What Influences Mental Illness? Discrepancies Between Medical Education and Conception

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ABSTRACT

OBJECTIVE: This preliminary study examined the differences between what was taught during a formal medical education and medical students’ and psychiatry residents’ conceptions of notions regarding the causes and determinants of mental illness.

METHODS: The authors surveyed 74 medical students and 11 residents via convenience sampling. The survey contained 18 statements which were rated twice based on truthfulness in terms of a participant’s formal education and conception, respectively. Descriptive statistics and a Wilcoxon signed rank test determined differences between education and conception.

RESULTS: Results showed that students were less likely to perceive a neurotransmitter imbalance to cause mental illness, as opposed to what was emphasized during a formal medical education. Students and residents also understood the importance of factors such as systemic racism and socioeconomic status in the development of mental illness, which were factors that did not receive heavy emphasis during medical education. Furthermore, students and residents believed that not only did mental illnesses have nonuniform pathologies, but that the Diagnostic and Statistical Manual of Mental Disorders also had the propensity to sometimes arbitrarily categorize individuals with potentially negative consequences.

CONCLUSIONS: If these notions are therefore part of students’ and residents’ conceptions, as well as documented in the literature, then it seems appropriate for medical education to be further developed to emphasize these ideas.

KEYWORDS: Behavioral science, medical education, psychiatry, individualized care

Introduction

The causes and determinants of mental illness are discussed in both undergraduate and graduate medical education. However, the uniformity of this discussion is not well-documented. Concepts involving the causes of mental disorders routinely appear on medical board examinations such as the United States Medical Licensing Examination, as well as other medical examinations. For example, the Behavioral Science Subject Exam, written by the National Board of Medical Examiners,¹ includes questions involving the diagnosis of psychopathologic disorders and principles of therapy and pharmacodynamics regarding those disorders. Much of these testable concepts are in relation to diagnosis as outlined by the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) and pharmacotherapy that corresponds to neurotransmitter abnormalities.

There have, however, been several calls to reshape medical education regarding psychiatry.²⁻⁴ Perhaps, this is because there have been many works and studies that have explored concepts not commonly found within a typical framework for medical education regarding mental illness and psychiatry. For example, there have been numerous works that have urged the medical community to undergo a paradigmatic shift away from a theory of neurotransmitter imbalance as an etiological explanation for mental illness.⁵⁻⁹ There have been suggestions that more complex and holistic causes should be explored, such as the interaction between neuroendocrine and inflammatory mechanisms¹⁰ or the complex dysregulation of brain circuitry in mental illness.¹¹,¹² as examples.

The environmental factors that influence the development of mental illness are still being explored.¹³ Although some of these factors may not be widely discussed in medical education, they are often well-studied in terms of their association with developing mental illness. Systemic racism, for example, has been consistently linked to the potential for developing mental illness.¹⁴⁻¹⁹ Socioeconomic status has also been correlated with the development mental illness and psychotic disorders in particular.¹⁰⁻²² In terms of specific experiences, traumatic events, including adverse childhood experiences, have also been extensively studied in terms of developing mental illness.²³⁻²⁵ These events may include war trauma,²⁶ physical and sexual abuse,²⁷ and even severe physical injury.²⁸

Another discussion that is controversial yet important involves the notion that the DSM-5 has the potential to diagnose mental illness in a person where a distinct psychopathology may not exist.²⁹ There has been much criticism of the DSM-5 regarding its propensity to medicalize and miscategorize phenomena such as personality disorders ³⁰ or existential issues such as cultural or religious crises.³¹ Livesley,³² albeit a member of the DSM-5 Working Group, claimed that the
Understanding mental illness is a multifaceted endeavor and therefore not necessarily straightforward. However, this understanding is commonly streamlined in an educational setting for teaching and testing. Psychiatry as a medical field uses a biopsychosocial model for a comprehensive understanding of the patient, but throughout medical education, the biological part of this model tends to be overemphasized. This leads to a potential lack of emphasis on the psychosocial aspects of psychiatric illness and general patient care. In this study, well-studied psychosocial concepts (e.g., systemic racism, the influence of the DSM) were examined in terms of their appearance as discussions in undergraduate medical education and psychiatry residency training programs. Concepts that also had the potential to be overemphasized in an exclusively biological model of psychiatry (e.g., neurotransmitter theories) were also examined. Furthermore, students’ and residents’ conceptions of these topics were acquired. These conceptions were based on their personal experiences, scholarly understanding, and, perhaps most significantly, their patient interactions.

The differences between school-based knowledge and personal conception were then analyzed to uncover potentially significant discrepancies. This was accomplished via an online survey in which students and residents were asked to rate statements based on perceived truthfulness in terms of what was taught in a formal education versus what was personally conceived to be true. The results may provide insight into the potential gaps in medical education regarding mental illness. The results may also possess the ability to further highlight some important concepts that are perhaps not explored or emphasized throughout a formal medical education.

It is hypothesized that there will be discrepancies between what is taught and what is personally understood to be true. Many concepts are examined in the survey to understand precisely where these discrepancies exist. For example, it is likely that the idea of systemic racism has not been encountered in a formal education, but this concept is relevant to patients and is prevalent in the literature. Therefore, students’ and residents’ conceptions of how systemic racism relates to mental illness will be different than what was taught in a formal medical education. The ultimate aim of this study is thus to provide a foundation for continuing to improve medical education in behavioral science and psychiatry. With this aim, there is potential to further emphasize the holistic, biopsychosocial nature in which the psychiatric patient should be considered.

Methods
The study was officially exempt from institutional review board approval. Participants in this preliminary study included 74 second, third, and fourth year medical students from 2 different schools and 11 residents from a psychiatry residency program. Students and residents voluntarily completed an online survey in August 2016 and were recruited to participate via convenience sampling. Emails were sent to approximately 800 total students and residents through school-based group emailing. The survey was created using Google Forms, and a link to the survey was sent to participants via email. The survey itself was created as a new measure to examine the discrepancies between medical education and personal conception. After extensive review of the literature, it was apparent that this measure needed to be created. However, due to the preliminary nature of this study, there are no reliability or validity data that exist for this measure yet. For this preliminary study, the survey response rate was approximately 10%.

The survey involved 18 statements that were rated twice by participants based on truthfulness (Table 1). The statements were based on concepts that may or may not have appeared during a formal medical education but are well-studied ideas related to the causes of mental illness. Each statement appeared twice. The first statement was rated based on what was taught in school or at the psychiatry training program. The second statement was rated based on the participant’s conception in terms of personal experience, literature review or research, patient encounters and interactions, or anything that did not pertain to what was formally taught. Participants rated each statement from 0 (not truthful) to 5 (truthful). If a statement had not appeared throughout a participant’s formal education, he or she was asked not to respond instead of rating the statement. Participants also had the ability to decline to answer any of the various statements or questions.

Results
This study aimed to understand the discrepancies between formal medical education and student and resident conception regarding statements about the potential determinants of mental illness. The results of the survey were analyzed to supply descriptive statistics for each statement. Paired statements were also analyzed for differences between education and conception using the Wilcoxon signed rank test (Table 1). Statements 2, 11, and 14 showed no difference in truthfulness between a student or resident’s formal psychiatry education and personal ideology. The other 15 statements showed differences in perceived truthfulness between these domains.

Several statements particularly yielded notable results. Statement 9 ("Systemic racism can contribute to the development of mental illness") was the statement that received the least responses in terms of formal education. This may signify that it was the statement that was least discussed in the education setting. There was also a significant difference in responses for education and conception ($Z = -3.91, P < .01$). It is also worth noting that Statement 9 and Statement 10 ("Socioeconomic status can contribute to the development of mental illness") were both more polarized than Statements 11 and 12, which had to do with trauma and adverse childhood
Table 1. Descriptive statistics and Wilcoxon signed rank test results for responses to statements based on truthfulness in terms of (a) formal education and (b) personal conception.

| STATEMENT # | STATEMENT                                                                 | TYPE | RESPONSES | MEAN   | SD      | MEDIAN | MODE | Z    | P VALUE |
|------------|---------------------------------------------------------------------------|------|-----------|--------|---------|--------|------|------|---------|
| 1          | Mental illnesses are caused by a dysfunction of neurotransmitter levels   | a    | 84        | 4.13   | 0.89    | 4     | 4    | −4.99 | .001*   |
|            |                                                                           | b    | 85        | 3.56   | 1.04    | 4     | 4    |       |         |
| 2          | Mental illnesses are caused by a dysfunction of complex brain circuitry   | a    | 84        | 4.07   | 0.87    | 4     | 4    | −1.3  | .195    |
|            |                                                                           | b    | 85        | 3.96   | 0.79    | 4     | 4    |       |         |
| 3          | Mental illnesses have well-understood pathologies                         | a    | 85        | 1.99   | 1.03    | 2     | 1    | −4.68 | .001*   |
|            |                                                                           | b    | 85        | 1.48   | 0.96    | 1     | 1    |       |         |
| 4          | Major depressive disorder is a disease with a uniform pathology           | a    | 84        | 1.65   | 1.26    | 2     | 2    | −4.16 | .001*   |
|            |                                                                           | b    | 85        | 1.19   | 1.05    | 1     | 1    |       |         |
| 5          | Generalized anxiety disorder is a disease with a uniform pathology        | a    | 84        | 1.93   | 1.22    | 2     | 2    | −4.16 | .001*   |
|            |                                                                           | b    | 85        | 1.46   | 1.16    | 1     | 1    |       |         |
| 6          | Schizophrenia is a disease with a uniform pathology                       | a    | 85        | 2.24   | 1.44    | 2     | 2    | −4.87 | .001*   |
|            |                                                                           | b    | 84        | 1.67   | 1.30    | 2     | 1    |       |         |
| 7          | Borderline personality disorder is a disease with a uniform pathology     | a    | 84        | 1.86   | 1.45    | 2     | 2    | −3.58 | .001*   |
|            |                                                                           | b    | 84        | 1.44   | 1.31    | 1     | 0    |       |         |
| 8          | Mental illnesses are localizable brain issues                             | a    | 85        | 2.09   | 1.23    | 2     | 3    | −3.87 | .001*   |
|            |                                                                           | b    | 85        | 1.64   | 1.10    | 2     | 1    |       |         |
| 9          | Systemic racism can contribute to the development of mental illness       | a    | 78        | 2.62   | 1.36    | 3     | 3    | −3.91 | .001*   |
|            |                                                                           | b    | 85        | 3.32   | 1.45    | 3     | 3    |       |         |
| 10         | Socioeconomic status can contribute to the development of mental illness  | a    | 82        | 3.71   | 1.16    | 4     | 4    | −3.90 | .001*   |
|            |                                                                           | b    | 85        | 4.15   | 1.04    | 4     | 5    |       |         |
| 11         | Trauma can contribute to the development of mental illness                | a    | 85        | 4.45   | 0.87    | 5     | 5    | −0.76 | .450    |
|            |                                                                           | b    | 85        | 4.51   | 0.80    | 5     | 5    |       |         |
| 12         | Adverse childhood events can contribute to the development of mental illness | a   | 85        | 4.49   | 0.75    | 5     | 5    | −2.98 | .003*   |
|            |                                                                           | b    | 85        | 4.65   | 0.63    | 5     | 5    |       |         |
| 13         | Environmental factors contribute to mental illness independently of neurotransmitter abnormality | a   | 83        | 3.25   | 1.31    | 3     | 3    | −3.14 | .002*   |
|            |                                                                           | b    | 85        | 3.58   | 1.37    | 4     | 4    |       |         |
| 14         | Environmental factors contribute to a neurotransmitter abnormality, which then leads to the development of mental illness | a   | 82        | 3.45   | 1.17    | 4     | 4    | −1.26 | .209    |
|            |                                                                           | b    | 85        | 3.53   | 1.17    | 4     | 3    |       |         |
| 15         | Some DSM (Diagnostic and Statistical Manual of Mental Disorders) diagnoses were arbitrarily created | a   | 83        | 3.00   | 1.51    | 3     | 4    | −5.47 | .001*   |
|            |                                                                           | b    | 84        | 3.87   | 1.10    | 4     | 4    |       |         |
| 16         | Some DSM diagnoses have the propensity to create mental illness in a person where there is no mental illness | a   | 80        | 2.28   | 1.43    | 2.5   | 3    | −5.83 | .001*   |
|            |                                                                           | b    | 84        | 3.38   | 1.35    | 3.5   | 3    |       |         |
| 17         | Mental illnesses are binary—either the patient has one or does not have one | a   | 82        | 1.80   | 1.50    | 2     | 0    | −4.79 | .001*   |
|            |                                                                           | b    | 84        | 0.96   | 1.16    | 1     | 0    |       |         |
| 18         | All patients benefit from receiving a specific diagnosis for their mental struggles | a   | 81        | 2.30   | 1.44    | 2     | 3    | −4.35 | .001*   |
|            |                                                                           | b    | 85        | 1.61   | 1.40    | 1     | 0    |       |         |

n = 85.

*Significant at a level of .01.
• **Less emphasis on neurotransmitters alone**: Neurotransmitter dysfunction theories should indeed be taught, partly because these ideas appear on national examinations. As more complex biological models of mental illness are investigated, these models should also be reviewed. However, the classic neurotransmitter theories (e.g., dopamine hypothesis of schizophrenia) should be formally taught within the framework of a biopsychosocial model.

• **More emphasis on a variety of psychosocial determinants**: A more in-depth discussion of the known environmental factors involved in the development of mental illness should occur within a biopsychosocial model. It is suggested that discussions of trauma, adverse childhood events, socioeconomic status, and systemic racism should be emphasized.

• **Discuss diagnostic nuances in addition to diagnostic criteria**: When various DSM disorders are taught, it is suggested that they should be taught in a straightforward (i.e., criteria for examination purposes) yet multi-faceted, nonuniform manner (i.e., biopsychosocial approach). This is so that students can be accustomed to multidimensional, complex thinking that is required to understand their future psychiatric patients and patients in any discipline.

• **Discuss the potential for harm in addition to benefit**: It is suggested that small group–style discussions should occur to further explore the nuances of what influences mental illness. The ethics of diagnosis and the potential for iatrogenic mechanisms are stimulating, relevant concepts that are generally lacking from curricula, but apparently not lacking from student and resident ideologies. If esophageal perforation is commonly discussed within the context of iatrogenic mechanisms, then so too should mental illness. Naturally, the benefits of DSM diagnoses and the current psychiatric system should be discussed as well. However, to further improve care for psychiatric patients and patients in general, students should be urged to consider each patient individually.

Events. Not only was Statement 11 not significant in terms of the Wilcoxon signed rank test ($Z = −0.76, P > .01$), but both Statements 11a (education) and 11b (conception) also had medians and modes of 5, which signified the highest possible truthfulness. Statement 12 yielded similar results. It is thus interesting to note the difference between trauma and adverse childhood events and systemic racism and socioeconomic status in terms of their emphasis as important environmental factors in the development of mental illness.

Statements 4 ($Z = −4.16, P < .01$), 5 ($Z = −4.16, P < .01$), 6 ($Z = −4.87, P < .01$), and 7 ($Z = −3.58, P < .01$) referred to the uniformity of pathologies in major depressive disorder, generalized anxiety disorder, schizophrenia, and borderline personality disorder, respectively. These items all not only showed significant differences between education and conception, but when answering based on education, participants also consistently rated the statements more truthfully. However, it is worth noting that both ratings for all 4 statements had descriptive statistics that indicated that these statements were not very truthful, even educationally (Table 1).

Statement 15 ($Z = −5.47, P < .01$) and Statement 16 ($Z = −5.83, P < .01$) also showed polarized results. These statements referred to the potential arbitrary nature of DSM categorizations as well as their ability to create mental illness. The truthfulness of these statements was rated higher, in general, for conception as opposed to education (Table 1).

Statements regarding the binary nature of diagnoses also showed significant differences between formal education and personal conception. Both Statements 17 ($Z = −4.79, P < .01$) and 18 ($Z = −4.35, P < .01$) yielded significant results. Statement 18 (“All patients benefit from receiving a specific diagnosis for their mental struggles”) had the largest discrepancy in mode of any statement between education (3) and conception (0). This shows that most students and residents feel as, though, this statement is not truthful, yet their formal education perhaps conveyed a slightly different ideological value.

**Discussion**

**A more holistic approach**

A discussion of the causes and determinants of mental illness has been streamlined for formal medical education so that teaching and testing are both more efficient. However, as per the literature and these preliminary results, this discussion should be more nuanced and increasingly multifaceted. The current paradigm of medical education has the potential to miss concepts that are well-studied in the literature and are perhaps vital to a holistic understanding. Medical students and residents provided insight into this phenomenon. As per the results, there were differences between formal medical education and conception in 15 out of the 18 statements presented to participants.

The results of the survey show that certain topics in mental illness are indeed emphasized throughout a formal education. Table 1 shows that Statements 1, 2, 11, and 12 were taught as highly true statements throughout this education. Conceptions of these statements agreed for Statements 2 and 11. However, conceptions were generally less inclined to agree with the taught idea that mental illnesses are caused by neurotransmitter imbalances (Statement 1). Perhaps, a discussion of neurotransmitter dysfunction should occur, but not as unequivocally as it may currently exist. There is also literature that coincides with this notion. Statement 2, however, regarding the

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**Figure 1.** General suggestions for behavioral science curricular development as implicated by this preliminary study. DSM indicates Diagnostic and Statistical Manual of Mental Disorders.
concept of dysregulated complex brain circuitry was accepted as true, both in education and conception, similarly. This requires a less reductionistic neurological approach to understanding mental illness, which may indeed be the emphasized approach in some cases. Certainly, there are studies that suggest that this holistic, biopsychosocial approach is worth pursuing and currently being pursued.\textsuperscript{31,12,33–36}

It appears that a formal medical education includes a discussion of trauma as well (Statement 11). Education and conception also showed no differences in perceived truthfulness of the statement. Perhaps, this is also because trauma is a well-documented environmental factor in the development of mental illness in the DSM-5.\textsuperscript{37} However, the results of this study showed a misalignment between education and conception when it came to environmental factors such as systemic racism and socioeconomic status. Statement 9 regarding systemic racism also received the least responses to the education component, which may signify that it was not consistently encountered as a concept. Regardless, systemic racism,\textsuperscript{14–19} as well as socioeconomic status, are studied factors in terms of their connection to the development of mental illness. Therefore, these topics should likely receive more attention in a formal medical education.

The nuances of diagnosis

As per the results, Statements 4, 5, 6, and 7 regarding the uniformity of psychiatric pathology all showed significant differences in truthfulness between what was taught and what was personally understood. For both education and conception ratings, participants rated these statements as mostly untruthful (Table 1). However, in general, the results for education showed that students and residents are taught that psychopathology is more uniform than they personally believe. This notable discrepancy can also be seen with the results from Statements 15 and 16 (Table 1). Often, students believe that some DSM diagnoses are created arbitrarily, and that some of these diagnoses have the propensity to create mental illness where there may be none. Furthermore, there was a significant difference between conception of this idea and what was taught in a formal education. So, not only do students and residents believe that there is variability in psychopathology, but there is also potential for the diagnoses in the DSM to be used to arbitrarily and potentially falsely categorize individuals. These concepts are also discussed in the literature.\textsuperscript{29–31} This further underscores the importance of these ideas to be discussed as part of the nuances of clinical diagnosis and epidemiology of mental illnesses.

In addition to this, Statement 17 (“Mental illnesses are binary . . .”) and Statement 18 (“All patients benefit from receiving a specific diagnosis . . .”) both yielded significant differences between what was taught and what was part of a personal ideology. Statement 18 showed the largest difference in mode between education (3) and conception (0). The modes were 0 for both statements based on conception, signifying that participants mostly found these 2 statements very untruthful. These results show that although medical education claims that patients benefit from diagnosis, both students and residents think that perhaps not all patients benefit from this paradigm. This has also been suggested in terms of the potential detriments of the stigma arising from these diagnostic labels.\textsuperscript{32,38} These results do not ultimately show that diagnosis or the DSM categorizations in general are negatively affecting patients necessarily. However, the results do indeed show that these ideas should be part of a medical education in understanding the nuances of diagnosis and how they may affect patients differently. This is especially important given that students and residents, as per the results, see some of these categorizations as nonuniform and potentially arbitrary.

Limitations

There are several distinct limitations to this study. First, the concepts examined by this study are by no means exhaustive. In other words, there are many other determinants and factors involved in developing mental illness that may be relevant to personal conception but lacking in medical education or vice versa. Further work should explore not only more concepts but also specific concepts more thoroughly to properly assess the potential disparities between school-based knowledge and other sources of understanding mental illness (i.e., personal conception). This will also allow for higher response rates, as the survey can then be more succinct and focused.

Another limitation worth noting is the potential value of students’ and residents’ conceptions as they relate to reshaping curricula. Because personal beliefs and experiences are involved in these conceptions, the value of the responses may therefore be limited. However, because research experience, understanding of the literature, and patient encounters are also involved in these conceptions, perhaps there is value to note when there is a discrepancy between conceptions and the current curricular experiences.

Future work should be done to properly assess the reliability and validity of the survey as well. This measure may be particularly useful when assessing the differences between formal education and personal conception, but it needs to be scrutinized before further use. In addition, more data should be collected on sample characteristics in future studies. For example, it should be noted if each medical student was a second, third, or fourth year student. Postgraduate year for residents should also be recorded to improve the value of the results.

Conclusions

It is apparent that students’ and residents’ conceptions of mental illness are generally more holistic than the emphases endorsed by a formal medical education. Understanding what influences mental illness is no simple task, but it is a necessarily multifaceted endeavor. This understanding seemingly should include a discussion of complex brain dysfunction, as well as a
discussion of environmental, societal, and systemic factors such as systemic racism, socioeconomic status, trauma, adverse events, and the ability of DSM diagnoses to have imperfections and varying effects on different individuals. Medical curricula may need to accommodate some of these concepts to better aid students in understanding the multidimensional causes and determinants of mental illness. In Figure 1, our general suggestions are outlined to allow the preliminary results of this work to be extrapolated and implemented as needed. The ultimate aim is for future psychiatrists as well as all physicians to have a better understanding of individualized care. Further work should be conducted using a larger sample size and a more focused survey to better encapsulate the ways in which these medical curricula can improve in discussing mental illness and its various determinants. This preliminary study provides a foundation that can progress and hopefully translate to improved curricula in the behavioral sciences and eventually even better care for patients in the future.

Author Contributions
EHE and KL conceived and designed the experiments, wrote the first draft of the manuscript, contributed to the writing of the manuscript, agree with manuscript results and conclusions, jointly developed the structure and arguments for the paper, and made critical revisions and approved final version. EHE analyzed the data. All authors reviewed and approved of the final manuscript.

Ethical Approval
The survey used in this study was completely anonymous and additionally did not collect any data regarding demographics.

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