Research Square

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Relationship of nurses' sensory processing sensitivity trait to the perception of invisible care: A cross-sectional study

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Abstract

Aim

To analyze the influence of sensory processing sensitivity on nursing professionals' perception of invisible care.

Methods

A cross-sectional descriptive observational study. Seventy-nine professionals from a level III hospital completed an online form assessing various situations encountered by nursing staff in their daily practice related to the different dimensions of invisible care (Care-Q) and the sensory processing sensitivity temperament trait (HSPS).

Results

Showed that 15% (12) of nursing professionals were highly sensitive. A statistically significant relationship was also found between the components of invisible care and the overall Care-Q score for professionals in general and for highly sensitive professionals. The invisible care component "maintains a trusting relationship" with the HSPS overall ($\rho = 0.224$), but no significant correlations were observed when professionals were identified as highly sensitive with scores ≥ 160 points with the different Care-Q components.

Conclusion

The perception of invisible care is inherent to the nursing profession and is not strongly influenced by the SPS trait. Therefore, invisible care is an essential component of nursing practice.

Introduction

Invisible care encompasses a set of interventions resulting from observation, empathy, knowledge, and experience that lead nursing professionals to make professional and ethical judgments centered on the needs of each patient and their family [1]. These interventions go beyond technical and delegated actions focused solely on the individual's physical well-being, as they are centered on each patient's needs [2]. Furthermore, they are intangible, inherent, and essential nursing interventions that embody the humanization of care, the very act of healing. Invisible care (also called non-technical or humanized care) is the essence of professionalizing nursing care. Although not typically documented, it forms an integral part of the patient care process.

Nurses who provide this care are not usually overlooked by their immediate environment. Still, they are often ignored by the institution, which neither values, quantifies, nor rewards this excellence and the benefits it brings to patients [3]. In this sense, documenting nursing interventions such as accompaniment, assistance, or collaboration demonstrates that "more humanized care is more important than the mastery of techniques to ensure the greatest possible well-being for patients." This makes visible and grants professional recognition to these actions based on the clinical and ethical judgment of professional nurses [4]. In this context, nursing care is subdivided into two categories: technical (High-Tech) care, which is related to healthcare technology and has social and professional recognition; and invisible or humanized (High-Touch) care, which is integrated into clinical care or not and is undervalued [5]. Germán and Hueso (2010) proposed ten dimensions to describe this invisible care, which were later synthesized by Huércanos-Esparza (2011) into eight: 1) promotion of self-care, 2) relationship of trust, 3) emotional support, 4) tact and listening, 5) comfort, 6) ethics and respect, 7) caring presence, and 8) the nurse's image within the team [3]. As Sioban Nelson

(2011) suggests, becoming visible in the healthcare system involves going beyond "saying little, doing much" and achieving a degree of legitimacy and social respect [6].

Another important and barely explored aspect is the perception of invisible care by nursing professionals who exhibit the trait of sensory processing sensitivity (highly sensitive people, HSPs). This personality trait is present in 15% to 30% of the population [7]. It is not an acquired condition, but rather a way of being, and has a hereditary component associated with the 5-HTTLPR s/s genotype responsible for serotonin transport [8]. These individuals have a nervous system that perceives and processes more sensory information simultaneously and more deeply than usual, although no differences have been found with respect to brain structures or sensory organs. This processing leads people to feel positive and negative experiences more emotionally [9], exhibiting a differential susceptibility [10, 11]. These individuals tend to be overstimulated by sensory stimuli, are aware of subtleties in others, and are highly intuitive, creative, empathetic, and conscientious. This last characteristic allows them to be in tune with their own thoughts and emotions and make fewer mistakes by anticipating or reflecting before acting [12]. Therefore, the SPS (Specific Positive Sense) entails a series of characteristics that must be understood for self-care and living a more balanced life between one's own needs and external demands. This trait, due to its hereditary component, implies the protection and the evolution of the species. In this alignment, society needs people who make their sensitivity visible and channel it as a strength [9].

Based on the literature on sensory processing sensitivity and the Job Demands-Resources model, it is predicted that the three components of sensory processing sensitivity (easiness of excitation, aesthetic sensitivity, and low sensory threshold) amplify the relationship between job demands (workload and emotional demands) and emotional exhaustion, as well as the relationship between job resources (task autonomy and social support) and helping behavior [13].

The main objective of this study is to analyze the influence of sensory processing sensitivity on the perception of invisible care by nursing professionals in a level III hospital.

The specific objectives are: 1) To assess the perception of invisible care using the Care Q questionnaire, and 2) To assess the sensory processing sensitivity temperament trait of nursing professionals using the Highly Sensitive Persons (HSPS) scale, 3) To explore the relationship between the dimensions of the Care-Q questionnaire and the SPS temperament trait, and 4) To relate working hours, length of service, age (under and over 50 years), and gender to the perception of invisible care and the SPS trait.

Nursing professionals inherently apply invisible care in the clinical setting to their patients. Based on this premise, nursing professionals with the sensory processing sensitivity trait will not show differences in their perception of invisible care compared to those without the trait. The invisible care provided by nursing professionals is universal and humanized, even though it is neither recorded nor recognized.

Methods

Study Design

A quantitative, cross-sectional, observational study was conducted. The primary variables were healthcare professionals' perceptions of invisible care. Secondary variables included age, gender, length of service, and time spent in the service/unit.

Sampling and Setting

Seventy-nine nursing professionals from Son Espases University Hospital (HUSE) participated in the study. Participation was free, voluntary, and without financial compensation for either the participants or the researchers. A random sample

was used, sufficient to estimate, with 95% confidence and a precision of +/- 3 percentage points, a population percentage expected to be around 2%. A replacement rate of 15% was considered.

The following eligibility criteria were applied in this research. Inclusion criteria were: 1) Nursing professionals with permanent, temporary, and contract positions working in the various departments of HUSE, 2) Both genders, 3) Ages between 21 and 65 years, and 4) Voluntary participation. The exclusion criteria were: 1) Nursing professionals on sick leave, 2) Conflicts of interest with the unit or service where they work or the institution, and 3) Incomplete completion of the questionnaire.

The study was conducted in the various units and services of Son Espases University Hospital (HUSE), a level III hospital and referral center in the Balearic Islands (Spain), belonging to the Ponent Health Sector. It also manages other affiliated centers such as the General Hospital, the Psychiatric Hospital, and the Virgen de la Salud Hospital.

Measures

An online form created with the Microsoft Forms tool (Microsoft 365®) was used. This form integrated standardized and validated questionnaires, as well as information on sociodemographic and occupational data, sleep quality, chronotype, perceived stress, general health, memory complaints, and quality of life. The average completion time was 28 minutes. The form link was sent via corporate email.

The sociodemographic variables, collected through open-ended questions, included: date of birth, gender, years of professional experience, length of time working in the department, a rating from 0 to 10 regarding the perceived quality of care provided to patients, a brief summary of the most relevant training in the field of nursing, and an indication of the meaning of the profession and the concept of care.

The Care-Q questionnaire [14, 15] assesses various situations that nursing staff encounter in their daily work related to different dimensions of invisible care. It is a questionnaire used to collect data from nursing staff. It includes the standard questionnaire questions, but also gathers sociodemographic variables. The questionnaire used, in its Latin American validation format, has a total of 50 closed-ended items divided into six categories: accessibility (6 questions), explanation and facilitation (6 questions), comfort (9 questions), anticipation (5 questions), maintenance of a trusting relationship (16 questions), and monitoring and follow-up (8 questions) [16]. The different dimensions were defined by Ariza Olarte (2024): 1) Accessibility: refers to care behaviors administered in a timely manner; 2) Explanation and Facilitation; 3) Comfort; 4) Anticipation; 5) Maintenance of a Trusting Relationship; and 6) Monitoring and Follow-up. Each question has five possible responses, consisting of a Likert-type scale composed as follows: very important, somewhat important, neither important nor unimportant, not very important, and not at all important. Cronbach's alpha values for the subscales of this study range from − 0.086 to 0.464. The overall alpha cannot be completed due to identical variance [17].

Highly Sensitive Person (HSP) Test [7, 9]. This test assesses whether individuals exhibit the trait of sensory processing sensitivity. Participants are presented with 27 statements to which they must respond according to how they usually feel. Responses are given on a Likert scale: 1) strongly disagree, 2) somewhat disagree, 3) somewhat disagree, 4) partly disagree/partly agree, 5) somewhat agree, 6) somewhat agree, and 7) strongly agree. For interpretation, a person is considered an HSP when women score 167 points or higher, and for men, 160 points or higher. Therefore, these individuals are more adept at detecting subtle environmental cues, including emotional states, in their daily and professional lives. They also exhibit high empathy and process information deeply, which can lead to rumination, potentially resulting in overstimulation due to information overload. Cronbach's alpha and McDonald's ω for the subscales, respectively, were as follows: sensitivity to overstimulation (SOS) = 0.86 and 0.87, aesthetic sensitivity (AES)

= 0.79 and 0.80, low sensory threshold (LST) = 0.82 and 0.85, fine psychological discrimination (FPD) = 0.56 and 0.57, and harm avoidance (HA) = 0.67 and 0.68. For the total HSPS-S score, they were 0.92 and 0.93.

Procedure

This study was conducted in several phases. Phase 1: Preparation and approval of permissions. Study approval was obtained from the HUSE Research Committee, the Balearic Islands Research Ethics Committee for Medicinal Products (CEIm-IB), and the Nursing Directorate (see section on ethical considerations). Phase 2: Data collection from participants. A literature search was conducted to gather the most comprehensive knowledge on the topic, and rigorous and validated questionnaires and scales were selected for assessment. Subsequently, an online form was designed using the 'Forms' tool (Microsoft 365®), which integrated the items from the selected questionnaires. The form was sent via corporate email to nursing professionals in January 2023, with two follow-up reminders: one week and another three weeks after the initial mailing. Participation was voluntary, anonymous, and confidential. Phase 3: Data organization and analysis. Once the professionals completed the questionnaire, the data were collected and automatically transferred to an Excel document integrated with the Forms tool. Simultaneously, the data were organized across different Excel pages to establish filters for primary and secondary variables and calculate frequencies, percentages, averages, and standard deviations for each variable. The data were then processed using IBM SPSS Statistics. (See the Statistical Analysis section for more details.) Phase 4: Results, Discussion, and Conclusions. The results are presented in relation to the objectives and interpreted and compared with recent, updated literature. Finally, limitations, future directions, and conclusions are presented.

Data Analysis

Data analysis was performed using descriptive and inferential statistics with data recorded using IBM SPSS Statistics, version 30.0 (2024). Descriptive statistics were applied, including means and standard deviations, as well as frequencies and percentages for the different variables. Normality criteria (Shapiro-Wilk and Kolmogorov-Smirnov tests) and homoscedasticity (Levene's test) were also verified. Subsequently, correlational statistics were calculated using Spearman's rho (ρ) for the different variables: Care-Q and HSPS-S. Finally, inferential statistics were performed using the Mann-Whitney U test (U) and the Kruskal-Wallis test (H). The significance level (p-value) was also obtained, and the effect size was calculated using rank-biserial correlation (r_{rb}).

Ethical considerations and data security

The study was approved by the Hospital Research Committee (CI-HUSE) with opinion number: CI-680-22 (approval date: July 29, 2022), the Balearic Islands Research Ethics Committee for Medicinal Products (CEIm-IB) with opinion number: IB 4968/22 PI (approval date: December 29, 2022), and the HUSE Nursing Management (approval date: January 17, 2023). Regarding other ethical aspects and data security, the following points were complied with: 1) The provisions of Law 14/2007, of July 3, on Biomedical Research (LIB), 2) Regulation (EU) 2016/679 of the European Parliament and of the Council, of April 27, 2016, on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation, GDPR), 3) Organic Law 3/2018, of December 5, on the Protection of Personal Data and Guarantee of Digital Rights (LOPDGDD), 4) The Ethical Principles for Medical Research Involving Human Subjects of the Declaration of Helsinki (World Medical Association [WMA], 2013),[18] 5) The principal investigator ensured the participants' rights to respect for privacy and the confidentiality of all related information with its process and the consent of the interested party according to Law 14/1986, of April 25, General Health Law (LGS), article 10. At all times the highest standards of professional conduct, confidentiality and anonymity were maintained, complying with the applicable national regulations regarding data

protection, and 6) The criteria of the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [19] for the completion of the online questionnaires.

Results

The results obtained in this study are presented below, based on the data collected and analyzed after the completion of the questionnaires and scales answered by the healthcare professionals.

Sociodemographic Data

Table 1
presents the sociodemographic and employment data of the 79 nursing professionals participating in the study. The variables presented are gender, age group, length of service in the current department, and length of service as a healthcare professional.

Table 1 Descriptive analysis of sociodemographic and occupational data of healthcare professionals.		
Gender n (%)	**M**	15 (19%)
	F	64 (81%)
Ege (years old)	21 to 30	6 (8%)
	31 to 40	15 (19%)
	41 to 50	32 (41%)
	More than 50	26 (33%)
Time in current Service/Unit (years)	Less than or equal to 10	50 (63%)
	More than 10	29 (37%)
Time spent working as a nursing professional (years)	Less than or equal to 10	19 (24%)
	More than 10	60 (76%)
Note: N, sample size; M, male; F, female		

There was a higher participation rate among women (81%) compared to men (19%). Regarding age, the majority of participants were between 41 and 50 years old (41%), followed by those over 50 (33%). As for length of service in their current position, most participants had worked ≤ 10 years (63%). However, in terms of professional experience, 76% of participants had more than 10 years of experience as nurses.

Correlations

Table 2
shows the correlations between the six dimensions of the Care-Q questionnaire, its total score, and the HSPS-S.

Table 2 Correlations of the total score and the six dimensions of invisible caregiving with the total score of the Highly Sensitive Persons Test for all participants.

	It is accessible	It explains and facilitates	It comforts	It anticipates	It maintains a relationship of trust	It monitors and follows up	Care-Q	HSPS-S
It accessible	1.000	0.573**	0.625**	0.569**	0.569**	0.428**	0.696**	0,125
It explains and facilitates		1.000	0.654**	0661**	0.708**	0.557**	0.816**	-0,012
It comforts			1.000	0,682**	0.713**	0.520**	0.820**	0,071
It anticipates				1,.000	0.791**	0.688**	0.875**	0,177
It maintains relationship trust					1,000	0.697**	0.934**	0,224*
It monitors and follows up						1,000	0.784**	0,159
Care-Q							1.000	0,156
HSPS-S								1,000

Note: Care-Q, Care Assessment Instrument; HSPS-S, Spanish version of the Highly Sensitive Person Scale. Correlations with a low significance level (0.05, two-tailed) are marked with *, and those with a medium significance level (0.01, two-tailed) are marked with **. Positive values indicate direct associations, negative values, inverse associations between the variables

The Care-Q dimensions were positively and significantly correlated with each other, showing strong associations between the domains Anticipates and Maintains a Trusting Relationship (ρ = 0.791**), between Anticipates and the total Care-Q score (ρ = 0.875**), and between Maintains a Trusting Relationship and the total Care-Q score (ρ = 0.934**). Likewise, the total HSPS-S score showed a significant correlation with the Maintains a Trusting Relationship dimension (ρ = 0.224*).

Table 3
shows the correlations between the Care-Q questionnaire dimensions, its total score, and the HSP-S, considering only participants with scores ≥ 160 on the High Sensitivity Test.

Table 3 Correlations of the total score and the six dimensions of invisible care with the total score of the test of highly sensitive people with participants with scores ≥ 160 points.

	It is accessible	It explains and facilitates	It comforts	It anticipates	It maintains a relationship of trust	It monitors and follows up	Care-Q	HSPS-S
It accessible	1.000	0.528	0.415	0.230	0.395	0.215	0.637*	0.018
It explains and facilitates		1.000	0.552	0.614*	0.667*	0.599*	0.846**	0.101
It comforts			1.000	0.462	0.476	0.493	0.689*	-0.270
It anticipates				1.000	0.775**	0.533	0.683*	0.036
It maintains relationship trust					1.000	0.576	0.887**	0.391
It monitors and follows up						1.000	0.726**	-0.171
Care-Q							1.000	0.127
HSPS-S								1.000

Note: Care-Q, Care Assessment Instrument; HSPS-S, Spanish version of the Highly Sensitive Person Scale. Correlations with a low significance level (0.05, two-tailed) are marked with *, and those with a medium significance level (0.01, two-tailed) are marked with **. Positive values indicate direct associations, and negative values, inverse associations between the variables

In this subgroup, significant correlations were observed between several dimensions of the Care-Q, with a notable association between Anticipates and Maintains a Trusting Relationship (ρ = 0.775**). Furthermore, the total Care-Q questionnaire score showed significant correlations with different dimensions, especially with Explains and Facilitates (ρ = 0.846**), Maintains a Trusting Relationship (ρ = 0.887**), and Monitors and Follows Up (ρ = 0.726**). In contrast, the HSPS-S did not show correlations with any of the dimensions in this subgroup.

Care-Q: Age

Table 4 presents the results of the inferential analysis of the dimensions of invisible care according to the age of the participants, comparing healthcare professionals aged ≤ 50 years and > 50 years.

Table 4
Análisis inferencial: Resultados de las dimensiones del cuidado invisible en relación con las diferencias por edad (≤ y > 50 años).

	≤ 50years 53 (67%)			> 50years 26 (33%)				
	M	**SD**	**Range**	**M**	**SD**	**Range**	**p**	**r_{rb}**
It accessible	4.36	0.54	2.50-5	4.49	0.48	3.33-5	0.198	0.145
It explains and facilitates	4.24	0.62	2.17-5	4.35	0.71	2.33-5	0.147	0.163
It comforts	4.42	0.49	2.78-5	4.57	0.35	3.89-5	0.299	0.117
It anticipates	4.06	0.69	240-5	4.16	0.70	2–5	0.475	0.080
It maintains relationship trust	4.20	0.55	2,.31 – 5	4,40	0.61	3–5	0.055	0.216
It monitors and follows up	4.31	0.53	263-5	4.39	0.53	3.25-5	0.519	0.073
Total	4.27	0.48	2.46–4.92	4.41	0.48	3.42–4.96	0.144	0.164

Note: N, sample size; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

The analysis by age showed no statistically significant differences between age groups in any of the Care-Q dimensions or in the total score. However, a non-significant trend was observed in the "Maintains a Trustworthy Relationship" dimension ($p = 0.055$), where professionals over 50 years of age obtained slightly higher scores of 4.40 (0.61) compared to those under 50 years of age, who scored 4.20 (0.55).

3.2 Care-Q: Gender

Table 5
represents the results of the inferential analysis of the dimensions of invisible care according to the gender of the participants.

Table 5 Inferential analysis: Results of the dimensions of invisible care in relation to gender differences.

	Male			**Female**				
	15 (19%)			**64 (81%)**				
	M	**SD**	**Range**	**M**	**SD**	**Range**	**p**	**r_{rb}**
It accessible	4.34	031	3.83–4.83	4.42	0.56	2.50-5	0.129	0.171
It explains and facilitates	4.34	0.38	3.50–4.83	4.27	0.70	2.17-5	0.637	0.053
It comforts	4.33	0.46	3,33 – 5	4.50	0.45	2.78-5	0.161	0.158
It anticipates	4.14	0.48	3–5	408	0.74	2–5	0.925	0.011
It maintains relationship trust	4.20	043	3.06–4.88	4.28	060	2.31-5	0.345	0.106
It monitors and follows up	4.54	0.36	3.75-5	4.29	0.55	2.63-5	0.127	0.172
Total	4.30	0.32	3.56–4.88	4.32	0.51	2.46–4.96	0.561	0.065

Note: N, sample size; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

The gender analysis showed no statistically significant differences between men and women in any of the Care-Q dimensions or in the total score. However, women tended to score higher than men in the dimensions of Is Accessible: 4.42 (0.56), Comforts: 4.50 (0.45), and Maintains a Trusting Relationship: 4.28 (0.60). Conversely, men obtained slightly higher scores in Explains and Facilitates: 4.34 (0.38), Anticipates: 4.14 (0.48), and Monitors and Follows Up: 4.54 (0.36).

Care-Q: Time in Service

Table 6
presents the results of the inferential analysis of the dimensions of invisible care as a function of length of service in the current department, comparing healthcare professionals with ≤ 10 years and > 10 years of experience in the unit.

Table 6 Inferential analysis: Results of the dimensions of invisible care in relation to differences by time in service (≤ and > 10 years).

	≤ 10years			**> 10years**				
	50 (63%)			**29 (37%)**				
	M	**SD**	**Range**	**M**	**SD**	**Range**	**p**	**r_{rb}**
It accessible	4.45	0.47	3.17-5	4.31	0.60	2.50-5	0.282	0.121
It explains and facilitates	4.33	0.62	2.33-5	4.19	0.70	2.17-5	0.341	0.107
It comforts	4.50	0.40	3.33-5	4.41	0.53	2.78-5	0.581	0.062
It anticipates	4.16	0.68	2–5	3.97	0.71	2.40-5	0.328	0.110
It maintains relationship trust	4.36	0.47	3.06-5	4.11	0.69	2.31-5	0.192	0.147
It monitors and follows up	4.39	0.47	2.88-5	4.25	0.60	2.63-5	0.371	0.101
Total	4.38	0.41	3.42–4.92	4.20	0.58	2.46–4.96	0.274	0.123

Note: N, sample size; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

The analysis by length of service showed no statistically significant differences between the groups in any of the Care-Q dimensions or in the total score. Although the differences in scores were minimal, professionals with more than 10 years of experience obtained slightly higher scores in the dimensions Explains and Facilitates: 4.29 (0.70) and Comforts: 4.48 (0.47), while those with ≤ 10 years showed higher scores in Is Accessible: 4.46 (0.49), Anticipates: 4.10 (0.64), Maintains a Trusting Relationship: 4.35 (0.46), and Monitors and Follows Up: 4.35 (0.53).

Care-Q: Length of Service

Table 7 presents the results of the inferential analysis of the dimensions of invisible care in relation to the total length of service as a healthcare professional, comparing those with ≤ 10 years and those with more than 10 years of experience.

Table 7
Inferential analysis: Results of the dimensions of invisible care in relation to differences by length of work performed (≤ and > 10 years).

	≤ 10 years			> 10 years				
	19 (24%)			60 (76%)				
	M	**SD**	**Range**	**M**	**SD**	**Range**	**p**	**r_{rb}**
It accessible	4.46	0.49	3.17-5	4.38	0.53	2.50-5	0.479	0.080
It explains and facilitates	4.26	0.50	3.17-5	4.29	0.70	2.17-5	0.374	0.100
It comforts	4.42	0.39	3.89-5	4.48	0.47	2.78-5	0.400	0.095
It anticipates	4.10	0.64	2.80-5	4.09	0.71	2–5	0.963	0.005
It maintains relationship trust	4.35	0.46	3.56-5	4.24	0.60	2.31-5	0.705	0.043
It monitors and follows up	4.35	0.53	2.88-5	4.33	0.53	2.63-5	0.963	0.005
Total	4.34	0.38	3.48–4.92	4.31	0.51	2.46–4.96	0.895	0.015

Note: N, sample size; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

The analysis by length of service showed no statistically significant differences between the two groups. However, it was observed that healthcare professionals with ≤ 10 years of service tended to score higher in all dimensions of the Care-Q and in the total score compared to those with > 10 years of experience in the unit.

HSPS-S

Table 8
presents the descriptive and inferential results of the total HSPS-S score based on the main sociodemographic and occupational variables of the healthcare professionals: age, gender, time in the current service, and total length of service.

Table 8 Descriptive and inferential analysis of sociodemographic and work data of healthcare professionals with the total score of the personnel test with high sensitivity.

Age	**≤ 50years**			**> 50years**				
	19 (24%)			60 (76%)				
	M	**SD**	**Range**	**M**	**SD**	**Range**	**p**	**r_{rb} / d**
	135.79	22.64	62–171	139.15	24.90	96–187	0.688	0.045
Gender	**Male**			**Female**				
	15 (19%)			64 (81%)				
	128.33	27.75	62–171	138.91	21.90	94–187	0.114	0.46
Time in Service	**≤ 10years**			**> 10years**				
	50 (63%)			29 (37%)				
	137.78	23.92	62–187	135.38	22.53	94–171	0.662	0.10
Length of Service	19 (24%)			60 (76%)				
	140.63	27.55	62–187	135.72	21.92	94–179	0.27	0.21

Note: N, sample size; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

Descriptive and inferential analysis showed no statistically significant differences in the total HSPS-S score based on age, gender, length of service, or total work experience. However, some non-significant trends were observed. Women had higher mean scores (138.91) than men (128.33), with a moderate effect size (r = 0.46), which could suggest greater sensory processing sensitivity in women. Regarding age, older participants (> 50 years) obtained higher scores (139.15) compared to younger participants (≤ 50 years). With respect to length of service, scores were slightly higher in professionals with ≤ 10 years (137.78) than in those with more than 10 years (135.38). Conversely, it was observed that professionals with ≤ 10 years of total work experience showed higher scores (140.63) than those with a longer work history (135.72).

Table 9
shows the scores for the different components of invisible care, the overall Care-Q score, and the overall HSPS score among nursing professionals with and without SPS.

Table 9 Inferential anlysis: Analysis of mean comparisons of the components of invisible care between nursing professionals with and without SPS

	SPS			**Not SPS**				
	12 (15%)			**67 (85%)**				
	M	**SD**	**Range**	**M**	**SD**	**Rango**	**p**	**r_{rb}**
It accessible	4,52	0,60	3,17 – 5	4,38	0,51	2,50 – 5	0,134	0,168
It explains and facilitates	4,40	0,55	3,50 – 5	4,26	0,67	2,17 – 5	0,527	0,071
It comforts	4,54	0,40	3,78 – 5	4,45	0,46	2,78 – 5	0,665	0,049
It anticipates	4,35	0,51	3,40 – 5	4,04	0,71	2–5	0,149	0,162
It maintains relationship trust	4,54	0,38	4–5	4,22	0,59	2,31 – 5	0,070	0,204
It monitors and follows up	4,61	0,31	4,13 – 5	4,29	0,54	2,63 – 5	0,047	0,224
Care-Q	4,51	0,33	3,90 – 4,92	4,28	0,50	2,46 – 4,96	0,135	0,168
HSPS-S	169,83	7,15	162–187	131	20,02	62–159	< 0,001	0,618

Note: SPS, sensory processing sensitivity; M, mean; SD, standard deviation; p with significance levels: $p < 0.001$ (high), $p < 0.01$ (medium), $p < 0.05$ (low); r_{rb}, rank-biserial correlation (effect size): $r_{rb} < 0.3$ small effect, r_{rb} between 0.30 and 0.50 medium effect, $r_{rb} > 0.50$ large effect

Table 9 shows statistically significant differences, revealing higher scores among SPS participants on the HSPS-S questionnaire and in the Monitors and Follows Up domain compared to participants without the trait. Furthermore, while no significant differences were found in the Maintains a Trusting Relationship domain, the effect size suggests a non-significant trend that could become more apparent with a larger sample size.

Discussion

The main objective was to analyze the perception of invisible care among nursing professionals in a level III hospital. Seventy-nine professionals participated by responding to the online questionnaire. Of these, only 12 scored 160 or higher on the HSP scale, representing 15% of the sample as highly sensitive professionals. This finding is consistent with epidemiological data from the general population [7, 9].

The study results showed a high perception of invisible care among nursing professionals, with mean scores above 4 in all dimensions of the Care-Q questionnaire. This finding underscores the essential role of nursing in humanizing healthcare and aligns with recent research highlighting how invisible, often unrecorded, care contributes significantly to patient well-being, although it frequently goes unnoticed in hospital settings. For example, studies on invisible care in healthcare settings highlight the need for nurses to make these interventions visible in order to improve the quality of care and reduce discrepancies between the perceptions of nurses and patients [20–22].

The absence of significant differences by age, gender, years in the profession, and years in the same department suggests that invisible care is inherent to the profession, regardless of demographic, personality, or work-related factors.

This underscores the universality of non-technical care in the clinical context.

As previously mentioned, only 15% of healthcare professionals exhibited the sensory processing sensitivity (SPS) trait, with scores ≥ 160 on the HSPS scale. This percentage is consistent with the prevalence of the trait in the general population.[8] Although no significant correlations were observed with most of the dimensions of invisible care, a weak but notable relationship was found with the dimension: Maintains a trusting relationship ($\rho = 0.224$, $p < 0.05$). This finding is consistent with recent studies linking high sensitivity with greater empathy and emotional reactivity in healthcare professionals, enhancing relational aspects of care [23]. Research in the intensive care setting has shown that professionals with high sensitivity may be affected by compassion fatigue, mediated by factors such as stress and sensory overstimulation, which could explain this selective association in this study [24, 25].

Furthermore, there were no statistically significant differences between sociodemographic variables and the perception of invisible caregiving among professionals with the SPS trait. This indicated that these variables are not moderated by sociodemographic, personality, or work environment characteristics. This aligns with the results of a systematic review exploring SPS in caregivers, which found that the trait is a better predictor of health-related quality of life and burnout, rather than direct demographic variations [26]. Recent studies in highly sensitive healthcare professionals have highlighted a greater vulnerability to mental health problems such as anxiety and depression, suggesting that the SPS trait acts as a predictor of burnout and resilience in contexts of high emotional demand and work requirements. This was explained by differential susceptibility [10, 11], by the ease of arousal, with a low sensory threshold, which strengthened the relationship between job demands and emotional exhaustion. Furthermore, temperament can act as both a vulnerability factor and a potential resource, depending on the nature of the perceived work environment [13, 27].

In addition, these results imply the need to integrate institutional recognition of invisible care to promote the professionalization of nursing, as proposed by data-driven approaches to highlight the impact of nurses on clinical outcomes. Moreover, when considering SPS (Sensitivity-Sensitivity), interventions could focus on coping strategies to mitigate the risk of fatigue in highly sensitive professionals, aligning with findings on its influence on occupational stress in nursing [28–30]. Future research should expand samples to explore these relationships in multicultural contexts, promoting more inclusive and humanized care.

The limitations and difficulties of this research were as follows: a) The sample size was small: only 79 nursing professionals participated, and the estimated number of professionals could not be reached after repeated mailings of the form; b) The voluntary nature of participation in the study may have introduced selection bias, because only those interested or motivated completed the questionnaires; c) The low prevalence of professionals with the SPS trait: only 12 participants (15%) were identified as highly sensitive people (HSPs), which limits the analysis of the relationship between sensory processing sensitivity (SPS) and the perception of invisible care; d) The cross-sectional design: a descriptive, cross-sectional observational design does not allow for establishing causal relationships, only associations; e) The lack of significant differences: no statistically significant differences were found in most of the variables (age, gender, work experience, and time in the service), which could be due to the sample size or the reliability of the instruments used, mainly the Care-Q; and f) Self-reporting: the data were based on self-administered questionnaires, which may introduce biases related to participants' subjective perception or memory.

The clinical impact of this study may include: a) A greater understanding of invisible care: the study highlights the importance of invisible (humanized, non-technical) care as an essential dimension of nursing practice, which contributes significantly to patients' recovery and well-being, although it is often not recorded or valued institutionally; b) The identification of highly sensitive individuals in nursing: the identification of 15% of professionals with high sensitivity suggests that this trait may influence how certain professionals perceive and deliver invisible care, particularly in the dimension of "maintaining a trusting relationship"; c) The promotion of humanization: the results underscore the relevance of the dimensions of invisible care (such as empathy, comfort, and trust) for improving the quality of care and

the patient experience, promoting a more humanized approach in clinical practice; and d) Implications for training: the lack of a significant relationship between the HSP trait and the perception of invisible care suggests that this care is inherent to the profession, which may guide professional training towards strengthening these competencies in all nurses, regardless of temperament traits.

Implications for Nursing & Health Policy: This clinical impact may lead to a set of expectations and future directions in the healthcare field regarding the SPS trait and nursing professionals: a) Greater visibility of invisible care: the study seeks to give visibility to non-technical care, promoting its institutional and social recognition as an integral part of nursing practice; b) Integration into clinical practice: it is hoped that the results will promote the incorporation of invisible care into clinical records and quality of care indicators, which could lead to greater professional recognition and better outcomes for patients; c) Exploration of the HSPS trait: although no significant differences were found, it is hoped that future studies will further explore how the sensory processing sensitivity trait may influence empathy, intuition, and quality of care in clinical contexts; d) Strengthening the nursing image: it is hoped that this will contribute to improving the social and professional image of nursing, overcoming the perception of "saying little, doing much" and achieving greater legitimacy and respect within the healthcare system; e) Expanding sample sizes: conducting studies with a larger and more representative sample to increase statistical power and better explore the relationships between variables; f) Longitudinal studies: implementing longitudinal designs to assess how the perception of invisible care and the HSP trait evolve over time and with professional experience; g) Exploring other variables: investigating additional factors that may influence the perception of invisible care, such as workload, stress, specific training in humanized care, or cultural context; h) Validating instruments: continuing to validate and adapt tools such as the Care-Q and the HSPS in different cultural and clinical contexts to improve their sensitivity and specificity; i) Educational interventions: developing training programs that strengthen competencies associated with invisible care, especially for highly sensitive professionals, to maximize their impact on patient care; j) Institutional integration: promoting strategies to record and value invisible care in health systems, including quality indicators and professional rewards; and k) Comparative studies: comparing the perception of invisible care between different types of hospitals (levels I, II, III) or between countries to identify contextual influences.

Conclusions

This research allows us to conclude that:

Invisible care is perceived as essential/fundamental by nursing professionals. These are humanized, intangible interventions that contribute significantly to patient well-being, although they often go unrecorded in the institutional system, which reinforces their invisibility.

The Care-Q questionnaire is useful in assessing the perception of invisible care in the different units and services of the hospital and identifies that the most valued dimensions are "Maintains a relationship of trust" and "Provides comfort," especially among women. This suggests that professionals prioritize empathy, closeness, and emotional well-being in their daily practice.

The trait of sensory processing sensitivity (SPS) is present in 15% of the nursing professionals evaluated. This indicates that a minority of nursing professionals in this hospital are highly sensitive people (HSPs). This percentage is consistent with the estimated prevalence of 15 to 30% in the general population, according to the literature.

No statistically significant relationship was found between most dimensions of the Care-Q questionnaire and the SPS trait, except for the "Maintains a trusting relationship" dimension. In the HSP subgroup, no significant correlations were observed with any dimension of the Care-Q. This suggests that the perception of invisible care is inherent to the nursing profession and is not strongly influenced by the SPS trait.

No statistically significant differences were found in the perception of invisible care or in the SPS trait according to sociodemographic and occupational variables. However, non-significant trends were observed, such as a higher perception among women and professionals with less time in the service.

Finally, the study concludes that invisible care is an essential component of nursing practice. These findings highlight the need for greater visibility and institutional recognition, promoting its integration into clinical practice and professional training to improve the quality of care and the image of nursing.

Declarations

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Author Contributions

Conceptualization, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R; methodology, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R; software, J.A.R.D. and S.F.S. ; validation, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R.; formal analysis, J.A.R.D. and S.F.S; investigation, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R; resources, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R.; data curation, J.A.R.D. and S.F.S.; writing—original draft preparation, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R.; writing—review and editing, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R; visualization, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R; supervision, J.A.R.D., S.F.S., M.M., C.M., J.M.G., and P.A.R.; project administration, J.A.R.D.

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Data Availability

The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Ethical approval

This study was conducted following the Declaration of Helsinki; informed consent was obtained from the participants before proceeding with the study. Ethical approval was obtained from the Hospital Research Committee (CI-HUSE) with opinion number: CI-680-22 (approval date: July 29, 2022), the Balearic Islands Research Ethics Committee for Medicinal Products (CEIm-IB) with opinion number: IB 4968/22 PI (approval date: December 29, 2022), and the HUSE Nursing Management (approval date: January 17, 2023).

Informed Consent Statement

Informed consent was obtained from all subjects involved in this study.

Conflicts of Interest

The authors declare no conflicts of interest.

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