The mental state inferences in healthcare professionals scale: a psychometric study

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Abstract

Background Empathizing with patients is an essential component of effective clinical care. Yet, a debate persists regarding how healthcare professionals' emotions and performance are impacted when they engage in empathetic behaviors and attempt to discern patients' mental states during clinical interactions. To approach this issue, this study explores the psychometric properties of the Mental State Inferences in Healthcare Professionals Scale (MSIHPS), a novel eight-item scale to evaluate healthcare professionals' perceptions of their own disposition to infer patients' mental states during clinical interactions.

Method The study was conducted across various units within a regional hospital and primary care units affiliated with the Canarian Public Health Service in Spain. Data collection took place over the course of 2022, spanning from February to November. The psychometric properties of the scale were analyzed, including an exploratory and a confirmatory factor analysis, to test reliability and validity. Additionally, an item response model was run to test potentially biased items. The study collected data from a sample of 585 healthcare professionals.

Results Overall, the results indicate that the psychometric properties of the tool are adequate. Furthermore, the unidimensionality of the scale was confirmed using the item response model, wherein the eight-items significantly contribute to predicting the latent construct.

Conclusion The MSIHPS offers the opportunity to explore the role of mentalizing in a diversity of healthcare settings. This measure can be useful to explore the relationship between healthcare professionals' disposition to infer patients' mental states and other relevant variables in clinical interactions, such as empathy and clinical performance.

Keywords Health psychology, Psychometric testing, Empathy, Nurse – patient interaction

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Introduction

Understanding of others' behaviors and the motives underlying their actions, that is, their cognitive and affective states, is crucial for successful social interaction [1] and prosocial behavior [2]. In healthcare contexts, the interactions between professionals and users are particularly complex at different levels. Coping with others' suffering represents a profound challenge for healthcare professionals, who routinely face the dilemma of striking a delicate balance in handling their own cognitive and emotional resources while responding to their patients' encounters with pain [3, 4]. Previous literature has posited that healthcare professionals can regulate their negative emotions derived from exposure to situations of suffering and pain, or from inflicting harm on patients (especially with some treatments), by avoiding social cognition regarding their patients [5]. In this sense, healthcare professionals should manage their own empathic processes in order to ensure their own psychological well-being [6–8].

To achieve optimal interactions between nurses, physicians, and patients, empathy and understanding are essential [7, 9]. For the healthcare professionals, taking charge of patients' suffering requires mentalizing each patient, and can involve a very high cognitive and emotional effort. According to [10] it has been shown, for example, that Theory of Mind (ToM) performance, which refers to the ability to understand an interaction partner´s thoughts and feelings, is reduced in situations where participants are faced with highly emotional negative information [11], pointing to a prioritization of empathy-processing in that context.

Empathy and the inference of mental states have often been conceptualized and investigated as different and isolated processes [12], as the affective and cognitive routes to understand others [13]. Research indicates significant differences between these two processes: Empathy has been primarily studied and measured as an emotional reaction involving the activation of brain areas associated with pain [14–16], whereas the inference of mental states is linked to a cognitive pathway of social information processing, aimed at comprehending and anticipating the reactions of the other person [17], with less emotional involvement from the observer [18, 15].

Nurses and physicians learn to regulate their own processes of empathy and mentalization in the interaction with patients [7]. Since the inference of mental states is a flexible and deliberate process [19], each professional can develop their own model about the *optimal level* of patient mentalization, viewing it as a strategy or tool acquired in their professional experience to deal with people suffering [20, 9]. This implies that professionals develop metacognition about these processes. In this sense, healthcare professionals can become aware of how

much they tune in emotionally, feeling what the other feels. They can also discern how much they tune in cognitively, taking on the perspectives of others. Additionally, they can assess the degree to which they mentalize, inferring the mental states of patients to achieve maximum effectiveness in their interventions. This latter process is involved, for example, in communicating bad news with minimal pain, transmitting hope, helping the patient to understand their situation and the various options to address it, and encouraging patients to adhere their treatment and adopt healthy behaviors [21]. In the case of breaking bad news, multiple studies have indicated that physicians experience anxiety, feelings of failure, frustration, and stress in these undesirable situations [22]. These emotions may be tied to how patients perceive the physician, who must navigate this complex scenario. In such contexts, healthcare professionals might become more self-conscious or task-focused, rather than patient-focused, particularly if they lack experience in handling this task [23]. In this type of situation, it is essential for physicians to be better prepared f by reflecting on and discussing their own emotions and needs.

There is extensive debate on how healthcare professionals' emotions and performance are affected by empathizing with and inferring patients' mental states. On the one hand, some studies have shown that being empathic and inferring mental states of patients have a constructive effect upon healthcare professionals, who tend to offer better attention, experience less suffering, and experience burnout to a lesser extent [27–29]. However, other studies indicate that healthcare professionals need to reduce their empathy and the inference of mental states toward patients to regulate their personal emotions, as well as to improve their performance [30, 31]. Nevertheless, reducing empathy could decrease the right response in tune with the pain that the patient manifests [32], leading to less professional efficacy. For empirical advancement to go further at clarifying the role of mentalizing patients in healthcare, a measure that explores healthcare professionals' beliefs about their inference of patients' mental states is required.

For that purpose, this study introduces the Mental State Inferences in Healthcare Professionals Scale (MSI-HPS) as a tool to evaluate healthcare professionals' ability to infer the mental states of their patients. Specifically, we aim to develop a thorough analysis of the scale's properties, with the use of both classical psychometric methods and item response theory (IRT).

The Mental State Inferences in Healthcare Professionals Scale

The instrument proposed in this study aims to measure the professional's tendency to manage the complexity of social interactions in the healthcare context by focusing

or not (and to what extent) on the mind of the other person. It is not intended to obtain a measure of the person's global capacity in ToM, but rather, the degree to which the professional beliefs or values the frequency with which she tends to make mental inferences in the context of interaction with patients. Regardless of whether they have more or less general capacity, what we want to know is whether the professionals have the impression that they take into account the mental states of the patients as a routine in their daily work.

Despite several ToM measurement instruments have been developed [9], most of these tests are designed to measure the personal ability to infer the mental states of other people, and discerning variations of ability among different individuals. The ability to make inferences about the mental states of others has been pointed out as an essential tool for the success of people in their social lives [24]. For example, it has been established that the degree of ToM impairment is associated with the degree of dysfunction in social behavior, in cases such as schizophrenia [25] or autism [26]. Although various scales aim to assess these differences or deficits, a significant number of them have a ceiling effect that prevents accurate and reliable assessment of ToM in a way that is sensitive to both subtle individual differences and clinical impairment.

In this sense, no specific instruments have been developed to evaluate the processes involved in mentalizing others in highly demanding contexts such as healthcare. In clinical interactions, regardless of each individual's disposition or ability to accurately infer the mental states of others, healthcare professionals may consider it more or less appropriate to make that effort or perform that task in their daily interactions with patients. In this line, the type of demand that healthcare providers face can determine whether it is appropriate to infer mental states in patients, to improve their performance and reduce their emotional exhaustion. More precisely, a flexible engagement of social cognition depends on the context, the type of interaction that the healthcare professional and the patient have to establish, and the professional's own demands and needs [19]. This could be essential to find the right balance that allows professional efficiency, avoiding personal suffering and signs of burnout, and obtaining high levels of patient satisfaction. For these reasons, a measure to assess the social cognition processes in healthcare is required.

The aim of the MSIHP Scale is to evaluate the degree to which healthcare professionals perceive, or estimate, that they make mental inferences in their daily interactions with patients. The eight items that comprise the scale were developed in a previous study [27], where the authors generated an item pool based on previous literature on mental state inferences. Two experts in

dehumanization reviewed these items, removing redundant ones and selecting those most relevant to inferring mental states. Their results showed that, globally, the inference of mental states generates positive consequences for the well-being and professional satisfaction of health personnel. However, the role of empathy was more complex, varying depending on the type of predominant empathic component for each professional. More precisely, the two *other-oriented* components of empathy (empathic concern and perspective taking) together with the inference of mental states, increased the personal accomplishment of health professionals. However, the *self-oriented* component of empathy (personal distress) was related to higher burnout indicators. These results support the relevance of delving into the role played by the inference of mental states in the context of the relationship between professional and patient.

In this article, we present a psychometric study of the MSIHPS. In doing so, we analyzed the psychometric structure of the scale, including an exploratory and a confirmatory factor analysis, to test reliability and validity. Additionally, an item response model was run to test how items measure the latent trait. This assessment ensures the measure's validity and reliability, essential for accurate interpretation in clinical and research contexts. By establishing robust psychometric properties, we aim to validate its effectiveness in measuring targeted constructs, adhere to scientific standards, and contribute to the field's knowledge base.

Based on the theoretical framework and the design of the instrument, we hypothesized that the internal structure of the MSIHPS can be represented by one factor.

Methods

Participants
Participants consisted of a convenience sample of healthcare professionals who voluntarily completed the self-administered questionnaire. Data was collected between February and November 2022 in primary care units and in 8 different services from a regional hospital in Spain. A total of 585 participants took part in the study (75% women), with ages ranging from 22 to 66 years (M=42.78; SD=10.29). Subjects were excluded from the study when they had been working for less than three months in the service or unit, and when they did not have direct contact with patients. The study was approved by the Ethics Committee of the University of La Laguna (Register CEIBA 2020−0418). All participants gave written informed consent according to the Declaration of Helsinki (See Table 1).

Instrument
The Mental State Inferences in Healthcare Professionals (MSIHP) Scale consists of eight items. Participants

Table 1 Mean, standard deviation for items, and demographic data for the total sample

item	n	mean	sd			n	mean	sd
MSIHPS1	552	4.02	0.79	**Age**		585	42.7	10.29
MSIHPS2	550	3.77	0.89	**Profession**	Doctor	193		
MSIHPS3	551	3.63	0.96		Nurse	393		
MSIHPS4	551	3.56	0.94	**Gender**	Male	144		
MSIHPS5	551	3.89	0.84		Female	438		
MSIHPS6	551	4.15	0.77		other	3		
MSIHPS7	551	3.60	1.06					
MSIHPS8	551	4.26	0.72					
MSIHPS_Total	550	3.85	0.64					

were asked to rate how often, on a scale from 1 (never) to 5 (always), they contemplate various aspects of their patients' mental states while engaging in conversations and interactions. Higher scores indicate a greater tendency to attribute mental states to patients. This measure was developed by [27]. Specifically, authors selected eight items from an item pool based on empirical research on mental state inferences and previous scales related to the topic. The items were edited for clarity and content. Appendix 1 shows the eight items composing the scale.

Procedure

Following the recommendations of the ITC (International Test Commission, 2017 [33]) for the validation of psychometric instruments, an exploratory factor analysis (EFA) with cross-validation was conducted on a random subsample of 485 participants (80% of the total sample). To test the items properties and biases in measuring the construct an item response model was tested. Finally a confirmatory factor analysis (CFA) was performed on the total sample to test construct validity. Reliability was computed in both factors models computed. The procedure involved the use of an online survey hosted by Qualtrics (Qualtrics Labs Inc., Provo, UT, USA). Participant recruitment was facilitated through hospital supervisors, who were responsible for distributing the questionnaire. The survey link was shared along with an explanation that the primary objective of the study was to enhance understanding of how they manage the responsibilities associated with caring for and supporting their patients.

Data analysis

A descriptive study of the participants' responses was conducted, to assess the normality of the response distribution the Shapiro-Wilks test was used. The psychometric properties of the scale were approached from both the classical and the item response model. The first included an exploratory and a confirmatory factor analysis, to test reliability and validity of the instrument. Furthermore, to examine the internal consistency and reliability of the instrument, Cronbach's alpha coefficient and Guttman λ6 coefficient were used. Second approach involved applying

an Item Response Theory (IRT) to assess how effectively items measure the underlying trait. Unlike Classical Test Theory (CTT) IRT is not dependent on specific samples, enhances measurement precision across diverse populations, optimizes instrument length, and validates accuracy in latent variable measurement. This approach assesses each item's discriminatory power within the latent construct based on participants' responses using a graded response model, which estimates the likelihood of selecting a response (1-never to 5-always) based on their latent ability level.

Data analyses were conducted using the R (R Core Team, 2021) software and the psych [34], ltm [35], and polycor [36] libraries.

Results

Participant responses distributions showed a negative skewness (*Asymmetry index [As]* = -0.60) with a significant Shapiro Wilks test [$W=0.97$, $p<0.05$]. The mean in MSIHPS is 3.85 (*SD* 0.64). This result is due to the inherent nature of the scale, where an increase in scores is expected for values above 3 on the response scale.

The exploratory factorial analysis (EFA, minres solution with oblimin rotation) displayed one factor with 60% variability explained. With an average weight of the items of 0.77.

The reliability analysis of the scale showed a Cronbach's *α* value of 0.92, Guttman's *λ6* of 0.92, and Asymptotic *ω* of 0.87. The factor score adequacy was 0.96, indicating a good fit of the predicted scores based on the factorial model (see Table 2).

Table 2 shows descriptives per item, the factor loading of the item on the factor, and the correlations between items for the random subsample.

To assess the theoretical one-dimensional model derived from the previous exploratory analysis, a confirmatory factor analysis was conducted, testing for invariance across groups (doctor vs. nurses) by examining the equality of weights and slopes. Results revealed a metric invariant model [$\chi2$ (7)=10.89, $p>0.05$]. The fit indices of the priori theorized factor model were χ^2 (43)=71,65, $p<0.001$, with the χ^2/df ratio being 1.6, indicating a good

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Table 2 Mean, standard deviation, factor loading, and items correlations for random subsample

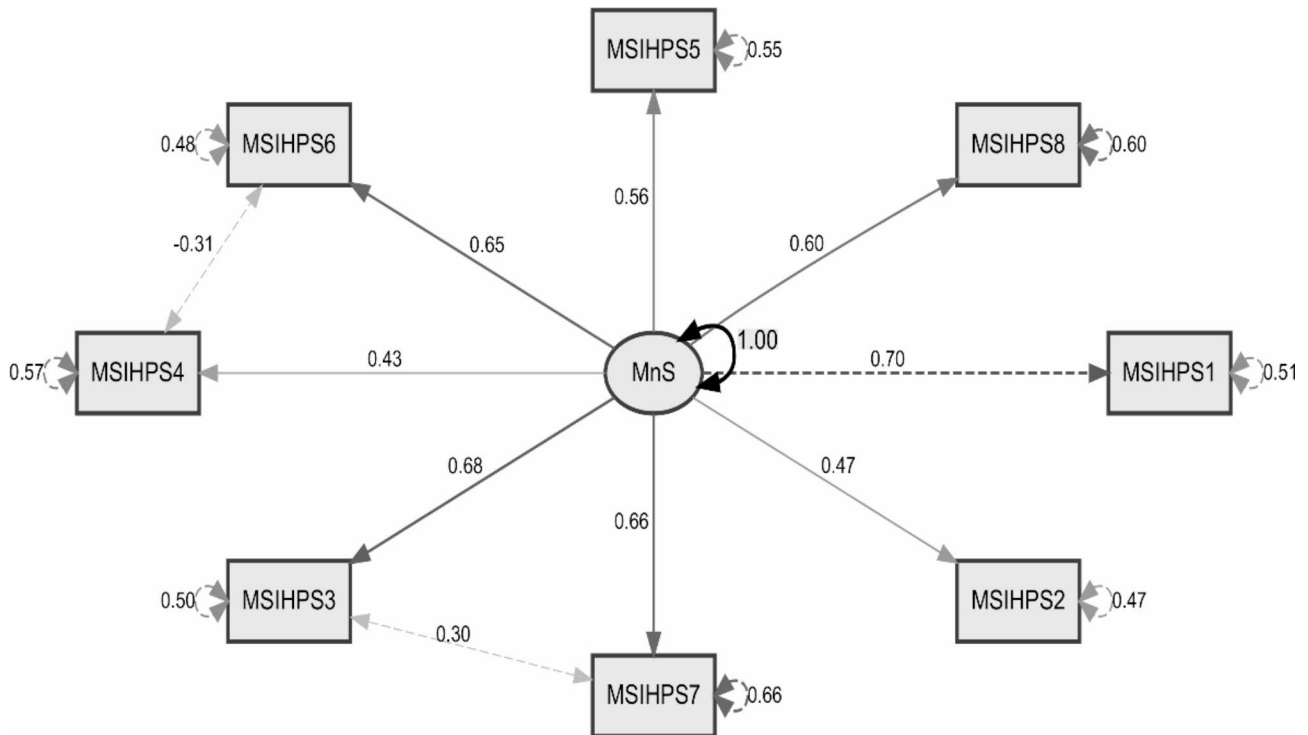|	*n*	mean	Sd	load	MSIHPS2	MSIHPS3	MSIHPS4	MSIHPS5	MSIHPS6	MSIHPS7	MSIHPS8
MSIHPS1	484	3.97	0.81	0.82	0.63	0.57	0.49	0.55	0.64	0.46	0.46
MSIHPS2	479	3.79	0.86	0.80		0.60	0.48	0.55	0.59	0.46	0.47
MSIHPS3	482	3.25	0.99	0.82			0.57	0.62	0.47	0.61	0.46
MSIHPS4	483	3.47	1.00	0.72				0.53	0.43	0.54	0.38
MSIHPS5	483	3.85	0.91	0.82					0.56	0.57	0.52
MSIHPS6	482	4.17	0.81	0.79						0.43	0.55
MSIHPS7	483	3.54	1.08	0.72							0.39
MSIHPS8	483	4.31	0.77	0.70							

Fig. 1 Path Diagram of Confirmatory Factor Analysis (CFA) model for MSIHPS showed loading and of each item in the latent variable and dashed lines indicated items variance and covariance. An unconstrained model was assumed since the log-Likelihood Ratio Test (LRT) was significant [*LRT* (7) = 33.75, *p* < 0.001]

fit, *CFI* = 0.97 and *TLI* = 0.96 both indicating a very good fit, *RMSEA* = 0.064, *95% CI* = [0.037, 0.090]. Finally, a Cronbach's *α* value of 0.88 was accounted by CFA, compared with the EFA reliability we obtained a non-significant 0,04 decreased alpha The standardized parameters of the model (factor loadings) are presented in Fig. 1.

Considering the item discrimination values, they fall within the range of 1.82 to 2.66. The items that most effectively discriminate the latent construct are Item 1, "patient's fears and perceptions," Item 3, "the patient has projects and plans," and Item 5, "the patient is experiencing other things besides the illness." Conversely, Item 4 and Item 8 exhibit the lowest discrimination indices, suggesting they offer less information about the scale.

Based on the Test Information Function, the response scale of the instrument (1 to 5) appears suitable. This plot permits to observe how the items and their response scale sample the continuum of the construct (ability). Overall, the response scale informs about average to lower levels of ability, which ensures a certain level of measurement precision (see Fig. 2).

Discussion

This study aimed to psychometrically test an instrument to measure the perception of healthcare professionals about how they integrate their patients' beliefs, emotions, intentions, and desires into their professional practice. The psychometric and empirical analysis show that this tool entails an expansion in the evaluation of mental inferences, thereby enriching this line of research. Several considerations are remarkable in the results.
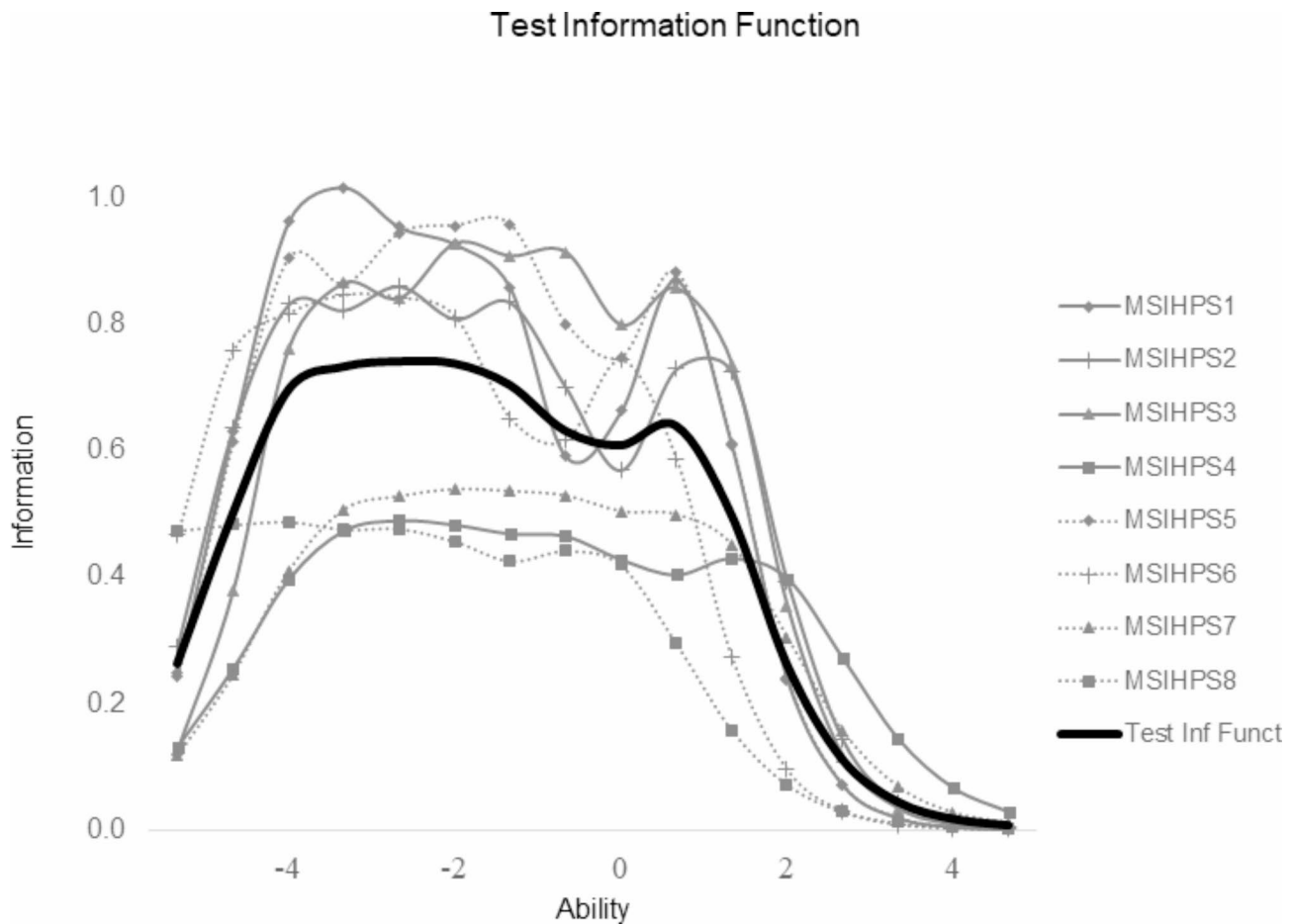
Fig. 2 Test information function for the MSIHPS items. TIF curve highlights the test's informativeness across varying ability levels, peaking between the range [-2 2]

The psychometric study confirmed the theoretically expected internal structure. In terms of reliability, the MSIHPS showed a high internal consistency with only eight items. In terms of internal structure, the fit indices of the confirmatory factor analysis, ranging from fair to very good. The combination of strong reliability and a validated internal structure suggests that the MSIHPS is a robust tool for measuring mental state inferences in the target population.

Results lead to the conclusion that the psychometric properties of the scale, both classical and item response theory-based, indicate a one-dimensional scale with adequate reliability values. All the items play a significant role in predicting the latent construct, as their correlations with the latent dimension are considered to be strong (all of values are in the range [0.58 0.72]. Furthermore, the validity of the items in predicting the construct was satisfactory and invariant, as evidenced by the standardized values in the confirmatory factor analysis. Finally, the item response model demonstrated the goodness of the measurement scale and the items in assessing and quantifying the latent construct, regardless of the

sample, as it was invariant across two sub-samples (doctors vs. nurses). The response scale of the instrument (1 to 5) was found to be suitable for capturing the underlying construct.

Theoretical implications

From a theoretical perspective, this scale covers the most novel conceptualizations of empathy and the inference of mental states from the integrative view of cognitive neuroscience [2, 37], as the processes of empathy and theory of mind are dependent on networks linked to discerning the mental states of others [8]. In addition, the chosen items were derived from an item pool grounded in empirical studies on mental state inferences and prior scales associated with the sample of interest [27]. Based on the study findings, the MSIHPS is a potentially useful tool for assessing the degree of (or beliefs about) inferring mental states across a range of nursing and clinical staff working in continuing care settings.

It is important to highlight several strengths of the MSIHPS. The first one is the clinical relevance; the test has been proven over healthcare practitioners

guaranteeing its validity. Second, a short measure is useful and easy to distribute together with other measures. This is especially relevant for instruments developed in professional contexts. To our view, one of the most important outcomes of this instrument is its ecological value; it focuses mental inferences in the context of interactions with patients, the situations that arise every day for healthcare professionals. Other instruments focusing on the acute ToM fail to capture the specific mechanisms implied in a flexible approach to social cognition processes [18]. The MSIHPS may enhance the theoretical understanding of the phenomenon and its associated outcomes. In this vein, the role of mentalizing patients in the performance of different types of clinical tasks could be better explored by using this type of measure.

Undoubtedly, empathy is an extremely relevant process in clinical practice that entails improvements in patients´ clinical picture [20]. Several studies have highlighted the clinical and theoretical usefulness of the test for the evaluation of empathy and cognitive process related to the professional practices in nursing [37]. Yet, the few studies that have been conducted show mixed results regarding the effect of understanding patients' mental states on the wellbeing of healthcare professionals [38, 9, 39]. From a theoretical advancement, future studies could confirm whether the propensity to make inferences about patients' mental states during daily medical practice plays a particular and different role from other processes such as perspective taking or empathic concern.

Practical implications

From a practical perspective, the MSIHPS is a valuable tool with strong psychometric properties, demonstrating high reliability in measuring healthcare professionals' willingness to infer mental states. Its clinical relevance and ease of use make it a promising instrument for both research and practical application in healthcare. Focusing on mentalizing in the context of daily interactions with patients, which is a crucial aspect of medical practice, this instrument becomes highly relevant and applicable to everyday clinical practice. The relationship between empathy, mental state inferences, and well-being in healthcare professionals remains complex, which highlights the need for further research to clarify these relationships. New research could be crucial to develop effective strategies of coping with emotion regulation needs and challenges in the healthcare context. Remarkably, the education and training of healthcare professionals often overlooks a critical component - learning to regulate their emotional responses when confronted with the suffering of others, a situation frequently encountered in healthcare settings, or even when causing minor discomfort, such as needle-sticking procedures [13, 6]. An implicit expectation within the healthcare community

is that repeated exposure to such distressing scenarios will naturally diminish reactivity, ultimately facilitating emotion regulation, thus avoiding the significant risk of burnout classically linked to empathy in general [38]. However, the relationships between each component of burnout and each component of empathy have been poorly explored [39]. This type of component-based analysis could increase the possibilities to reduce the risk of suffering burnout whereas promoting specific empathic skills that mitigate the effect of exposure to constant suffering.

Limitations

This study offers preliminary evidence supporting the reliability and validity of a novel, concise assessment tool measuring disposition to infer patients' mental states during clinical interactions, which is firmly grounded in empathy in clinical contexts. Nevertheless, there are several limitations. Notably, we did not conduct predictive or discriminant validity tests, focusing primarily on evaluating the psychometric properties of the scale. While this choice might constrain the broader application of our findings, the emphasis on healthcare professionals and students as our target population offers several advantages. Future studies might explore the instrument's predictive and discriminant validity and thus enhance its robustness and applicability, as well as their usefulness across different types of healthcare providers (i.e., nurses, physicians, administrative staff, psychologists).

Another limitation to note is that our sample was predominantly female and mostly healthcare professionals. While gender distribution aligns with the demographic characteristics often observed in healthcare professions, it's important to emphasize that the objectives of this study were not to conduct a normative investigation. Therefore, there isn't an inherent generalization issue based on our sample. However, for those who utilize this tool in future research, we recommend considering and recording sociodemographic variables for a better understanding of the results.

Healthcare professionals engage in the complex task of inferring the mental states of their patients, a process that is both cognitive and deliberate, with the depth of such engagement varying according to individual professional judgment. However, whether it is a cognitive skill that can be trained and applied across contexts, or to what extent it is a personal trait that varies innately and across tasks, is beyond the scope of this study. To approach a more valid assessment, the instructions are directed solely to day-to-day inferences made while talking and interacting with patients.

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Conclusions

Human beings have a natural aversion to suffering, not only to their own suffering, but also to the harm and suffering of others [7]. This characteristically human reaction to the suffering of others has to do with the processes of empathy that are triggered when we humanize others, perceiving them as equals [18]. The MSIHPS offers opportunities for future studies exploring the role of mentalizing and dehumanization in a diversity of healthcare contexts. This way, incorporating the study of inferring mental states into occupational health research and practice could be facilitated, with the possibility of integrating the patients' and the healthcare providers' perspectives and needs. Based on the study findings, the MSIHPS is a potentially useful tool for assessing the degree of (or beliefs about) inferring mental states across a range of nursing and clinical staff working in continuing care settings. However, the study did have some limitations, such as the lack of predictive validity tests, demographic imbalances in the sample, and the complex interplay between empathy and well-being. Undeniably, a deep understanding of these complex socio-cognitive processes not only will have a direct impact on healthcare professionals' wellbeing, but it will also impact the quality of treatment, and in the end the patient's health.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-024-02119-4.

Supplementary Material 1

Data availability
The datasets and analysis scripts used in the current study are available in the OSF repository https://osf.io/7ehkf/.

Declarations

Ethics approval and consent to participate
The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Research Ethics and Animal Welfare Committee of the University of La Laguna (protocol code CEIBA2019-0332).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Consent to participate
The study was approved by the Ethics Committee of the University of La Laguna (Register CEIBA 2020 – 0418). All participants gave written informed consent according to the Declaration of Helsinki.

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