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The Noetic Signature Inventory: 12-Factor Confirmatory Factor Analysis

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Abstract

Background

The Noetic Signature Inventory (NSI) is a 44-item self-report questionnaire that evaluates people's experiences of intuition or inner knowing. Previous research developing and validating the measure demonstrated its validity and reliability, and a 12-factor model describing the variability of noetic experiences was found. This current study aims to confirm this factor model in a new population.

Methods

In a cross-sectional study, 2,415 participants completed demographic information and the NSI. The collected data were then subjected to a confirmatory factor analysis (CFA).

Results

Participants were 51.7±15.0 years old with 16.7±3.3 years of education. They hailed from 76 countries, although most were from the United States, the United Kingdom, and Canada. The CFA results for the 12-factor model were as follows: $\chi 2$ (836) =3962.74, $p < .001$, CFI=0.981, TLI=0.979, RMSEA = 0.039 (90% CI=0.039-0.041), and SRMR = 0.048. All 44 items had factor loadings above the 0.50 cutoff, ranging from 0.86 to 1.83 (M=1.12). These values represent a very good model fit to the data, as commonly reported fit statistics indicate.

Conclusion

The 12-factor structure of the NSI was confirmed with excellent fit indices, supporting its potential as a valid and reliable tool for assessing noetic characteristics. Nonetheless, limitations remain, and further research is needed to confirm and extend the findings in diverse populations and settings. The results contribute to our understanding of the multidimensionality of noetic phenomena. Future research could build upon these findings by replicating the factor structure of the NSI in other populations, incorporating objective measures, conducting longitudinal studies, exploring underlying mechanisms, and using qualitative methods to deepen understanding of inner knowing experiences.

Keywords: Intuition; Inner Knowing; Noetic; Noetic Signature; Noetic Signature Inventory

Abbreviations: NSI: Noetic Signature Inventory; CFA: Confirmatory Factor Analysis; DWLS: Diagonally Weighted Least Squares; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual

Introduction

Noetic comes from the Greek word noēsis, meaning inner wisdom or direct knowing. Noetic refers to ways of knowing beyond our traditional five senses, and noetic information is perceived as different from information involving the intellect or information received through an individual's five physical senses. American philosopher and psychologist William James described noetic experiences as "states of knowledge. They are states of insight into depths of truth unplumbed by the discursive intellect. They are illuminations, revelations, full of significance and importance, all inarticulate though they remain; and as a rule, they carry with them a curious sense of authority for after-time" [1].

Examples of noetic experiences include gut hunches that turn out to be correct, knowing something to be true even though one has no traditional means of having that knowledge, or having a dream about the future that comes to fruition. Noetic experiences often transcend the perception of our five senses and are ubiquitous worldwide [2,3]. Despite the highly prevalent nature of these experiences, there has been limited research effort

to understand these phenomena. More recently, assessing these intuitive experiences has gained increased attention as researchers and clinicians recognize their potential positive impact on mental health and well-being [4,5]. To improve research enquiry, we developed the Noetic Signature Inventory (NSI) through an iterative qualitative and statistical process to subjectively assess noetic characteristics [6].

The NSI consists of 44 items that evaluate different aspects of inner knowing [6]. The pilot studies developing and validating the NSI involved administering it to multiple populations. The NSI demonstrated internal consistency (Cronbach's alpha=0.94), convergent and divergent content validity, and test retest (ICC=0.88) reliability [6]. The study also found that individuals who reported having had noetic experiences had higher scores on the NSI than those who did not, supporting its construct validity.

Factor analysis of the NSI revealed 12 factors or areas of intuitive knowing. The 12-factors are: (1) General Intuition, (2) Embodied Sensations, (3) Visualizing to Access or Affect, (4) Inner Knowing Through Touch, (5) Healing, (6) Knowing the Future, (7) Physical Sensations from Other People, (8) Knowing Yourself, (9) Knowing Other's Minds, (10) Apparent Communication with Non-physical Beings, (11) Knowing Through Dreams, and (12) Inner Voice [6]. However, the factor analysis establishing this 12-factor model had inherent bias because participants were enrolled through a third-party recruitment company with paid participants, many of whom recorded invalid responses. This was evaluated by ensuring reverse-coded items aligned with similar non-reverse-coded items. Data cleaning procedures were implemented, and numerous invalid records were deleted from the dataset. Thus, the 12-factor model was considered preliminary, and a study confirming the 12-factor model in a different population is essential.

This study aims to conduct a confirmatory factor analysis (CFA) of the NSI to examine its factor structure and evaluate its hypothesized 12-factor structure.

Methods

Participants

Participants were recruited from the Institute of Noetic Sciences membership through e-newsletters, blogs, and online recruitment postings. Inclusion criteria were: (1) age 18 years or older, (2) fluent in English, (3) having had a prior noetic experience, (4) agreed to the study consent form, and 5) completed all items of the NSI. All participants signed an informed consent to participate in the study, and all study activities were approved and overseen by the Institutional Review Board at the Institute of Noetic Sciences (IORG#0003743). No specific sample size was determined a priori, besides having at least 440 participants (10 participants for each estimated parameter, as recommended [7].

Study Procedures

Volunteers arrived at a HIPAA-compliant SurveyMonkey website and were asked eligibility questions. Eligible volunteers were routed to the informed consent form and were asked to confirm that they had read and understood the form to continue. They then answered demographic questions (age, years of education, gender and racial identification, and country) and completed the 44 items of the NSI.

The NSI is a 44-item subjective questionnaire that evaluates 12 factors of intuitive inner knowing [6]. The 12 factors and their number of items are as follows: General Intuition (10-items); Embodied Sensations (5-items); Visualization/Manifestation (4-items; 1 Reverse Coded); Inner Knowing Through Touch (3-items; 1 Reverse Coded); Healing (3-items; 1 Reverse Coded); Knowing the Future (3-items); Physical Sensations from Other People (3-items); Knowing Yourself (3-items); Knowing Other's Minds (3-items); Apparent Communication with Non-Physical Beings (3-items; 1 Reverse Coded); Knowing Through Dreams (2-items; 1 Reverse Coded); and Inner Voice (2-items). Items included such statements as, "I have just felt in my body when something is true or not," and "I have received information about things that will happen in the future." Participants were asked to "Please read each statement and move the slider to indicate, in general, how much you agree or disagree with each statement. There are no right or wrong answers. Just move the slider to the selection you feel is right for you." The sliding scale was anchored by Strongly Disagree (0), Neither Agree nor Disagree (50), and Strongly Agree (100). The NSI items are available upon request from the first author.

Statistical Analysis

All data cleaning/organization and statistical analyses were conducted using Microsoft Excel (Redmond, WA). Data analyses were performed in R version 4.2.3. [8]. Reverse-coded items were transformed. The updated dataset (with reverse-coded items) was assessed for multivariate normality using the Mardia Skewness and Kurtosis multivariate normality tests and Shapiro-Wilk univariate normality tests in the R package MVN (Korkmaz et al., 2014).

CFA is a statistical technique commonly used to validate the factor structure of a measure and is based on the assumption that a construct is composed of multiple latent factors, each measured by a set of observed variables [9]. CFA allows researchers to test whether the observed variables are reliable indicators of the latent factors and to identify the underlying factor structure of a measure. Therefore, CFA is a valuable tool for assessing the construct validity of a measure. A standard CFA model was fit to the data using the R package lavaan with the latent variable variance constrained to 1. Given that the data did not uphold the assumption of multivariate normality, CFAs were fit using

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the diagonally weighted least squares (DWLS) estimator and the limited-memory Broyden-Fletcher-Goldfarb-Shanno optimization method [10]. The DWLS estimator was used for this CFA, as it was deemed a more appropriate estimator for this data because 0 and 100 data can be considered ordinal or numerical. That is, it does not quite fit ordinal data because there are so many categories, but they do not quite fit numerical data because they do not live on the real number line, but on an interval.

We assessed the goodness of fit of the model using several fit indices. While chi-square was the original test of model fit and is still expected to be reported, it has limitations in cases of both large and small sample sizes, so various other fit metrics have been developed [11]. Thus, we will use the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The CFI and TLI are "goodness-of-fit" indicators ranging from 0 to 1, with larger values indicating better fit. Of note, TLI values can technically extend below 0 or above 1 in extremely bad or good fit cases. The typical rules for interpreting CFI and TLI values are that values greater than 0.90 and 0.95 indicate an acceptable and very good fit [12, 13]. RMSEA and SRMR are indicators of "badness-of-fit", where 0 corresponds to a perfect fit. For RMSEA, values less than .05 correspond to a "close fit", a value of .08 would correspond to "adequate fit", and values above .10 indicate "unacceptable fit" [11]. Interpretation of SRMR is similar to RMSEA, with values less than .05 indicating a "good fit", and values up to 0.10 considered a "acceptable fit" [14].

Results

Two thousand four hundred and fifteen participants completed the NSI between May 1, 2022, and July 5, 2025, met inclusion/exclusion criteria, and are included in this analysis (Figure 1). Participants could skip items, so participant numbers are included after the demographic results. There was no missing data for NSI values, as participants were excluded if their NSI was incomplete.

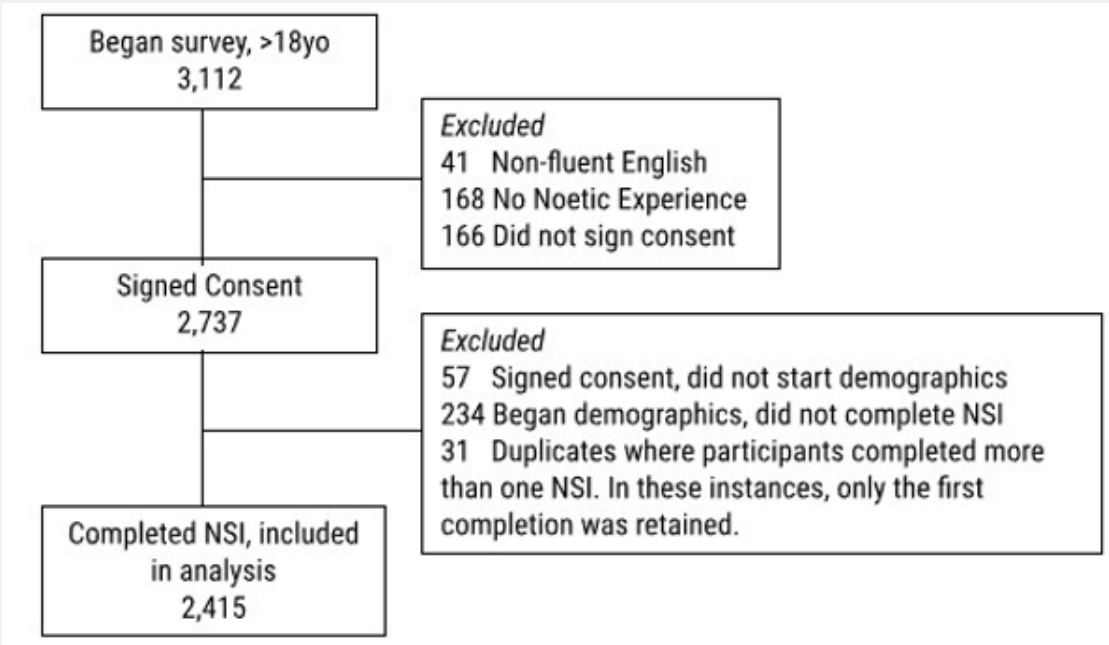

Figure 1: Participant recruitment flowchart

Participants were 51.7±15.0 years old (n=2292) with 16.7±3.3 years of education (n=2,415). Participant gender identifications were 1,773 (73.4%) female, 600(24.8%) male, and 42 or 1.7%of another gender. All the participants have provided information on their racial identification (n=2,415). Most participants identified as European (n=1,734; 71.8%). The second most frequently reported category was Two or more races (n=230; 9.5%). The rest proportions included Asian (n=118; 4.9%), Latinx/Hispanic (n=116; 4.8%), Native American (n=59; 2.4%), African (n=52; 2.2%), Middle Eastern (n=20; 0.8%), and Native Pacific Islander (n=13; 0.5%). Additionally, Other/Declined to answer was selected by 73 participants (3.0%). Together, 2,391 participants provided their nationalities. Most participants were from the United States (1,688, 70.6%), Canada (166, 6.9%), the United Kingdom (141,

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5.9%), Australia (83, 3.5%), and India (32, 1.3%) were the next highest-represented countries. The remaining participants hailed from seventy-one other countries, with 11.8% of the participants.

The CFA results for the 12-factor model were as follows: the chi-square statistic equaled 3962.74 with 836 degrees of freedom and p<.001. The CFI was 0.981, the TLI was 0.979, the RMSEA was 0.039 (90% confidence interval 0.039-0.041), and the SRMR was 0.048. All 44 items had factor loadings above the 0.5 cutoff, ranging from 0.86 to 1.83, with an average factor loading of 1.12. These values represent a very good model fit to the data, as indicated by commonly reported fit statistics [12, 13]. Additional statistical output is available upon request.

Discussion

In summary, this study confirmed the 12-factor model of the NSI in a large global sample. The participants were mostly Caucasian from the United States, although there were participants from 67 different countries and multiple racial backgrounds.

Limitations

There are several limitations to consider in this study. First, the sample was recruited from the Institute of Noetic Sciences membership, which may introduce selection bias, as members of this organization may have a higher likelihood of having had noetic experiences than the general population. This may limit the generalizability of the findings to other populations. While the study population here was somewhat diverse in that around 30% were non-Caucasian, the predominance of Caucasians from Western countries is notable and does not reflect the global population. The NSI being in English limits its use in non-English populations. Another limitation of this study is that we did not include any other questionnaires and thus, cannot infer continued content validity in this population. However, previous work has already demonstrated this [15].

Additionally, the study relied on self-report measures, which are subject to recall bias and social desirability bias. Participants may have provided responses that they believed were more socially acceptable or aligned with their beliefs about noetic experiences, leading to potential measurement error. Furthermore, the study did not include any objective measures to validate the self-report measures, which may further limit the validity of the findings. Finally, the test-retest psychometrics of the NSI over time were not assessed through this current study.

Implications of this study

Despite these limitations, this study has important implications for the field of noetic experiences research. The confirmatory factor analysis of the NSI provides evidence for its 12-factor structure, which adds to the growing body of literature on the different aspects of intuitive inner knowing. This finding may facilitate the use of NSI as a reliable and valid tool for assessing noetic characteristics in future research and clinical practice. Identifying 12 factors of intuitive inner knowing, such as general intuition, embodied sensations, and knowing the future, may also contribute to our understanding of the multidimensionality of noetic experiences and their potential impact on mental health and well-being. Moreover, the study highlights the need for further research to confirm and extend the findings in different populations and settings, which may help to establish the generalizability and robustness of the NSI as a measurement tool. While the NSI likely does not capture every unique iteration of noetic experiences, what it encompasses thus far appears to be generalizable to the populations it has been administered to. We welcome other researchers to use the NSI for their own research to continue broadening our understanding of the ubiquitous noetic experience. More importantly, this work supports the normalization of these experiences. Long side-lined at best or labeled as mental illness at worst, these experiences warrant further attention from researchers and clinicians alike [15].

Recommendations for further research

Based on the findings of this study, several recommendations for future research can be made. First, future studies should aim to replicate the 12-factor structure of the NSI in diverse populations, such as different age groups, cultural backgrounds, and clinical populations, to further establish the validity and generalizability of the measure. Future steps to translate the NSI into non-English languages would increase recruitment of more diverse populations worldwide. Evaluating these intuitive experiences across cultures will undoubtedly aid in our understanding of them. In addition, targeted recruitment in diverse racial populations will support testing the NSI's generalizability. Additionally, longitudinal studies could be conducted to investigate the stability and change of noetic experiences over time, and to examine their potential predictive value for mental health outcomes.

Another central area of future research should be the exploration of intra- and inter-variation, normative values within the populations already studied, the prevalence of the 12 factors and their interactions with each other, if any, and potentially beneficial applications of the information the NSI provides. Objective measures, such as physiological or neurobiological markers, could also be incorporated to provide convergent validity evidence for the self-report measures of noetic experiences. The NSI, paired with biological markers, would evaluate any organic origin to the specific expression of each individual's noetic experiences. Preliminary studies have alluded to some relationship between genetics and noetic experiences [15-18], but additional work is needed. Ongoing studies are also evaluating the relationship between structural neuroimaging data and self-report noetic experiences [19]. Further research could also explore the underlying mechanisms of noetic experiences, such as the role of cognitive processes, emotional regulation, and neural networks, to gain a deeper understanding of the nature and

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origins of these phenomena. These areas and more are ripe for further consideration.

Ethics Statement

All study activities were approved and overseen by the Institutional Review Board at the Institute of Noetic Sciences (IORG#0003743). The participants provided their written informed consent to participate in this study.

Data availability

Fig share: Noetic Signature Inventory Dataset. https://doi.org/10.6084/m9.figshare.22577866.

This project contains the following underlying data:

• Raw data file, which includes demographic data and raw item scores of the Noetic Signature Inventory that were used for this analysis

• Model formula file is also available here

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