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RESEARCH ARTICLE
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DEVELOPMENT OF A VALID AND A RELIABLE TOOL TO IDENTIFY PRESENCE OF 'DUNNING KRUGER EFFECT' IN STUDENTS

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Abstract

Background: Dunning Kruger Effect is a failure of metacognition, self-awareness and self-perceptiveness in which people who are unaware of their incompetence in certain fields assume they are very much competent. This bias in medical students leads to inability of proper learning and later hampered medical practice. It is very important to identify such students and work towards eliminating this bias to improve their quality of education, skills and attitude. This study aims to develop a valid and a reliable instrument to identify presence of the Dunning Kruger Effect in students.

Methods: The study was multiphase mixed-method research divided into three phases. In phase 1 extensive literature review was done to identify themes and develop questions for the instrument. In phase 2, content validation and response process validation were established through purposive sampling. In Phase three, one hundred and forty participants participated in the exploratory factor analysis to establish the reliability of the instrument.

Results: During phase one, a preliminary list of twenty items was developed and refined under four theoretical constructs. During part one of phase two, these were sent for content validity index which led to omission of six items. In part two of phase two, response process validity was established and four items were rephrased. By the end of first two rounds, fourteen items were finalized for round three that is exploratory factor analysis. The sample size was adequate. Eigenvalue determined that two factors were extracted that were effective enough in representing all the characteristics or components highlighted by the stated fourteen variables. Component rotation divided the fourteen items into groups of eight and six.

Conclusion: Instrument formed has fourteen items under two components. It can be introduced in medical colleges to identify students with this bias so that extra effort can be put in the right direction to enhance their learning and knowledge.

Keywords: Dunning Kruger Effect, students, healthcare professionals, medical education, tool, instrument, validity, reliability

Introduction

Cognitive bias is a methodical way of deviation from reason that can affect decision-making and thinking processes in human beings. In the field of medical education, various cognitive biases can impact the learning, assessment, and decision-making processes of both students and healthcare professionals. Dunning Kruger Effect (DKE) is one such effect that purely reflects 'overconfidence' in individuals. It is a failure of metacognition and self-awareness in which people who are unaware of their incompetence in a particular field assume they are very much competent (Zhou & Jenkins, 2020). According to a study, more students show over-confidence as compared to under-confidence in medical students (Borracci & Arribalzaga, 2018). These students are considered double cursed as they lack knowledge of the material, and there is an absence of apprehension of the knowledge and skill that they do and do not possess. (Miller & Geraci, 2011). So this leads to potential dangers when it comes to medical decision-making, diagnosis and treatment, hampering the impact it could have on patient health care. This overconfidence can result in poor academic performance and a lack of awareness regarding their own limitations.

Healthcare professionals are not fully aware of the implications of these students due to lack of identification. Many studies have been conducted exploring the attitudes regarding the Dunning Kruger effect but so far, no validated instrument has been developed for identification of this cognitive bias in medical students. There were three objectives of this study:

1. To identify different themes of the Dunning Kruger effect
2. To develop items that adequately assess the themes of the Dunning Kruger effect
3. To establish validity and reliability of the instrument developed for identification of the Dunning Kruger effect

Methodology

This was a multiphase mixed method study held over six months from February 2023 to July 2023.

Phase 1

Extensive literature review was done on the Dunning Kruger Effect. Out of all the literature search, 10 articles were finalized to help construct the themes. All themes are interlinked with one another and are very crucial to the attributes of the people with Dunning Kruger Effect. First version of this instrument was developed using extensive literature search. Theoretical constructs of Dunning Kruger Effect were developed and adequate amount of items were created to reliably capture the essence of the construct in question (Artino Jr et al., 2014).

Phase 2

Part 1: Item level content validity index (ICVI) was found out in this phase. This was a consensus building exercise where participants were required to rate each item against a 4-point Likert scale in terms of its representativeness, clarity and relevance of its constructs. Twenty Participants were selected through purposive sampling for first part of phase 2 that is to figure out the content validity index of the items to filter the questions. The target population was healthcare professionals including Medical educationist (CHPE/diploma/MHPE) and Senior and Junior faculty members.

The feedback of the experts was analyzed by the principal investigator who initially organized all the comments on various items of the instrument. The changes in the items were made based on the criteria:
1 = the item is not relevant to the measured domain
2 = the item is somewhat relevant to the measured scale
3 = the item is quiet relevant to the measured scale
4 = the item is highly relevant to the measured scale

Formula used for calculation of I-CVI

I-CVI = (total relevance of the item)/ (number of experts)

By the end a total of 20 responses were received and analyzed and comments received from participants were noted. Items with I-CVI ≤ 0.78 were removed and I-CVI ≥ 0.78 were included after making any changes if suggested by experts (Yusoff, 2019).

Part 2: Response process validity was assessed in this part to ensure whether test-takers are interpreting the test items as intended and providing responses that genuinely reflect their knowledge or abilities rather than being influenced by factors like guessing, random responding, or misunderstanding the questions (Padilla & Benítez, 2014). Ensuring response process validity involves several considerations like clarity of Items, appropriateness of Format, avoiding Bias, response consistency, response patterns and think-aloud protocols. By assessing response process validity, researchers and test developers can gain confidence in the meaningfulness and reliability of the test scores and draw more accurate inferences about the knowledge, skills, or abilities of the test-takers. Four Participants were selected through purposive sampling. The target population was healthcare professionals including Medical educationist (CHPE/diploma/MHPE) and Senior and Junior faculty members.

Participants were selected for cognitive interview conducted for response process validity using think aloud and verbal probing technique. After taking informed consent the participants were asked to carefully read the item statements, Repeat the statements to make themselves understand them more clearly, clarify any unclear terms in the statements and chose the appropriate response answers. The comments and remarks provided by the experts were categorized and used to modify the items.

Phase 3
It determined the dimensions of various domains of the instrument with unknown relationship. Irrelevant items are excluded by establishing correlation among items (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Ten participants per item were selected for exploratory factor analysis**.** Medical students were selected as participants for this phase as they are my main target for the identification of DKE by this instrument. Data was collected through questionnaires and Exploratory Factor Analysis (EFA) will be done by using SPSS version 26.

The flowchart below (image 1) summarizes the data collection and analysis procedure of all three phases of this study as discussed in the detail above. All three phases are written in order with brief insights to give a clear picture of the study.

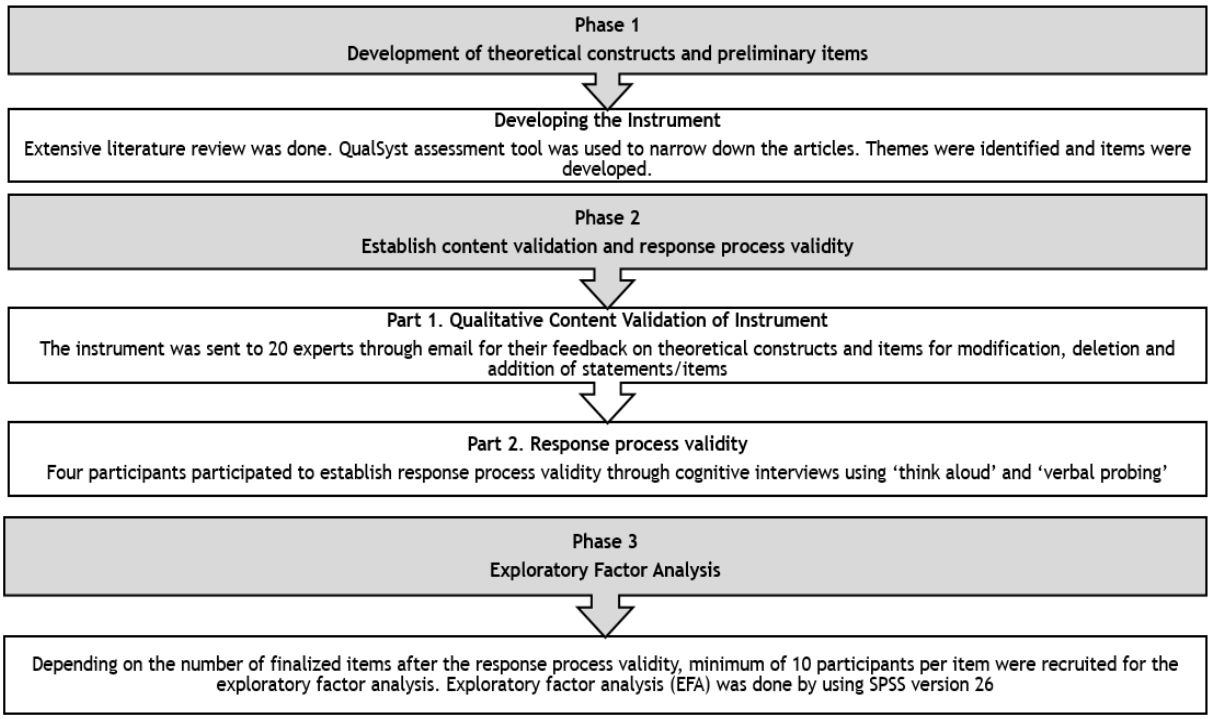

Image 1 Flowchart showing study methodology

Results

Phase 1

Extensive literature review was done on the Dunning Kruger Effect. Out of all the literature search, 10 articles were finalized to help construct the themes. All themes are interlinked with one another and are very crucial to the attributes of the people with Dunning Kruger Effect. First version of this instrument was developed with 4 theoretical constructs of Dunning Kruger Effect. Twenty items were carefully created keeping in mind the themes and knowledge gathered from the articles. Image two shows the theoretical constructs deduced in phase 1.

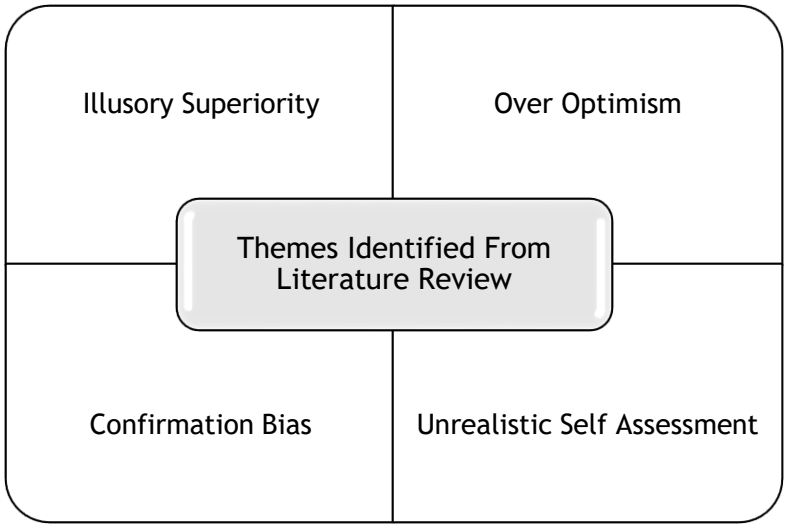

Image 2 Themes deduced from literature review

Illusory Superiority

The term "illusory superiority" refers to a cognitive bias where individuals tend to overestimate their abilities or qualities relative to others (Muller et al., 2020). This bias can manifest in various areas of life, such as intelligence, attractiveness, driving ability, or job performance. The interesting aspect is

that a significant percentage of people believe they are better than the average person in these domains, even when this is statistically impossible (Yamada et al., 2013). It may lead to complacency or an underestimation of risks, as people may believe they are less likely to experience negative outcomes.

Over Optimism

Over optimism and Dunning Kruger effect are two cognitive biases that are bridged together by same outcomes. Both are cognitive biases where individuals tend to have an excessively positive and unrealistic outlook on future events or their own abilities. They may believe that things will turn out better than they realistically will, leading to an overestimation of their chances of success or the likelihood of positive outcomes. This can influence decision-making, leading individuals to take on risky endeavors without fully considering potential challenges or setback. Someone experiencing the Dunning-Kruger effect may overestimate their abilities in a particular domain, leading to over optimism about their chances of success in related endeavors (Burson et al., 2006). An over optimistic person has no idea of the difficulty level coming his way and is under prepared for the struggles coming his way.

Confirmation Bias

Confirmation bias is basically the tendency to seek out and prefer information that supports our preexisting beliefs. One of the most concerning aspects of confirmation bias is that it operates largely at an unconscious level. Instead of objectively evaluating evidence and considering all sides of an issue, individuals tend to selectively seek out information that supports what they already think, and they may even interpret ambiguous evidence in a way that aligns with their preconceived notions.

Unrealistic Self-Assessment

Unrealistic self-assessment, also known as overconfidence or an inflated self-view, refers to a cognitive bias in which individuals tend to overestimate their abilities, skills, knowledge, or performance in various areas. It involves having an overly positive and unrealistic perception of oneself, often without adequate evidence to support such beliefs (Kruger & Dunning, 1999). People who exhibit unrealistic self-assessment may think they are better than they actually are in comparison to others or believe they can achieve outcomes that are beyond their capabilities. This bias can manifest in different aspects of life, such as academic performance, professional skills, interpersonal relationships, decision-making abilities, and physical attributes.

Preliminary Instrument after phase one

A Preliminary draft version of the items generated from the above four theoretical constructs was formulated. Table one shows the items developed under the four theoretical constructs.

ITEMS
ILLUSORY SUPERIORITY
I often believe that I am better than most people in various areas, such as intelligence, skills, or performance
When receiving feedback or criticism, I tend to dismiss it or believe that others simply don't understand your abilities
I often find myself boasting about my achievements or abilities to others
I have encountered situations where I have been proven wrong or performed poorly despite initially believing I would excel
I am open to acknowledging and learning from others who demonstrate expertise or skills beyond my own
OVER OPTIMISM
When setting goals or making plans, I generally expect things to turn out better than they realistically might

I find myself underestimating the time, effort, or resources required to accomplish a task or achieve a goal
I experience situations where I was overly confident about the success of a project or endeavor, only to be disappointed by the actual outcome
When faced with potential risks or obstacles, I tend to downplay their significance or believe that they won't impact my desired outcome
When someone presents me with potential downsides or challenges related to my plans or ideas, I tend to dismiss them.
CONFIRMATORY BIAS
When researching a topic or issue, I tend to prioritize sources or information that align with my existing beliefs or opinions
I have found myself dismissing or ignoring information or evidence that contradicts my viewpoints
I am open to engage in discussions or debates with individuals who hold opposing opinions or perspectives
I actively seek out diverse sources of information to ensure a balanced understanding of different viewpoints
I am willing to consider alternative explanations or interpretations when faced with conflicting evidence
UNREALISTIC SELF ASSESMENT
I often do believe that I am better at a task or skill than I actually am
I have been surprised by my actual performance or outcomes, realizing that I overestimated my abilities
I often find myself embellishing my achievements or skills when discussing them with others
I tend to take on tasks or responsibilities without considering whether I have the necessary qualifications or experience
I have experienced situations where my overconfidence led to mistakes or poor decision-making

Table 1 Preliminary items after phase one

Phase 2

Part 1: Results of content validation of the instrument

The table two summarizes the process that led to the final results. After the calculation of content validity of items, a total of six items were omitted.

List of omitted items:

Two items from illusory Superiority: Item 4 and Item 5

One item from Over Optimism: Item 1

Two items from Confirmation Bias: Item 2 and Item 4

One item from Unrealistic Self-Assessment: Item 2

The results highlighted green shows the items that have been approved by the group of experts for the instrument. Red highlighted results show the items that weren't relevant enough to include in the instrument.

No comments were provided by the participants for any item. The results are solely based on the ranking done on the Likert scale. A total of fourteen items made it to the instrument after exclusion of six. In the table below, segment one remains with three items, segment two with four, segment three with three and segment four with four. The coding is refreshed as per the number of remaining items in each segment.

	Experts																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
Items	Relevance																				Total	I-CVI	RESULT
Illusory Superiority																							
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	17	0.85	INCLUDE
2	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	1	1	1	16	0.80	INCLUDE
3	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	16	0.80	INCLUDE
4	1	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	06	0.30	REMOVE
5	0	0	0	0	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	05	0.25	REMOVE
Over Optimism																							
1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	01	0.05	REMOVE
2	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	0	1	1	1	16	0.80	INCLUDE
3	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	16	0.80	INCLUDE
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	18	0.90	INCLUDE
5	0	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1	16	0.80	INCLUDE
Confirmation Bias																							
1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	1	1	16	0.80	INCLUDE
2	0	0	0	0	1	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0	05	0.25	REMOVE
3	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	16	0.80	INCLUDE
4	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	1	0	05	0.25	REMOVE
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	18	0.90	INCLUDE
Unrealistic Self-Assessment																							
1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	16	0.80	INCLUDE
2	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	1	05	0.25	REMOVE
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	17	0.85	INCLUDE
4	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	17	0.85	INCLUDE
5	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	17	0.85	INCLUDE

Table 2 CVI Results

Part 2: Results of Response process validity

After the part one of phase two of this study, a total of fourteen items made it to the instrument after exclusion of six. In response process validity pretesting 4 medical educationists participated. It explored the views of participants regarding the statements of the items of instrument. On the basis of responses obtained from participants during response process validity, four items were rephrased. Table 3 shows the instrument after both parts of phase two of the study. A total of fourteen items remained in the instrument.

Items
Illusory superiority
I often believe that I am better than most people in various areas, such as intelligence, skills, or performance.
When receiving feedback or criticism, I tend to dismiss it or believe that others simply don't understand your abilities.
I often find myself boasting about my achievements or abilities to others
Over Optimism
I find myself underestimating the time, effort, or resources required to accomplish a task or achieve a goal.
I experience situations where I was overly confident about the success of a project or endeavor, only to be disappointed by the actual outcome.
When faced with potential risks or obstacles, I tend to downplay their significance or believe that they won't impact my desired outcome
When someone presents me with potential downsides or challenges related to my plans or ideas, I tend to dismiss them.
Confirmation Bias
When researching a topic or issue, I tend to prioritize sources or information that align with my existing beliefs or opinions
I am open to engage in discussions or debates with individuals who hold opposing opinions or perspectives.
I am usually willing to consider alternative explanations or interpretations when faced with conflicting evidence.
Unrealistic Self-Assessment

I often believe I am better at a task or skill than I actually am.
I tend to take on tasks or responsibilities without considering whether I have the necessary qualifications or experience.
I often find myself embellishing my achievements or skills when discussing them with others.
I have experienced situations where my overconfidence led to mistakes or poor decision making.

Table 3 Instrument after phase two

Phase 3: Results of Exploratory Factory Analysis

The instrument has been designed to be used in any situation where there is a need to evaluate/ measure the presence of Dunning Kruger Effect in students. The sample size was 140 as minimum of 10 participants per item were selected for the exploratory factor analysis. After giving instructions, informed consent was taken from participants. My participants were MBBS students. SPSS was used to run the test for the exploratory factor analysis.

Kaiser Meyer Olkin (KMO)

This test measures sampling adequacy not for the complete model only but also for each variable in the model.

This is how you interpret the statistical result of KMO:

KMO = 0.8-1: Sampling is adequate.

KMO > 0.6: Sampling is not adequate and that remedial action is required

KMO Values close to zero means there are widespread correlations which are a large problem for factor analysis.

KMO in our study is 0.97 which showed adequate sampling.

Bartlett's Test of Spherecity

This test is used to check if there is a certain redundancy between the variables that we can summarize with a few numbers of factors. If Bartlett's test of Sphericity is significant ($p < 0.05$), we should proceed with the Exploratory Factor Analysis. The results of this study were significant as $chi^2 = 1605.560$ ($p < 0.001$), which indicates its suitability for factor analysis

Communalities

A communality is the extent to which an item correlates with all other items. Higher communalities are better. If communalities for a particular variable are as low as 0.5 or less, then that variable may struggle to load significantly on any factor.

In this study, communalities for 8 items were more than 0.7, 5 items were between 0.6-0.7 and 1 tem was between 0.5-0.6. That item was reviewed but not omitted as it was not below the cut off value 0.5.

Total Variance

In the table Four we have three panels which are:

Panel one: initial Eigen values

Panel 2: extraction sums of square loadings

Panel 3: Rotation sums of squared loadings

In the first panel, Eigen values are looked at, at first. Eigenvalues are a measure of the amount of variance accounted for by a factor, and so they can be useful in determining the number of factors that we need to extract. In component one and two, the Eigen value is more than one as highlighted yellow, and this these two are our extracted factors. So in total, we have two extracted factors. In the second panel we see that the first two factors in my analysis, together account for 70.64% of total variance as highlighted green in the following table. This panel shows common variance hence the values are less than the total variance as shown in panel one. Coming to the third panel. It represents the distribution of the variance after the Varimax rotation. This method simplifies the interpretation

of the factors. Variation spread in this panel is more evenly distributed as compared to percentage variance in the other two panels.

The table shows that two components are effective enough in representing all the characteristics or components highlighted by the stated fourteen variables.

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.251	58.937	58.937	8.251	58.937	58.937	5.579	39.848	39.848
2	1.638	11.701	70.638	1.638	11.701	70.638	4.311	30.790	70.638
3	.727	5.193	75.831						
4	.558	3.983	79.814						
5	.505	3.604	83.418						
6	.454	3.240	86.659						
7	.389	2.777	89.435						
8	.325	2.321	91.756						
9	.271	1.934	93.690						
10	.234	1.668	95.358						
11	.222	1.587	96.945						
12	.180	1.282	98.227						
13	.145	1.034	99.261						
14	.103	.739	100.000						
Extraction Method: **Principal Component Analysis**.									

Table 4 Results of total variance

Rotated Component Matrix

This is basically the rotated factor loadings, which speaks for how not only are the variables weighted for every factor exclusively but also the correlation between the variables and the factor. In this study, rotated component matrix divides items into two components with eight items under component one and six items under component two as shown in image three.

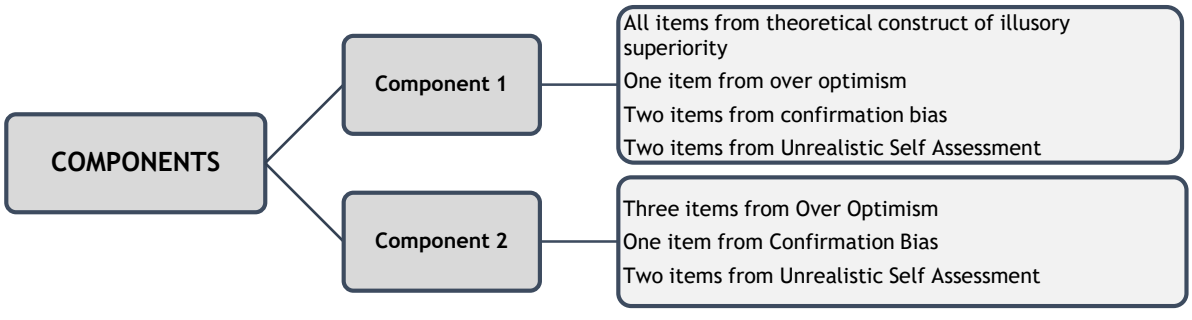

Image 3 Results of rotated component matrix

After going through the results of EFA, a conclusion is deduced that our instrument can be divided into two components which are effective enough in representing all the characteristics or components highlighted by the stated fourteen variables. It is no surprise as all the theories studied in this study are interconnected with one another and are co-related. Component one comprises of all the items from the theoretical construct of illusory superiority one from over

optimism, two from confirmatory bias and two from unrealistic self-assessment. Component two has items from all theories except for illusory superiority. It contains three items from over optimism, one from confirmation bias and two from unrealistic self-assessment. To rename these both components, major constituents of the components were looked at. Component one is assessing self-reflection of the participants and component two is assessing confidence threshold of a participant while performing a task. Table five shows the final instrument after all three phases of this study.

S. No	Item	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Self-Reflection						
1.	2. I often believe that I am better than most people in various areas, such as intelligence, skills, or performance	3.	4.	5.	6.	7.
8.	9. When receiving feedback or criticism, I tend to dismiss it or believe that others simply don't understand your abilities	10.	11.	12.	13.	14.
15.	16. I often find myself boasting about my achievements or abilities to others	17.	18.	19.	20.	21.
1.	2. When someone presents me with potential downsides or challenges related to my plans or ideas, I tend to dismiss them.	3.	4.	5.	6.	7.
1.	2. When researching a topic or issue, I tend to prioritize sources or information that align with my existing beliefs or opinions.	3.	4.	5.	6.	7.
8.	9. I am open to engage in discussions or debates with individuals who hold opposing opinions or perspectives.	10.	11.	12.	13.	14.
7	I often believe I am better at a task or skill than I actually am.					
8	I often find myself embellishing my achievements or skills when discussing them with others.					
Confidence Threshold						
9	I find myself underestimating the time, effort, or resources required to accomplish a task or achieve a goal.					
8.0	9. I experience situations where I was overly confident about the success of a project or endeavor, only to be disappointed by the actual outcome.	10.	11.	12.	13.	14.
15.1	16. When faced with potential risks or obstacles, I tend to downplay their significance or believe that they won't impact my desired outcome.	17.	18.	19.	20.	21.
12	I am usually willing to consider alternative explanations or interpretations when faced with conflicting evidence.					
13	I tend to take on tasks or responsibilities without considering whether I have the necessary qualifications or experience.					
14	I have experienced situations where my overconfidence led to mistakes or poor decision making.					

Table 5 Final instrument developed in this study

DISCUSSION

Dunning Kruger Effect suggests that less skilled and knowledgeable students overestimate their abilities in certain areas. This leads to potential dangers when it comes to medical decision-making, diagnosis and treatment, hampering the impact it could have on patient health care. These gaps can prevent them from recognizing the extent of what they do not know. As a result, they may

overestimate their capabilities because they are unaware of the depth and complexity of the subject matter. Due to their constrained expertise, medical students may also overestimate their talents and know-how in positive areas. They may accept as true with they've a comprehended hold while, in reality, they've simplest scratched the floor. This may lead to errors in scientific reasoning, diagnosis, and treatment.

The main purpose of this mixed method study was to develop a valid and a reliable tool used to identify students with prevalence of the cognitive bias called the Dunning Kruger Effect. The need for this study was very important in medical education. to identify the prevalence of the Dunning Kruger Effect in such students. In the present study, the tool was formed and validated using a structured seven step process for questionnaire development using AMEE guide No. 87(Artino Jr et al., 2014). In medical education research is commonly used to provide a framework to develop autonomous questionnaires. The objective of using this Guide was to develop prime quality tool that was psychometrically sound. A preliminary version of the questionnaire was formed based on the results of rigorous literature review. 4 major theoretical constructs were formed based on the 4 themes identified; Illusory Superiority, Over Optimism, Confirmation Bias and Unrealistic Self-Assessment. Items were developed for all these theoretical constructs and after all the phases of study, the instrument narrowed down two fourteen items under two components.

CONCLUSION

Medical education is advancing towards progression every single day, even now as I write this, globally so many innovations are being introduced, which we believed were not possible to incorporate in the growing medical field. Cognitive biases cause mind to deviate from rationality that can affect decision-making and thinking processes. In the field of medical education, various cognitive biases can impact the learning, assessment, and decision-making processes of both students and healthcare professionals. The developed instrument consists of two segments. One segment is majorly assessing the self-reflection of the participant and the other segment assesses the confidence threshold when analyzing and completing a task. This tool can help the faculty to identify such students and provide them with proper guidance and mentorship to prevent them from misjudging their knowledge and skills and making mistakes.

Limitations of the Study

As this study focuses on a cognitive bias, the students were not very willing towards filling the forms for EFA and in my opinion some of them weren't a 100% truthful. When using this questionnaire in medical colleges, a pre survey mentorship session should be held to ease the students into filling this form honestly.

Recommendations for Future Research

Keeping current study in view, there are a few recommendations for future studies. The study must be tested globally to ensure generalizability of the study. Research evaluating the outcome of this study must be carried out to see the impact of the formed instrument so that it can positively lead to improving student centered activities and incorporation of mentorship programs in the curriculums of colleges. This tool is a generic tool and further studies can be done to make different versions of this instrument to assess presence of Dunning Kruger Effect in various medical specialties and sub specialties.

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