Critical reflection is the process of identifying and exploring your own thoughts, feelings, and experiences and then making decisions about how they fit with the ideas, concepts, and theories that you're aware of and learning more about.

Think about this course, and our 3-week blocks: Nutrition and Chronic Disease (part 1), and how the topics we have covered in this first part (1) have fit together (for you), and what you have taken away from all of this (Scope of Practice and Code of Ethics; Health Disparities; Malnutrition; Overweight/Obesity).

1. **You will choose at least (1) paper that successfully discusses the interrelated topics we have discussed this semester.**

2. **You will thoughtfully and critically read and analyze your chosen paper.**

3. **You are going to critically-reflect on that paper, *from your own perspective.*** The point is to experience and express your ideas and thoughts [before examining them from a different perspective] to give you better insight into your own perspective. This is about identifying your values and biases.

Ask yourself:

How did my own experiences and knowledge influence my understanding of this paper?

Did my personal values and possible biases influence my thoughts about this?

What are some ways [others, who are different from me] may have experienced this paper?

Were there broad social and/political or emotional issues that influenced my thoughts about this?

Did my usual assumptions mislead me somehow? What assumptions can I challenge next time?

Another way to think about this question is: what is the "moral of my story"?

What did I ultimately learn from reading and reflecting on this paper?

4. **You must identify and analyze your topic** using the following three guiding questions:

a. What are the ideologies and assumptions that underlie the thoughts and actions that gave rise [your topic]? Consider power dynamics, social norms and values, constructions of knowledge, public health education, etc.

b. How accurate and/or valid are the ideologies or assumptions upon which [your topic] is built?

c. How can we reconstruct the ideologies or assumptions to make them more [inclusive and integrative] - whatever you are proposing here?

5. You must also summarize your findings. You must include a conclusion to your assignment that provides a description of your assessment, that answers the question "so what". "***So what" does this mean?***

Then, answer "now what" – what should we [as a profession] do to make our practice [whatever your practice will be, be that in allied healthcare or not] xxx - whatever you are saying can be / should be / could be done (these can be Policy-Level suggestions).

The answer to this is more than just a change in the approach on the topic warranted, it is also imperative to find a way to communicate to [health/other] professionals about this issue. How c/would you do that?

How could that be done in a way that is engaging, informative, and effective?

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Critical Reflection:

Precision Medicine in the Era of Artificial Intelligence: Implications for Chronic Disease Management

It is no secret that students today are using artificial intelligence (AI) programs like Chat GPT to complete assignments. According to Chat GPT, AI simulates human intelligence and is designed to perform tasks that would normally require human cognition, such as problem-solving, writing, learning, and decision-making. AI has many more applications than writing assignments for students however, and the article *Precision Medicine in the Era of Artificial Intelligence: Implications for Chronic Disease Management* by Subramanian et al. discusses its potential applications in the world of medicine.

Summary of Article

The article explores the causality and relationships of chronic diseases. For the purpose of the article, the chronic diseases examined were type 2 diabetes, obesity, cardiovascular disease, metabolic fatty liver disease, cancer, lung and kidney disease, and autoimmune and neurodegenerative disease.[1] The authors use the term "exposome" as the sum of all environmental exposures throughout the lifespan that have an effect on overall health and chronic disease.[1]

The external exposome comprises of:

1. Lifestyle factors – diet, exercise, sleep, smoking, alcohol consumption
2. Physical and Chemical factors – temperature, pollution, pesticides, food contamination
3. Ecosystem factors – climate, global warming, population, location
4. Social factors – SES, stress, community support, cultural practices

The internal exposome comprises of:

1. Molecules generated via metabolic reactions like oxidative stress

2. Infections
3. Gut Microbiome
4. Factors affecting DNA and protein transcription within the body

After listing these factors, the authors then explain how these factors can contribute to chronic low-grade metabolic inflammation, which is persistent and leads to the chronic diseases listed above.

After conveying information on the factors medical professionals can use to predict disease status, the article then discusses how these factors are used in precision medicine. Precision medicine was defined as an emerging field in therapeutics that is based on understanding the factors comprising the exposome, and can be used to customize prevention and treatment for individual patients.[1] By converting risk factors into data points, it is possible to enter them into an AI algorithm to for an accurate prediction.[1] The authors provided examples of administrations and organizations that currently use AI, such as the FDA, to promote medical imaging evaluation.[1] The authors concludes with pointing to the fact that AI and precise medicine can help medical professionals move towards more individualized approaches to chronic diseases and risk factors.

Relation to Class Topics

Subramanian et al.'s review article perfectly relates back to the course and its topics, looking at the name alone, you can see some relation. Throughout this curriculum, I have been using artificial intelligence to simplify and summarize the assigned reading in order to make them easier to digest. I knew I was just scratching the surface of AI, and was even talking to a friend in the PA program about AI and precision medicine before reading this article. I believe AI is in its beginning phases and the possibilities are quite literally endless, however it is important

to note that AI cannot give the same emotional care and connection that a human health professional can provide.

Scope of Practice + Code of Ethics

AI is an emerging technology that improves efficiency and has potential applications to provide precise care to individuals. Not all healthcare providers have the power to diagnose disease; using AI providers can now expand their scope of practice. If an AI system becomes verified by professionals and has been shown to make precise and accurate predictions about a person's risk factors or disease profile, then "lower level" professionals would be able to use that system to provide higher levels of care. By using the AI system, professionals are also able to save time on diagnosis and treatment prescriptions, allowing for more time to be spent with patients. By having relevant professionals verify AI systems, people could be able to receive more personalized care rather than a "one size fits all" that some professionals may use.

Health Disparities

In the author's explanations of the exposome, I was able to see many of the health disparities we discussed in class. The authors ensured to make mention of how some of the factors are outside of an individual's control. The exposome looks at an individual's entire lifespan, not just their current state and surroundings. The external exposome factors specifically relate to health disparities, as it includes the environment as the social status of individuals similar to how we examined social determinants of health in this course.

Malnutrition

Within the exposome, and throughout the entire article, the author makes note of how diet can lead to low impact metabolic inflammation. The article specifically mentions the western

diet pattern, touching on how it both provides over and under nutrition. Both the external and internal branches of the exposome have factors related to nutrition. The lifestyle risk factors include diet, with high sugar and fatty foods contributing to inflammation. The Gut Microbiome is directly influenced by our diet, and the biome has an effect on inflammation. With a healthy microbiome, gained by eating pre and probiotics, inflammation can be decreased, while a poor and undiverse diet can lead to an unhealthy gut that promotes inflammation.

Obesity

Obesity is both a disease and a risk factor for other chronic diseases. The article discusses obesity more in-depth than any of the other chronic diseases, discussing how it is a result of inflammation, but then itself promotes and sustains metabolic inflammation. Obesity was discussed in class as a multicausational disease, and this article further reinforces the point. The authors discuss how factors within the exposome can contribute to obesity and how the risk can be mitigating by making the right lifestyle choices.

Reflection

How did my own experiences and knowledge influence my understanding of this paper?

Within my own life, I do not have any chronic diseases and am also more aware of potential risk factors due to my undergrad and graduate education. I remain active and do my best to eat diverse and follow my plate, although I know I am not perfect; I also practice self control and do not indulge in over eating or tobacco. I always thought it was easy, say no to drugs and excess food and exercise, but through this class and reading this article I realize how naive and somewhat ignorant I was. My education at King's in my undergrad and graduate programs as well as my personal use of AI helped me to understand this paper. These two programs at King's ensure to provide us with a holistic view on chronic disease and teach us

what risk factors are mitigable and which ones are simply out of our control and must be worked around. By applying that knowledge, I was able to quickly understand the exosome, and will most certainly be using that model in the future while teaching students and interacting with clients.

Did my personal values and possible biases influence my thoughts about this?

I value exercise and dietary discipline, and I've noticed this creates somewhat of a bias, as I believe other people should value them as much as I do. I also must remind myself of other risk factors associated with obesity. I see obesity as somewhat of the progenitor of other diseases, and by avoiding obesity we put ourselves at less risk for other chronic diseases. For this reason, I sometimes forget people may have chronic diseases and conditions while not being obese or overweight, something class work and these articles remind me of.

What are some ways [others, who are different from me] may have experienced this paper?

Other people may have focused more on the content and information in the article rather than focusing on the application of the article. This article discussed the mechanisms of inflammation and how AI has been used, but it lacks a discussion section. I find the discussion section stimulating when reading articles and while I am learning, I am trying to essentially "steal" methods I can use to improve the care I will provide to future clients. I take the information of articles in, but I also do my best to take away something I could apply and explain to a lay person. Others reading this article may focus more on learning about inflammation while I focus on how AI and the exosome method can be applied to reduce it, and would use this article as a starting point to develop similar ideas that are more feasible for my limited means.

Were there broad social and/political or emotional issues that influenced my thoughts about this?

The major "issue" or "movement" that inspired my thoughts on this paper is the emergence of AI. As Jan's graduate assistant I have used AI to do projects with him and we encourage the students to use AI to help them with their project. I have heard people voice their fears about AI "taking over" but they seem short cited to me. AI is a tool that can be used to decrease manpower, but it could never replace human cognition and compassion. I really like the approach Dr. K takes towards AI; he is adapting his classes and teaching style to incorporate the use of AI while still providing students with skill and education to do everything without it. I do believe AI is the future, and we should begin incorporating it in all fields. The above article speaks on its potential to diagnose chronic disease and weigh risk factors, but I believe this is just the start of AI's capabilities in the field of medicine.

Did my usual assumptions mislead me somehow? What assumptions can I challenge next time?

As I mentioned above, I tend to assume that people with certain chronic diseases will be overweight or obese. This paper somewhat reinforced this thought however, as it delves into obesity and how it causes inflammation that can lead to other complications. While that was not the goal of this article, I had to remember not to take that away as a fact. This article discussed many different risk factors that cause inflammation aside from being obese, so I ensured to focus on those factors as a greater takeaway.

Another way to think about this question is: what is the "moral of my story"?

This article emphases that there are many different causalities of low-grade metabolic inflammation. Diseases are multifaceted, and so should their approach be. Negating one risk

factor is good, but it is only one risk factor out of many, and so healthcare professionals should work with individuals to negate as many as possible. Using precise medicine through AI can aid in this, as it can catalogue and quantify risk factors. I must ensure that I am also looking at multifaceted approaches when working with future clients to provide them with the quality of care they need.

What did I ultimately learn from reading and reflecting on this paper?

This paper reinforced the holistic approach to chronic diseases that was taught throughout this course. I may not have learned more about the diseases themselves, but I learned about the exposome model and how it can be used to catalogue risk factors. One of my larger takeaways from this reflection is my existing weight and disease bias. As someone who has never experienced any of these diseases, I do not truly understand how people with them may feel. As an emerging healthcare professional I need to be able to treat all clients, regardless of exercise and nutritional status as people who want to improve themselves. This class and article have pointed out ways to help mitigate the risk of developing disease in ways other than exercise and nutrition. I have learned to look at the whole person, or their whole exposome, and not just at the factors within their control.

Identify and analyze your topic

a. What are the ideologies and assumptions that underlie the thoughts and actions that gave rise [your topic]?

The authors conducted a review of precise medicine and how AI can be used to further this form of care, with the potential to increase equity within healthcare. The authors stick to the fact that due to genetic variability; people display chronic diseases differently and may have

different symptoms. Before precise medicine, healthcare professionals used to take a more broad approach to treatment. The implication of AI can change the power dynamics of healthcare, by allowing less trained individuals to complete a more advanced job with AI assistance. I have heard of Dr.s talking down to nurses and other similar situations, which could be mitigated if the "lower level" healthcare worker now has the same power as those "above" them.

One potential downside of AI is the lack of personability. AI may not be able to understand cultural and societal values and norms, leading to ineffective personalized care. AI is only a system of inputs and outputs and does not take feelings or emotions into account. A prescription for treatment may not take norms and feelings into account, rendering it useless. AI is also developed by software companies, not by medical professionals, and so it may accidentally overlook or underappreciate certain data points that a medical practitioner would know to incorporate.

b. How accurate and/or valid are the ideologies or assumptions upon which [your topic] is built?

Previously AI has shown strength in providing predictions and has already been used for medical imaging. AI is driven by data inputs, and by converting data points into quantitative values we are able to form subjective measures that AI can then interpret; humans already do this, using AI would decrease the time and workload. By working in communion with healthcare providers, software developers are able to customize AI to fit to health professional's needs. The articles emphasis on the holistic exposome also shows promise in the use of AI to not only treat but to predict chronic diseases. With AI using a holistic model it provides the AI with more data input points for a more personalized and accurate output.

As I just stated, software developers are the ones making the AI systems, which may cause potential bias. A software developer is not a health professional, and they may program the AI to weigh data points incorrectly. This cause underserviced populations to become even more underservices, providers in the area may think they are improving quality with AI while they are actually decreasing it. Depending on the population, the technology for an AI system may not even be accessible, or may be too high of a cost to implement. Using of AI may also create over-reliance or overuse, where professions relying too heavily on the AI and are not taking their own education into account, causing grave misjudgments. If we combine over-reliance and low feasibility, an area can become completely underserviced by providers who have to rely on the AI that is not available.

c. How can we reconstruct the ideologies or assumptions to make them more [inclusive and integrative] - whatever you are proposing here?

We must first ensure that AI is used a tool by healthcare providers, and that it does not serve to replace them. AI should be used to increase efficiency and be used by a trained provider to ensure accurate use and application of the results the AI presents. Healthcare providers should be trained to use AI systems, while still learing how to complete skills and tasks without its assistance We need humans to deliver the results given by AI to ensure they are given with care and that nothing is overlooked or undervalued in the treatment of chronic diseases.

In order to ensure inclusiveness, cultural and societal norms and values must be taken into account. If treatment does not fit into a person's lifestyle, they will most likely not follow through with it. We must ensure that the developers and the users of AI know how to include these values into their input, or at the least know how to incorporate them along with the AI's output. Professionals should also work in tandem with community leaders and stakeholders and

take a multifaceted and collaborative approach to chronic diseases in order to ensure they are addressing potential social determinants of health.

Summarize your findings.

"So what" does this mean?

The use of the exosome and possible applications of AI have the potential to revolutionize they way we treat and care for individuals with chronic disease. The use of precise medicine through AI can change how healthcare providers view treatments; providers can begin to ask "how do we treat this individual" instead of "how to do we treat this disease." AI can be used as a tool for healthcare professionals, but it cannot replace the interpersonal care they provide. AI has the ability to increase efficiency in the healthcare system, but its employment must be both equitable and ethical. By focusing on a holistic individualized approach, and using precise medicine through AI we could increase both the amount and quality of healthcare provided.

What should we [as a profession] do to make our practice [whatever your practice will be, be that in allied healthcare or not] xxx - whatever you are saying can be / should be / could be done.

I believe we should start doing what Dr. K has been doing: encourage the use of AI. Not just healthcare, but all professions could benefit from AI. Current students should be taught how to use it and what it can do, but also be taught about its limitations and still be shown how to function without it. Healthcare professionals should work with software developers to ensure the AI inputs and outputs are usable and readable for other healthcare professionals, ensuring less systematic bias. Institutions should put funding forward to work towards verifying current and upcoming AI, and should work to ensure the verified systems are widespread and easy to access,

ensuring more equitable healthcare. Ethical guidelines must also be established and taught to ensure the data used for AI is kept confidential.

The answer to this is more than just a change in the approach on the topic warranted, it is also imperative to find a way to communicate to [health/other] professionals about this issue. How c/would you do that?

I would begin by raising awareness of AI, and demonstrating first hand what it is capable of. Some professionals may need to see it to believe it or may overlook AI and believe they are "above it" or "don't need." I would use a multifaceted approach to show how all levels of professionals can use AI to their advantage and attempt to remove stigma surrounding AI as "lazy work."

How could that be done in a way that is engaging, informative, and effective?

Making use of interactive workshops where professionals are able to test run AI systems would ensure engagement. I would also have a trained professional there to show them that what they just did only scratches the surface of what AI can be used for. I would also use first hand experiences form both physicians and patients and have them relay stories of successful treatment with the aid of AI. To ensure the point goes across, I would have a licensed professional attempt to use precise medicine without AI and have another professional do the same, then compare and contrast the strengths of the professional equipped with AI vs one who does not have AI at their disposal .

Source:

1. Subramanian M, Wojtusciszyn A, Favre L, et al. Precision medicine in the era of artificial intelligence: implications in chronic disease management. *Journal of Translational Medicine*. 2020;18(1). doi:https://doi.org/10.1186/s12967-020-02658-5