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Impact of uncertainty intolerance on clinical reasoning: a scoping review of the 21st century literature

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INTRODUCTION

Choquet (2019, p. 18) defines **clinical reasoning** as "*the set of thought and decision-making processes that allow the clinician to determine the most appropriate actions in a specific context of health problem solving*". Among factors influencing clinical reasoning and thus medical decisions, uncertainty is currently extensively studied.

Intolerance of uncertainty (IU), *i.e.*, "*the tendency of an individual to consider as unacceptable the possibility that a negative event will occur, regardless of the probability of its occurrence*" (Carleton et al., 2007, p. 105), can have a significant impact on clinical reasoning.

Various studies show that a high level of **IU has deleterious effects on problem-solving abilities** and information processing, which can lead to inaction and avoidance of ambiguous situations (Begin et al., 2022).

However, studies on healthcare professionals' reactions to uncertainty and their impact on clinical reasoning are still rare.

This study aimed to **assess the current state of the literature regarding the influence of IU on the quality of clinical reasoning**. To answer this question, we conducted a scoping review.

METHOD

A **digital scoping review** was conducted by screening Google Scholar, Medline, PsycINFO and PBSC using English keywords identified using classifications (*e.g.*, MeSH, TermSciences terminology databases).

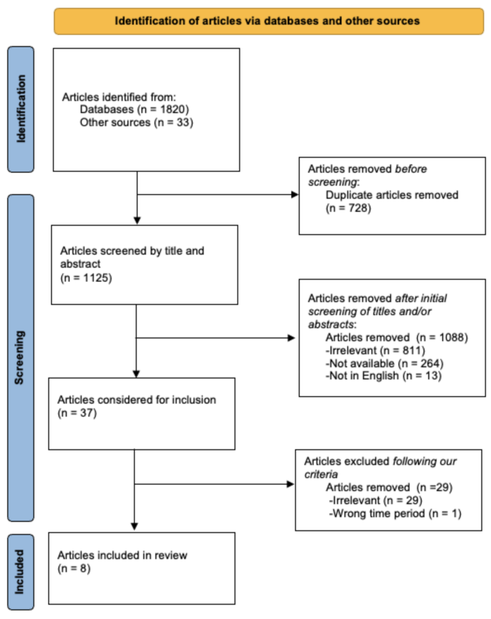
We used the following search equation: **(« clinical reasoning » OR diagnostic OR « intolerance of uncertainty ») AND (review OR definition OR introduction OR process* OR « decision making » OR uncertainty) OR (« clinical reasoning » AND diagnostic)**.

We included articles i) containing terms specified in our search equation, ii) talking about healthcare professionals as defined by the Public Health Code, and iii) reporting on the impact of uncertainty intolerance or uncertainty management on clinical reasoning. We excluded: i) articles with titles containing keywords but whose topic was incorrect, ii) articles published before 2000, iii) articles not written in English and iv) articles that were not freely available in PDF or readable format.

We selected articles by: a) removing duplicates, b) reading the titles and abstracts of the remaining articles saving only those relevant, c) reading full-text articles and excluding those which did not match our criteria and including the remaining articles to our review.

RESULTS

1. Practitioners' experience seems to influence their uncertainty management : increased **experience is related to increased comfort with uncertainty**.
2. The way **uncertainty is communicated to peers and patients impacts practitioners' well-being.**



3. Our analysis also revealed 2 categories of behaviours influenced by IU: investigative and prescriptive behaviours.

Regarding **investigative behaviours**, we found that IU could be associated with information withholding and reasoning bias, potentially resulting in diagnostic errors. IU was also associated with more referrals to peers and less use of new types of medical interventions.

Regarding **prescribing behaviours**, IU was associated with overtesting, which may be unnecessary or even dangerous. IUI was also associated with more prescriptions of antibiotics in situations where they should be prescribed with caution.

Finally, IU could influence abortion recommendations in cases of cystic fibrosis diagnosis in prenatal genetic tests.

DISCUSSION

Selected articles reported practical consequences, without mentioning cognitive impacts in detail. Future should focus more on the real-time psychological impact of IU on the different phases of clinical reasoning.

Also, a significant proportion of the articles that dealt with uncertainty in the health field **investigated the influence of uncertainty on patients' decision making rather than health professionals' decision making or how health professionals communicate their medical decisions and uncertainties** (Rising et al., 2018). Research seems currently focused on the impact of a hypothesized uncertainty, which should be more experimentally proven, on decision making.

Future studies should also examine these various concepts while recontextualizing them in decision support approaches, namely clinical decision support systems (CDSS, Harada et al., 2021). These systems are bound to grow in the future, especially since scientific studies have shown their interest for various conditions such as common chronic diseases. It is essential to work jointly on these aspects in order to ensure the development of programs that promote optimized diagnosis that are compatible with these new systems.

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DecidHealth : Psychometric validation of the IUS-12 and IUS-12-H scales on French healthcare professionals

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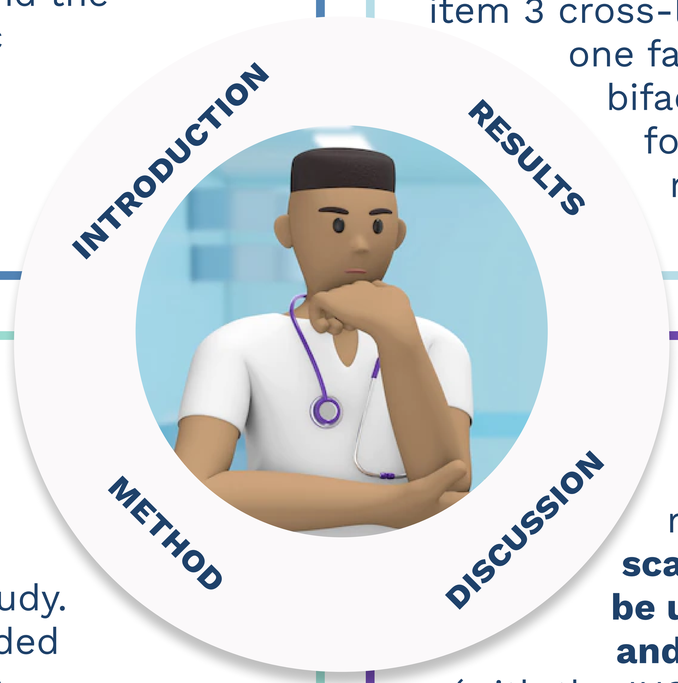
INTRODUCTION

Intolerance of uncertainty (IU) is of primary interest in the health field, as it can have negative consequences on the health decision making process. Given the importance of this factor, research into the relationship between **clinical reasoning** and intolerance of uncertainty, including its **impact on medical decisions**, is essential.

However, the implementation and evaluation of the relevance of action plans to modify this parameter **requires reliable and valid tools**.

Researchers commonly use the Intolerance of Uncertainty Scale (Carleton et al., 2007). A 27-item version (IUS-27) and a shorter 12-item version exist (IUS-12). However, no reliable and valid version of this scale exists for measuring this parameter in HCPs in France. **We wished to conduct a French psychometric validation study of the IUS-12 scale as well as a validation of a version adapted to HCPs (called IUS-12-H).**

As the IUS-12 has shown good psychometric qualities in English and that the IUS-12-H is partly based on the IUS-12 (Carleton et al., 2007), we hypothesized that both our French versions of the IUS-12 and the IUS-12-H would show good psychometric qualities and would correlate with each other.



RESULTS

Results of the external validity factorial analyses of the IUS-12 and IUS-12-H :

	PRU	DTS	DIS	PSS10	DERS-16	QIT	NFCO	NFC	IUS-12	TAMSAD
IUS-12	Distinct	Distinct	Distinct	Distinct	Distinct	Partial cross loading	Distinct	Distinct	-	Distinct
IUS-12-H	Distinct	Distinct	Distinct	Distinct	Distinct	Distinct	Distinct	Distinct	Partial cross loading	Distinct

Note: Distinct = Both scales have very distinct factor structures, Partial cross loading = Both scales have factor structures that cross load on some items

We followed a three-stage analysis for all the scales in our study: 1) We ascertained the construct validity of all the scales by **checking that the factorial structure observed corresponded to that described in the literature**, 2) Then we **tested the external validity of our scales by conducting correlational analyses**, 3) And then we conducted **new factor analyses with our scales and the additional scales in pairs in order to check the external validity** (*i.e.*, did the factor analyses show that the scales had different factor structures when taken in pairs).
The seminal paper by Carleton et al (2007) describes a two-factor structure. We found this structure to explain 53% of the variance for the IUS-12 (factor loadings ranging from 0.46 to 0.95). This bifactorial model explained 50% of the variance for the IUS-12-H (factor loadings ranging from 0.43 to 0.87). However, item 3 cross-loaded and did not seem to fall more into one factor than another. A new test of this bifactorial model without item 3 accounted for 51% of the variance (factor loadings ranging from 0.42 to 0.88).

METHOD

933 healthcare professionals (recruited using emails and social networks as LinkedIn) completed the study. Among the respondents, 417 were excluded because they did not meet our inclusion criterias (*i.e.*, they were underaged and/or notHCPs according to our definition and/or did not fully complete more than two scales).
The final sample was composed of **516 participants** (*M*age = 36.72, *ET*age = 12.22, 197 women, 120 men, 2 others and 197 who did not specify their gender).

Participants completed the **IUS-12** and **IUS-12-H**, as well as **additional scales** intended to allow for convergent and divergent validity analyses (*i.e.*, Physicians' Reactions to Uncertainty (PRU), Distress Tolerance Scale (DTS), Discomfort Intolerance Scale (DIS), Perceived Stress Scale (PSS10), Difficulties in Emotion Regulation Scale (DERS-16), Work Uncertainty Questionnaire (WQ), Need for Cognition Scale (NFCO), Need For Closure Scale (NFC), and the Tolerance of Ambiguity in Medical Students and Doctors (TAMSAD)).

The survey ended with socio-demographic questions (*i.e.*, age, gender, discipline practiced and for how many years).

DISCUSSION

Our psychometric analyses on the responses of 516 HCPs suggest that **both scales are psychometrically valid and can be used to measure IU** (with the IUS-12) **and IU in the medical context among HCPs** (with the IUS-12-H).

This study is also encouraging for many practical implications. **IUS-12-H can be used in training courses involving HCPs with very different backgrounds and occupations**. Beyond the prospects of comparison between professions, this scale offers the possibility of identifying HCPs with a high level of IU requiring remediation. This will also be an opportunity to develop and propose to HCPs pedagogical models adapted to their level of IU, without mixing in training individuals with very different levels of IU.
Insofar as uncertainty can lead to inadequate care, we are pleased to know that with IU scales it is now possible to better understand how HCPs deal with uncertainty, and thus to **be able to identify individuals at greater risk of sub-optimal treatment issues due to poor uncertainty management.**
We are aware that a framework for interpreting the score is needed and future studies will have to determine at what threshold of "score change" one can consider that there has been a change in the IU of HCPs.

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