaiser-Meyer-Olkin Measure of Sampling adequacy (.87) suggest factorability. Both Kaiser's criterion and the scree plot suggest the extraction of four factors, whereas random parallel analysis indicates six factors to be retained. Nevertheless, this last resulting number of factors was over-defined, with factors loaded by only one or two indicators, items with loadings not reaching the minimum value of .30 on any factors, and a number of items loading simultaneously on two factors, without a difference of at least .30.

Based on the loading patterns, four factors are retained, explaining the 69% of the total variance. Two items are excluded due to their double-loading: item 3 loads at .567 on F2 and at .352 on F3; item 18 loads at .434 on F3 and at .424 on F4. The four identified factors may be labeled "Luck," "Powerlessness," "Predetermination," and "Pessimism." Reliability for all subscales is satisfactory, ranging from .77 (F4) to .93 (F1), alpha for F2 and F3 is .86 and .85, respectively. Table 1 shows the factor solution of the Fatalism Scale items. Table 2 depicts the factor correlation matrix, whose results support the application of an oblique rotation.

Based on the inspection of measurement errors, a correlation between item 16 and item 17 residuals is added. This path inclusion is believed to be plausible enough, since the highest shared residual covariance is estimated between two items belonging

Table 1. Results From Exploratory Factor Analysis of the Fatalism Scale.

	Fatalism Scale items	Factor loading			
		1	2	3	4
Factor 1	13. How long I live is a matter of luck.	.95*	-.03	-.09	.08
	14. I will stay healthy if I am lucky.	.92*	-.02	-.02	.01
	11. I will get diseases if I am unlucky.	.86*	.09	-.03	-.11
	12. My health is a matter of luck.	.83*	-.04	.10	-.07
Factor 2	1. If someone is meant to get a serious disease, it doesn't matter what kinds of food they eat, they will get that disease anyway.	-.06	1.00*	-.18	-.19
	2. If someone is meant to get a serious disease, they will get it no matter what they do.	.00	.80*	-.01	.04
	4. If someone is meant to have a serious disease, they will get that disease.	-.09	.62*	.31	.03
	5. If someone has a serious disease and gets treatment for it, they will probably still die from it.	.09	.54*	.09	-.03
	6. If someone was meant to have a serious disease, it doesn't matter what doctors and nurses tell them to do, they will get the disease anyway.	.14	.53*	.12	.00
Factor 3	15. Everything that can go wrong for me does.	.25	.32*	.00	.23
	9. My health is determined by fate.	.09	.32	1.05*	-.06
	7. How long I live is predetermined.	-.05	-.26	.77*	-.07
	10. My health is determined by something greater than myself.	-.05	.09	.70*	.00
	8. I will die when I am fated to die.	-.07	.13	.57*	.14
Factor 4	17. I will suffer a lot from bad health.	-.06	-.09	-.12	.94*
	16. I will have a lot of pain from illness.	-.06	-.04	.00	.83*
	19. Sometimes I feel that I'm being pushed around in life.	.11	.04	.15	.43*
	20. There is really no way I can solve some of the problems I have.	.09	.12	.16	.42*

Notes: *= Factor loadings above .30 with a difference of at least .30 between primary and secondary loadings; Factor 1= Luck; Factor 2= Powerlessness; Factor 3= Predetermination; Factor 4= Pessimism.

Table 2. Correlation Matrix.

Factor	F1	F2	F3
Factor 1. Luck	–		
Factor 2. Powerlessness	.56	–	
Factor 3. Predetermination	.48	.63	–
Factor 4. Pessimism	.31	.47	.46

to the same dimension. The verified model achieves reasonable indices of goodness-of-fit (χ^2= 237.72, *df*= 124, *p* <.001; *CFI*= .96; *NNFI*= .95; *RMSEA*= .06; 90% *CI*= .049–.082; *SRMR*= .07) (see Table 3). Figure 1 depicts the standardized solution of the four-factor model.

Figure 2 shows test information function and standard error curve of the 18-item FS, with total score of test information function on the left axis and score of standard error on the right axis. The extreme scores show a decrease in the accuracy of the test measurements. The test provides the largest amount of information around θ= zero and two standard deviations above the mean in the latent trait.

As expected, all the FS subscales are significantly and inversely correlated with the LOT-R score (-.38< *r* <-.27, *p* <.01). Internal locus of control subscale shows significant negative associations with FS Luck subscale (*r*= -.33, *p* <.01), FS Powerlessness subscale (*r*= -.34, *p* <.01), and FS Pessimism subscale (*r*= -.18, *p* <.05). Significant positive correlations are also observed between HLCS God subscale and FS Predetermination subscale (*r*= .45, *p* <.01), between HLCS Others subscale and FS Powerlessness subscale (*r*= .27, *p* <.01), and between HLCS Others subscale and FS Pessimism subscale (*r*=

Table 3. Results of Confirmatory Factor Analysis for the Fatalism Scale.

Model	χ^2	*df*	χ^2/df	*NNFI*	*CFI*	*SRMR*	*RMSEA*	90% *CI*
Four-factor model	237.724***	124	1.42	.95	.96	.07	.06	[.049–.082]

Notes: *NNFI*= Non-Normed Fit Index; *CFI*= Comparative Fit Index; *SRMR*= Standardized Root-Mean-square Residual; *RMSEA*= Root-Mean-Square Error of Approximation; *CI* = Confidence Interval; ***= *p* <.001.

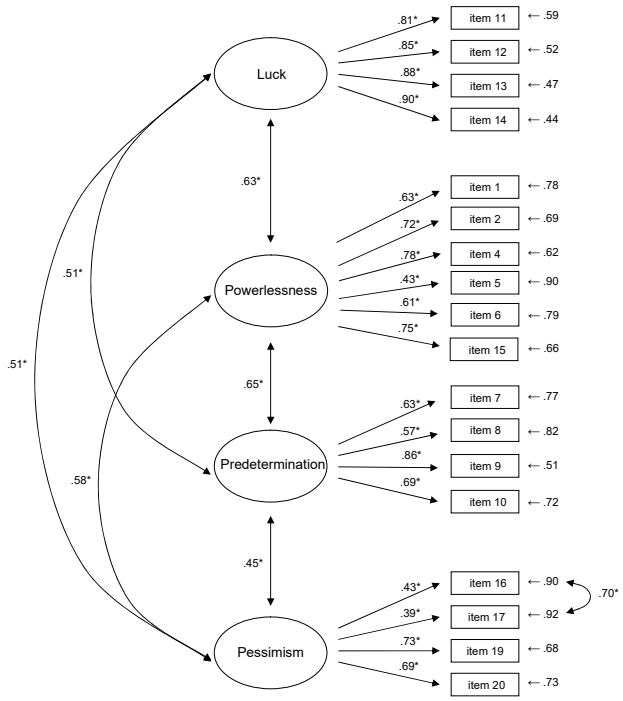

Figure 1. Standardized Solution of the four-factor model (*= p <.05).

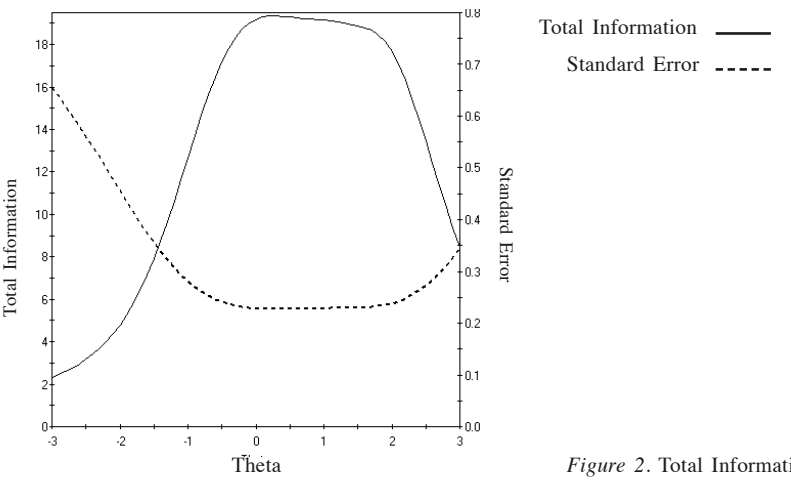

Figure 2. Total Information Curve.

.22, p <.01). Complete findings regarding correlations between FS subscales and related measures are reported in Table 4.

The moderate intercorrelations between the dependent variables (.32< r <.58, p <.01) shows the absence of multicollinearity. After dropping out three outliers (i.e., the cases with a Mahalanobis Distance above the critical value), the multivariate normality is satisfied. These preliminary examination results support the appropriateness of conducting MANOVAs.

Table 4. Correlations Between Fatalism Subscales and Related Measures.

Measure	1	2	3	4	5	6	7
1. FS Luck	–						
2. FS Powerlessness	.56**	–					
3. FS Predetermination	.43**	.54**	–				
4. FS Pessimism	.37**	.40**	.32**	–			
5. LOT-R	-.27**	-.30**	-.31**	-.38**	–		
6. HLCS Internal	-.33**	-.34**	-.11	-.18*	.22**	–	
7. HLCS External (God)	.07	.10	.45**	-.02	.10	.19*	–
8. HLCS External (Others)	.12	.27**	.14	.22**	-.96	-.10	.08

Notes: FS= Fatalism Scale; LOT-R= Life Orientation Test-Revised; HLCS= Health Locus of Control Scale; *= p <.05; **= p <.01.

Our findings reveals statistically significant differences between males and females when the four dependent variables –Luck, Powerlessness, Predetermination, and Pessimism– are considered jointly and simultaneously: Wilks Λ= .90, $F_{(4, 292)}$= 8.46, p <.001, partial η^2= .104. A separate ANOVA, conducted on each dependent variable, shows a significant difference in FS Luck subscale (M_{males}= 10.19, SD= 4.51; $M_{females}$= 8.35, SD= 4.24; $F_{(1, 295)}$= 12.75, p <.001, partial η^2= .041) and in FS Pessimism subscale (M_{males}= 10.52, SD= 3.24; $M_{females}$= 11.54, SD= 3.90; $F_{(1, 295)}$= 5.62, p <.05, partial η^2= .019), whereas no statistical differences are observed neither in Predetermination ($F_{(1, 294)}$= .47, p= .894, partial η^2= .000) nor in Powerlessness ($F_{(1, 295)}$= 2.54, p= .112, partial η^2= .009).

DISCUSSION

The goal of the current study was to examine the psychometric properties of the Italian version of the Fatalism Scale for use in measuring fatalism during the COVID-19 pandemic. Based on findings from our exploratory factor analysis, a four-factor model is reported: F1 "Luck," F2 "Powerlessness," F3 "Predetermination," and F4 "Pessimism." The first factor describes the belief according to which health conditions are a matter of luck. The second factor is composed of items describing human powerlessness in front of illness and disease. The third factor includes items reflecting the idea that what happens in life is predetermined. The fourth factor involves items depicting a pessimistic prospective regarding health and life conditions.

The emerged factorial structure can be partially compared to the original three-factor solution, since three of the four revealed dimensions are conceptually equivalent to Shen *et alia*'s (2009) results. However, the scale's original dimensional structure is not supported by our results.

The additional identified factor (i.e., Powerlessness) may provide a significant contribution to fatalism conceptualization, suggesting the relevance to evaluate how people perceive themselves and their own actions when facing health concerns. Items belonging to Powerlessness dimension have been included in Predetermination (items 1, 2, 4, 5, 6) and Pessimism (item 15) subscales in Shen *et alia*'s (2009) original measure. Conversely, in line with our outcomes, earlier research (Powe & Johnson, 1995; Scheier & Bridges, 1995) included powerlessness among fatalism facets, emphasizing its distinction from other related dimensions.

We argue that Luck, Powerlessness, Predetermination, and Pessimism represent different, though related, aspects of fatalism. Our hypothesis is supported by the moderately significant intercorrelations among the reported dimensions, providing

evidence about the relative independence of the four emerged factors. In other words, our findings suggest that Luck, Predetermination, Powerlessness, and Pessimism describe four different aspects of the investigated construct. The proposed four-factor model was well-confirmed and estimated internal consistency suggests satisfying reliability for the Italian version of the Fatalism Scale.

Evidence of validity related to other variables is to some extent gathered comparing the FS scores with two theoretically related tools measuring optimism and health locus of control. Consistent with our initial hypothesis and previous studies (Hayes *et alia*, 2016; Joiner *et alia*, 2001; Piña Watson & Abraído Lanza, 2017), the four FS subscales show significant inverse correlations with optimism score. Instead, our empirical data partially confirms the expected relationships between fatalism and health locus of control. Specifically, in line with previous research according to which fatalism is associated with the belief that health outcomes derive from external forces (Flórez *et alia*, 2009; Franklin *et alia*, 2007; Shahid *et alia*, 2020; Shen, 2017), internal health locus of control is inversely related to luck, powerlessness, and pessimism. Hovewer, external health locus of control related to god is positively associated to predetermination, and external health locus of control related to others is positively linked to powerlessness and pessimism. As a viable interpretation, when luck is observed, the health conditions and outcomes are not related to god neither to family members or friends, since people might believe that their health would depend entirely on the case. When predetermination is examined, health locus of control is externally oriented. Typically, individuals deny that humans have much control over their own fate; thus, outcomes are attributed to the laws of god or destiny and not to others. Conversely, when powerlessness and pessimism are detected, health conditions are related to others and not to god. Religion and faith might play a role in determining relationships between fatalism and locus of control. Distinctively, predetermination might be positively related to faith and hence associated with external locus of control related to god, whereas powerlessness and pessimism might be negatively related to faith and thus associated to external locus of control related to family members or friends. Deeper investigations are required to clarify whether religiosity and spirituality could act as a moderator variable in statistical and theoretical explanations of the obtained results.

Based on MANOVA's results, males report higher luck scores and females show higher scores on pessimism. Previous studies examining gender differences on fatalism were fairly controversial (Caplan & Schooler, 2003; Shen *et alia*, 2009). Moreover, from our observation, we can deduce a degree of incoherence since males showed greater levels of fatalism on one facet (i.e., Luck), whereas females had higher values of fatalism in relation to another dimension (i.e., Pessimism). As well, in accordance with further obtained empirical evidence, different mean scores on FS Pessimism subscale were found, according to which females tended to have a more pessimistic view about their own health and life conditions rather than males (Maercker *et alia*, 2019; Welch & Ellis, 2018). Further research should be addressed at deeply examining whether gender might be associated with fatalistic beliefs to broaden our understanding on this issue.

The findings from the current study should be viewed in light of some limitations. Notably, participants' age is quite variable, ranging from 18 to 70 years for the total and the first subsample, and from 18 to 60 years for the second subsample, but the age group around 30 years is overrepresented, whereas the number of people older than 50 is very small. This does not allow us to perform measurement invariance across age to determine if the FS items function equally for both younger and elder participants.

Further, for a meaningful interpretation of gender mean differences, measurement invariance should be established since it shows that respondents from different groups interpret the concept of particular items similarly. If measurement invariance does not hold, it is unclear whether the observed disparity is a real difference in the underlying construct of interest or an artificial effect of different items interpretation (Ingoglia, Faraci, Musso, Lo Coco, & Liga, 2018). However, our outcomes do not permit us to conclude on the structural invariance for gender, thus not allowing to reveal whether the factor structure is equivalent for both males and females.

Findings from recent studies have pointed out the associations between fatalistic beliefs and a wide range of negative outcomes linked to different health conditions (Amuta *et alia*, 2017; Craig-Kuhn *et alia*, 2020; Gutiérrez *et alia*, 2017; Sukkarieh-Haraty *et alia*, 2019). Thus, it would be useful to extend the assessment of the Fatalism Scale in clinical samples, as well as future research might be addressed at evaluating the role of individual differences (e.g., self-actualization, guilt sensitivity, boredom proneness) in predicting fatalistic attitude (Craparo, Faraci, Gori, Hunter, Hunter, Pileggi, Costanzo, Lazzaro, & Eastwood, 2017; Faraci & Cannistraci, 2015; Perdighe, Cosentino, Faraci, Gragnani, Saliani, & Mancini, 2015).

Despite these limitations, the overall results indicate that the adapted version of the Fatalism Scale is a valuable tool for assessing fatalism during an acute health crisis among Italian-speaking people. The proposed four-factor model –with Luck, Powerlessness, Predetermination, and Pessimism as the four facets of the construct– may provide a meaningful contribution to the evaluation of fatalism. Its robustness and ease of use make it applicable in research and clinical contexts and across several health conditions. Most importantly, this instrument might be useful to those interested in assessing fatalism during future waves of the COVID-19 pandemic and other public health crises.

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