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REVIEW

What are judgment skills in health literacy? A psycho-cognitive perspective of judgment and decision-making research

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Objective: The aim of this review is to summarize current research relating to psychological processes involved in judgment and decision-making (JDM) and identify which processes can be incorporated and used in the construct of health literacy (HL) in order to enrich its conceptualization and to provide more information about people's preferences.

Methods: The literature review was aimed at identifying comprehensive research in the field; therefore appropriate databases were searched for English language articles dated from 1998 to 2015.

Results: Several psychological processes have been found to be constituents of JDM and potentially incorporated in the definition of HL: cognition, self-regulation, emotion, reasoning-thinking, and social perception.

Conclusion: HL research can benefit from this JDM literature overview, first, by elaborating on the idea that judgment is multidimensional and constituted by several specific processes, and second, by using the results to implement the definition of "judgment skills". Moreover, this review can favor the development of new instruments that can measure HL.

Practical implications: Future researchers in HL should work together with researchers in psychological sciences not only to investigate the processes behind JDM in-depth but also to create effective opportunities to improve HL in all patients, to promote good decisions, and orient patients' preferences in all health contexts.

Keywords: health literacy, judgment, decision-making, psychological processes, skills, cognitive factors

Introduction

Different psychological processes have been called into play to explain judgment and choice phenomena. These processes provide predictions about people's preferences and help to understand judgment and decision-making (JDM) behavior. JDM is an essential part of health behavior and there is a well-developed and growing body of literature on this topic.[1,2] In the field of psychology, over the past few decades, JDM behavior has been recognized as a critical determinant of successful or unsuccessful disease management in which the patient assumes an important role. Indeed, more than in the past, people want to be involved in making decisions about their preferences in terms of care and treatment.[3,4]Although physicians have historically been the direct voice of health and medical information, other voices are becoming more accessible to the general population with the rapid diffusion of health information via media, internet, and other social networks.[4–6] Thus, patients' skills in applying information and making judgments about health preferences may have a critical impact on their

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behavior and decisions.[7] Recently, such skills have been conceptualized in the frame of health literacy (HL).

HL

According to the World Health Organization, HL is defined as:

> The cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health.[8]

Based on this definition, Nutbeam proposed a model of HL that assumes both individual and population benefits at different levels: i) functional literacy such as basic skills like reading and writing so as to be able to function effectively in everyday situations; ii) communicative/interactive literacy – more superior skills enabling them to be involved in health choices, to extract information, express preferences and to apply new information to changing circumstances; and iii) critical literacy – more superior skills to evaluate health information seriously and use this information to maintain control over life events and situations.[8] The last two types of literacy require the use of skills that are more superior to the basic skills of reading and writing. In these definitions, HL is seen as a multidimensional skill.[7] As conceptualized in Schulz and Nakamoto's model, these two definitions of HL subtend the use of different superior skills.[7] Indeed a health-literate patient has to use "judgment skills" in order to take decisions in relation with his/her knowledge, experiences, and goals. Similarly, Zarcadoolas et al, in defining HL, stress the importance "to understand and act on messages" about health information. Their conceptualization acknowledges HL as an important life skill that includes "the ability to express judgments and the ability to participate in ongoing public and private dialogues about health, medicine, scientific knowledge, and cultural beliefs".[9] In this context, HL includes the ability of the patient to meaningfully interpret specific information, to structure his/her experiences, and to respond appropriately to specific (and new) challenges regarding his/her own health and, ultimately, to choose the proper sort of behavior regarding a disease.

The state of the art

Over the past years, HL has been frequently explored at a national and an international level,[10] although most existing studies measure HL at the basic level only, evaluating skills related to the ability to read written materials, such as the Rapid Estimate of Adult Literacy (REALM),[11] the Test of Functional Health Literacy in Adults (TOFHLA),[12] and their abbreviated versions; REALM-R[13] and S-TOFHLA.[14] These tests, focusing only on a limited ability to read and understand medical material, give little information about patients' health outcomes or more advanced skills such as judgment, for example. Few attempts have been made to examine other components of HL, especially the individual processes that affect patients' preferences, such as the ability to extract and critically analyze information for making a decision, which should be included in the higher levels of HL as well as of judgment skills.[9,10] In order to participate in the health care system and express their preferences, a patient needs to be able to make decisions effectively, such as choose over-the-counter medications, understand treatments, explain health problems or side-effects, and more generally, maintain a good health status.[15,16] So, a health-literate patient activates several processes that could be related with the psychological processes of JDM. Recognizing this overlap between the two domains, means analyzing which processes of JDM can be encompassed in the conceptualization of HL (research question 1), and how HL research can benefit from the results of JDM research (research question 2).

Purpose of the review

The aim of this literature review is to summarize current research relating to the psychological processes involved in JDM in the context of health and identify which processes can be incorporated and used in the construct of HL in order to enrich its conceptualization and its use in literature.

The literature review involves an extensive examination of the available research in the psychological literature dealing with JDM in the health context.

Methods

Search strategy structure

SR structured the search strategy, in collaboration with a research librarian as included in Table 1. The full search was originally developed in Medline and then adjusted to each successive bibliographic database. SR executed the searches between the 15th–30th of April, 2015. The following bibliographic databases were consulted from 1998 to 2015: Applied Social Science Index and Abstracts, Blackwell Synergy, Cambridge Journals, Ebscohost, Ingenta, International Bibliography of the Social Sciences, PsycINFO, SAGE, ScienceDirect, SpringerLink, and ISI Web of Knowledge. Subsequently, the bibliographic reference lists in included studies were also assessed. The period taken into consideration dates from the first works published on HL, originally described in 1998 by

Table 1 Databases, search hits, and articles shortlisted

Database	Search hits/results	Articles shortlisted
Medline	7,502	12
Applied social science Index and abstracts	150	4
Blackwell synergy	87	3
Cambridge journals	76	3
Ebscohost	105	2
Ingenta	116	1
International bibliography of the social sciences	108	3
PsycINFO	18,325	18
SAGE	207	6
ScienceDirect	333	5
SpringerLink	345	3
ISI web of knowledge	8,890	3
Total	36,244	63

Nutbeam to the current literature. This review was limited to published and peer-reviewed literature. Publication bias was not formally assessed.

Selection criteria

Primary data collection articles were selected for inclusion in this review if they reported psychological processes involved in JDM in the health context from the patient's point of view in a qualitative or quantitative manner and were published in English between 1998 and 2015.

Inclusion and exclusion criteria

Studies included in the literature synthesis were those which evaluated psychological processes involved in JDM in health contexts. A large number of studies were identified through the literature retrieval process described earlier; however not all studies were of relevance to the literature review. Many studies were excluded, as they did not focus on a medical context or on the patient's perspective. Sections of the literature that did not specifically involve an evaluation of individual psychological processes in judgments were excluded from the review (eg, culture). Moreover, a number of studies described the correlation between judgment and social support; they were also excluded as they did not focus on individual, but on social context and social support. In addition, studies that did not provide sufficient information or apply sufficient methodological rigor were also excluded.

Outcomes

Primary outcomes under evaluation included:

1. general judgments and preferences toward including patients in JDM,
2. skills about the JDM,
3. patients' views on what information should and should not be considered in JDM,
4. patients views' on what mental processes could and could not be included in JDM.

As there is no single definition used in the literature for JDM, we decided to include all studies that discuss active involvement of patients in the clinical JDM process.

Article extraction

Article extraction was led in two stages: 1) the title and abstract analysis stage and 2) the full text analysis phase. If a paper met the inclusion criteria in stage 1, the full paper was analyzed for potential inclusion. General agreement among all the authors included in the paper was reached. Two researchers (SR and PI) conducted the two stages of the research independently and in duplicate.

Data summary

A data summary form was developed specifically for this paper. Items included in this form were author name, title, year of publication, journal, type of the study (quantitative, qualitative, and mixed-methods), and decisional context. The data summary form was developed by SR and tested by SR and PI. Both reviewers applied the data summary form to a selection of suitable works until no other revisions to the form were required, and all items were agreed upon. All data abstraction was completed by SR and verified by one additional reviewer (AA or GP). All disagreements were resolved through consensus discussion. Databases, search hits, and articles shortlisted are described in Table 1.

Given the heterogeneity of methods used and given the decisional context, we conducted a narrative synthesis of the results. The narrative synthesis consisted of separate reporting of the main processes involved in JDM that could be incorporated into the construct of HL.

Results

Guided by the first of our two research questions, a variety of studies were extracted. Several processes involved in JDM were identified as basic components of HL: cognition, self-regulation, emotion, reasoning-thinking, and social perception (Table 2).

Cognition

Information perception

There is ample evidence that people's reasoning-thinking and decision-making is highly influenced by the way in

Table 2 Processes identified

Process/component	Sub-component
Cognition	Information perception
	Frame and bias
	Heuristics
	Type of processing
Self-regulation	Metacognition
	Self-efficacy
	Feedback and learning
Emotion	Neuropsychological mechanism
	Confidence and expectations
Reasoning and thinking	Argumentation
	Declarative and procedural knowledge
Social perception	Attitudes and beliefs

which the information is perceived and represented.[17,18] This perception influences how a patient expresses his preferences and the level of HL.[19–21] Information can involve the use of verbal labels, such as "likely" or "rare", or numerical categories, such as "10%" or "1 in a 100". In terms of the former, there is evidence to believe that people differ largely in their judgment of the terms that are commonly used to describe information probability, especially in medical and health contexts.[20] Information can also be comprehended and judged, using an "absolute numerical frame" or a "relative risk frame". For example, a "disease-risk decrement" from 6% to 3% can be described as an absolute risk reduction of 3% or, in relative terms, as the risk having halved or being reduced by 50%.[22,23] The perception of this information differs largely and this perception strongly affects JDM.[23,24]

Frame and bias

JDM is strongly affected by the way in which the information is framed, positively or negatively. This, in turn, affects patients' HL. It is well-known that people are more likely to choose a particular option when information is framed positively (eg, there is a 90% chance of survival) rather than negatively (eg, there is a 10% risk of dying).[24] Literature on HL has shown that positive frames might be more effective in promoting preventive behavior,[25,26] whereas negative frames might be more effective for disease detection behaviors.[27,28] JDM is affected by human biases, generally. A cognitive bias is a pattern of deviation in judgment that occurs in particular situations, leading to perceptual distortion, inaccurate judgment, and illogical interpretation. Framing is one of the most important and well-studied biases; other biases influencing JDM include the hindsight bias, sometimes called the "I knew it all along" effect, that is the inclination to see past events as being predictable,[28] or the anchoring bias, that is the tendency to rely or "anchor", on a past event or on one past experience or piece of information when expressing preferences and making decisions.[24,29]

Heuristics

Generally, health-literate persons rely on simplifying principles that reduce the complex tasks of assessing probabilities and preferences.[30–32] Such principles are referred to as heuristics. In more precise terms, heuristics are strategies using readily accessible, though loosely applicable, information to control problem solving. In decision contexts characterized by uncertainty and time constraints (eg, health care decisions), heuristics, especially fast and frugal heuristics, may perform better than complex rules of reasoning.[24,30] Recently, Riva et al[31] found that the "take the best" heuristic (ie, selection of a "most important reason") and "the tallying" integration algorithm (ie, unitary weighing of pros and cons) are commonly used by people in over-the-counter drugs selection. Similarly, in another medical context, Durand et al[33] found that these two heuristics are frequently used by women in pregnancy when facing examinations and testing.

The type of processing

According to the "dual process theories" of reasoning, judgments are mediated by either rapid, automatic processes or more slow, analytic ones. One system of processing (type 1) is automatic and unconscious. The other system (type 2), also known as the explicit system, operates in more analytic and sequential thinking. The theory should, then, be relevant for medical decision-making, and, in particular, to the patient preferences process itself.[34–36] These two systems have also been identified in the field of HL in some definitions[7] as two important processes in HL. Recently, a universal model for diagnostic reasoning has been proposed, describing the basic operations of the diagnostic process within a dual process framework and explaining how diagnostic reasoning skills are acquired, how they might optimally function, and importantly, how diagnostic failure occurs.[35] The principal modus operandi of the model is pattern recognition. At the outset, the person evaluates features of the medical condition directly (eg, presence of fever). Some conditions may be diagnosed on perceptual signs alone (eg, the classic flu), but others will need additional information such as a description of symptoms, or other critical aspects that must be discussed with an expert. Relatively early on in the process, it will be clear whether the condition is recognized or not. If it is, type 1 processes will rapidly and effortlessly make the diagnosis and nothing further may be required. If it is not, then linear,

analytical, deliberate, and effortful type 2 reasoning will need to be engaged instead with the support of a physician.

Self-regulation

In the context of health, self-regulation may be defined "as the process of maintaining a sense of monitoring over one's health behavior and psychological processes in an attempt to meet desired goals, and expected health preferences".[37,38]

Metacognition

Metacognition is part of the JDM dimensions in all reviewed literature and it is defined as "cognition about cognition", or knowing about knowing.[38,39] It can take many forms; it includes knowledge about when and how to use particular strategies for learning or for problem solving. In the field of health, high metacognition ability is associated with a higher level of constructive mental activity including a thorough evaluation of information/situations, and a more in-depth evaluation of individual thought processes.[40–42] The literature on HL often considers the importance of using different skills that encompass the metacognition function and it describes a health-literate individual as a person who is able to express more options for making preferences, who is able to willfully evaluate solutions, and to assess different events.[42,43] In doing so, a health-literate individual is able to more effectively focus attention on key information and to show a higher level of meaning construction.

Self-efficacy

Self-efficacy is the measure of one's own competence to complete tasks and reach goals.[44] In the field of health decisions, self-efficacy is thought to be a link between knowledge and behavior. A self-efficient patient seeks relevant information for his/her own health and they are self-confident to make the right decision to preserve their health.[45–47] Self-efficacy also includes skills related to behaviors such as communication with a health care professional[47,48] or the skill to overcome barriers to accessing health care.[48,49] All these capabilities are often presented in the description of HL.[7–9]

Feedback system

Feedback is essential to JDM.[50,51] People learn more effectively whether they can change and try alternative methods immediately upon receiving information when they can directly tie together cause and effect. With feedback, people are more likely to generate more thoughts and develop their thought processes to a greater extent.[52,53] Within the feedback process, simulation and contemplation are two processes that help to recognize all possible alternatives by comparing consequences and effects and generating hypothetical plans of action.[53–55]

Emotion

Neuropsychological mechanisms of emotions

Functional magnetic resonance imaging studies have contributed to define how JDM and patients' preferences are affected by neuropsychological mechanisms activated by emotions, precisely. The anterior insula is connected to performance in a task of decision in which aversive emotions such as disgust are implied.[56–58] In patients with brain damage in regions involving emotion, a significant impairment in decision-making tasks was found.[59] Both theory and evidence on the relationship between affect and decision-making have suggested that people in positive affect will tend to express preferences easily by engaging in speedy and simplifying kinds of processing, like "shorter decision time, lesser acquisitions of decision-related information".[60,61]

Confidence and expectations

As several studies have shown, positive and negative emotions impact on people's sense of confidence and expectations which, in turns, impact on the decision-making process. Generally, positive emotions are related with a choice of something good for you. Negative emotions are related with a choice of something bad for you. The impact of emotions can manifest in two ways: "a hazy sense of expectancy, or confidence versus doubt, and affect a sense of positivity or negativity".[62] As emotion becomes more negative, doubts increase; as emotion becomes more positive, favorable expectations and confidence also rise.[62] As part of this process, people use memories of prior outcomes in similar situations.[62,63] Many times people retrieve chronic expectancies from memory. In this case, these summaries of products of previous behavior already are expectancies. For example, in the field of health it has been shown that patients who had experienced problems in losing weight may judge themselves automatically expecting the worst from an upcoming weight loss program.[62–64] More recently, similar results were found in HL literature in the ambit of chronic fatigue,[65] and attitude toward drinking.[66] At other times, patients think about possible changes to the situation. People must evaluate the consequences for such possibilities to influence expectancies. In the field of patient preferences, for example, it has been shown that patients with cancer who are considering a new therapy may play through a scenario of undergoing the treatment,

having limited side effects, and achieving an improvement in health. Playing through that scenario may help the patients derive a sense of confidence. Scenarios put emphasis on explicit processes required to reach a particular goal, including the concrete passages that must be followed in order to reach the goal[62–64] and results have been found in different contexts such as coronary disease,[67] in acquired immunodeficiency syndrome,[68] pregnancy, postpartum condition, and chronic back pain.[69–71]

Reasoning and thinking

Argumentation

As well as establishing the possible preferences in making a decision, an effective decision maker must marshal the arguments for and against each option on the basis of his/her knowledge, and combine these arguments to come to a decision. The argumentation approach formalizes the use of knowledge in decision-making.[72,73] Informally, arguments are reasons to believe in possible states of the world (eg, reasons to believe a patient has a disease) and reasons to act in particular ways in order to bring about or prevent anticipated states of affairs (eg, reasons for expressing preference for a particular treatment rather than another). The person's knowledge base may include general knowledge (about the world) and may include formal or technical knowledge (like medical knowledge).[73] In the field of health, as in other domains, health-literate persons have to evaluate the arguments, merging them into a "case" and then deciding which case is the "strongest" in order to make an effective decision.[74]

Declarative and procedural knowledge

Declarative knowledge is defined as the factual information stored in memory and known to be static in nature. It is the part of knowledge that describes how things are. Procedural knowledge is the knowledge of how to perform, or how to operate. It is also termed "know-how".[75] Both types of knowledge impact on JDM and, in turn, on patients' preferences. Declarative knowledge comes into play at every stage of thinking. First, when people receive a large amount of information in a short period of time, they are likely to identify those aspects that exemplify concepts that are easily accessible in memory at the time.[76] Second, when people interpret ambiguous information, they are likely to interpret it in terms of concepts that happen to be accessible in memory rather than other, equally applicable but less accessible concepts.[77,78] Third, at the judgment stage, accessible concepts may be used as standards of comparison, producing a contrast effect on judgments.[76–79]

Also, the effect of procedural knowledge at the decision stage is distinctive. As reflected by several studies, people often think about an action to do when they perform that action, thus strengthening the association between these two components.[80,81] Therefore, thinking about a concept is often sufficient to activate the corresponding decision to do this action, and this action may be automatically applied to the task at hand. These types of knowledge are always described in the definition of HL.[7–9]

Social perception

Attitudes and beliefs

Belief systems and attitudes of patients are critically important in JDM.[82–84] Because attitudes have been shown to be strongly correlated with and predictive of voluntary behavior, the choice to express a preference for one option versus another option could be dependent on people's attitudes toward the options. Much research has been conducted to measure attitudes and to determine the antecedents of patients' attitudes about health and medical care decisions.[85–87] Most studies have used behavioral decision-making approaches that incorporate evaluation of perceived consequences of alternative behaviors and the likelihood of the consequences occurring. Results have shown that positive beliefs and attitudes toward a medical decision increase emphasis on patients playing an active role in decision-making about their care.[84–87]

How can HL research benefit from the results of JDM research?

The critical synthesis of psychological processes involved in JDM reveals that JDM is considered a multidimensional capability. All of these processes help to understand the meaning of HL. JDM is influenced by cognitive variables, such as biases and heuristics and by the type of information processing activated by people. At the same time, self-regulation permits to maintain a sense of control that is crucial in making choices. Emotions impact on our decisions intervening in people's cognitive feedback control processes and influencing people's expectations and the sense of confidence. Reasoning and thinking allows people to assess their information. Finally, attitudes and beliefs influence our social perception and, in the field of health, these elements impact on illness decisions and on disease management.

In this manner, HL research can benefit from this JDM literature overview, first, by elaborating on the idea that judgment is multidimensional and constituted by several specific processes. Therefore, clinicians and researchers who wish to study and promote patients' preferences and patients'

perspectives have to take into account several variables. Second, the results of this analysis can implement the definition of "judgment skills" in HL that are often mentioned but hardly described in literature. Indeed, in the HL literature, many researchers highlight the importance of including judgment components.[7–10,88,89] However, these researchers do not define which are these judgment components, how these components are characterized and measured. For example, Jordan et al[89] include the importance of "express preferences and make decision" when defining HL; however it is not clear which are the elements of HL to make preferences and decisions. Similarly, Schulz and Nakamoto's model describes the presence of judgment skills as necessary components underlying knowledge. However, judgment skills are not fully described.[89]

Every day, patients are confronted with difficult decisions about disease, treatment, and prevention. Understanding the processes of JDM my help both researchers and patients to know how to interpret situations, how to recognize fallacies and mistakes, and how to devise a proper decision-making process. In this way, the overall level of HL in patients can be improved and refined.

Again HL can benefit from this literature review, by favoring the development of new instruments that can measure HL multidimensionally and in a more articulated way. A health-literate patient activates several psychological and cognitive processes such as perception, assessment, computation, comparison-making, selection, metacognition, confidence, knowledge, and other capabilities which have been described as constituents of the JDM domain and that can be measured and operationalized in the context of HL. The development of new measures will also improve the analysis and the evaluation of patients' preferences in health contexts.

Discussion

This work describes one of the first comprehensive syntheses of the current state of JDM and HL research and practice. The goals were to provide a rationale for the potential commonalities of JDM psychological processes in the HL domain, to describe the various processes of JDM that can be encompassed in HL skills, to orient the reader to understand the HL construct, and to offer recommendations for future research based on the current state of knowledge.

The concept of HL has changed considerably over the last 15–20 years. Initially, HL was defined as reading and writing skills in the health context. Today, it has to be defined as a broader multidimensional concept. Particularly, recent conceptualizations acknowledge HL as an important life skill that includes the ability to express judgments, preferences, and make decisions. In this context, HL encompasses the ability of the patient to meaningfully interpret specific information, to structure his/her experiences, and to respond appropriately to challenges regarding his/her own health. To give a contribution to the current discussion on HL and its implications on JDM, we conducted a review of literature on psychological processes involved in JDM, which are scarcely considered in the HL domain.

Our review revealed several elements of JDM, structured in five processes: cognition, self-regulation, emotion, reasoning-thinking, and social perception. The conceptualization of HL, in its more extensive definition, cannot ignore the consideration of psychological aspects that influence JDM and preferences in any patient. Only by accepting the multidimensionality, we can improve the research on HL by favoring the development and the study of more comprehensive measures, such as new questionnaires and new scales, and by hypothesizing new measurable interventions at multiple levels.

Based on the results of our literature review, HL research can benefit first, by learning that judgment is multidimensional and constituted by several specific factors, and second, by using the results of this analysis to implement the definition of HL. This means to understand the psychological processes that are activated when a patient is involved in a decision about own health, and it means to understand the psychological processes that are activated when a patient expresses his/her preferences. At the level of health and health activities, results of this synthesis can be used to implement educational public actions oriented to promote healthy decisions, as well as to implement health campaigns for different groups of individuals.

The current review also gives the possibility to enrich the definition of HL including judgment skills that, up to now, are only mentioned by few works. More specifically, as reported earlier in the introduction, Zarcadoolas et al[9] seem to be the only authors who describe judgment components in HL and even they did not detail which components of judgment intervene in HL construct.

Despite the desire to identify a complete and exhaustive corpus of literature, it must be recognized that our work is inserted in a broad structured framework of literature pertaining to the health context but regarding different domains, namely HL, JDM, and patient preferences. In conclusion, this is an initial work and the present findings warrant further investigation. First, it might be possible to compare our results investigating the role of other features, excluded from our review, which can be discriminatory in the JDM domain

(eg, the role of cultural factors or social support). Second, JDM could be evaluated in specific scenarios (eg, comparing a chronic vs an acute condition). Evidence suggests that people tend to express different preferences in relation to the grade of familiarity of the condition and of the treatment.[90] Third, it would be possible to investigate the role of all these processes of JDM at the social level in the development of specific campaigns and other health promotion activities.

In spite of these limitations, there are several avenues for future investigation which have been highlighted in this literature review. First, different psychological processes have the potential to influence individuals' judgment and participation in decisions concerning own health. From an educational point of view, clinicians and researchers in HL should study these processes and aid the transmission of information and its correct use in decision-making. Second, future researchers in HL should work together with those in the psychological sciences not only to further investigate the processes behind JDM but also to create effective opportunities to improve HL in all patients and to promote better decisions in all health contexts.

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Author contributions

All authors contributed toward data analysis, drafting and critically revising the paper, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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