130 years of evidence: risk of suicide among doctors and medical students

130 anos de evidências: risco de suicídio entre médicos e estudantes de medicina

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ABSTRACT: *Objective:* To evaluate the incidence of risk of Mental Disorders (MD), Suicide and Quality of Life in medical students. *Methods:* This is a prospective cross-sectional study conducted at a Public Higher Education Institution of Medicine in Southern Brazil. Evaluation of 775 students who responded in person to Adult Self Repport (ASR) and WHOQOL-100, with individual return of results, orientation and mandatory referral for those with "Borderline" and "Clinical" scores and optional for those with "Normal" score. *Results:* The incidence of MD risk was 54.3% and suicide risk was 10.6%. Internalizing Problems were observed in 34.7% of cases and Externalizing Problems in 12.6%. Among the most frequent syndromes, Anxiety/Depression, Isolation and Attention were highlighted. "Poor" or "Moderate" Overall Quality of Life was observed in about 30%, associated with adaptive functioning and the presence of DSM-Oriented or ASR problems at "Clinical" level (p <0.001). The main variables for suicide risk were Anxiety/Depression Problems, Internalizing Problems, Thought Problems, and Antisocial Personality (p <0.001). "Clinical" Score for two or more Syndromes or Total Problems was selected as an independent variable for the risk of suicide, while the Spirituality and Psychological domains were appointed as protective (p <0.001). *Conclusions:* There was a high incidence of MD associated with poor quality of life and increased risk of suicide among medical students.

Keywords: Mental disorder; Suicide; Medical students, Quality of life.

RESUMO: *Objetivo*: Avaliar a incidência de risco para Transtornos Mentais (TM), Suicídio e Qualidade de Vida em estudantes de Medicina. *Métodos:* Estudo transversal, prospectivo realizado em Instituição Pública de Ensino Superior de Medicina do Sul do Brasil. Avaliação de 775 estudantes que responderam presencialmente ao Adult Self Repport (ASR) e WHOQOL-100, com devolução individual do resultado, orientação e encaminhamento obrigatório para aqueles com escores "Limítrofe" e "Clínico" e opcional para os com escore "Normal". *Resultados:* A incidência de risco de TM foi de 54,3% e de risco de suicídio de 10,6%. Problemas Internalizantes foram observados em 34,7% e Problemas Externalizantes em 12,6%. Entre as síndromes mais frequentes, destacaram-se Ansiedade/Depressão; Isolamento e Problemas de Atenção. Qualidade de vida geral "Ruim" ou "Moderada" foi observada em cerca de 30%, associada a funcionamento adaptativo e presença de Problemas do DSM-Orientado ou ASR em nível "Clínico" (p<0,001). As principais variáveis para o risco de suicídio foram: Ansiedade/Depressão; Problemas Internalizantes, Problemas de Pensamento e Personalidade Antissocial (p <0,001). Escore "Clínico" para duas ou mais Síndromes ou Total de Problemas foi selecionado como variável independente para o risco de Suicídio enquanto os domínios Espiritualidade e Psicológico foram apontados como protetores (p<0,001). *Conclusões:* Observou-se elevada incidência de TM, associado a qualidade de vida ruim e aumento do risco de suicídio entre estudantes de Medicina.

Palavras-chave: Transtornos mentais; Estudantes de medicina; Qualidade de vida.

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INTRODUCTION

In the last 5 years at least 53 publications have been indexed considering the keywords ´medical student´ and ´suicide´. Some of their titles are impressive: "Mental Health Services for Medical Students - Time to Act"[1]; "Time to Act - Alarming Rise in Suicides Among Medical Professionals in Pakistan"[2]; "Medicine: in need of culture change"[3] and "Medical students hanging by a thread"[4]. Among these cases, the most real, clear, and moving is that of a young medical student, Cassandra. In "This is Why", a two-page letter draws, sculpts and transcribes the dark environment that surrounds the soul of such young doctors[5]:

"I write this because I'm afraid to write this. I write this because I am a fourth-year medical student typing on a small laptop in my closet in the dark. Because I am sitting on the floor with my back against the wall. Because to my left lies a pile of unsorted clothes and underneath a silver knife. I write this because I hope for a future in which a medical student fighting mental illness will be seen as someone strong and not as someone dying"[5].

Suicide is the second leading cause of death among young people aged 15-29. In 2013, the World Health Organization established a program called "Suicide Prevention: A Global Goal to reduce the suicide rate worldwide by 10% until 2020". In 2012, this prevalence was 11.4/100.000 and today it is estimated at 10.5/100.000. In addition, it is estimated that for each suicide accomplished there are 20 or more suicidal ideations[6,7].

Studies indicate that the prevalence of suicide among doctors is 3 to 4 times higher, ranging from 28 to 40/100.000. The frequency of depression, suicidal ideation and Burnout Syndrome is also higher when compared to the general population, besides the higher risk of Mental Disorders (MD)[1] that usually appear for the first time in early adulthood, especially during the university period[8,9,10].

MD are syndromes characterized by clinical disturbances in an individual's cognition, emotional regulation, or behavior that reflect dysfunctions in the psychological, biological, or developmental processes underlying mental functioning, often associated with significant suffering or disability that affects an individual's social and professional life[7].

Medical students enter the university full of expectations. However, as they come into contact with the course, they begin to complain a lot about it, for example, the need for exhaustive study, lack of time for academic, family and leisure activities, physical tiredness, exhausting contact with terminal patients and with death, which may determine the higher prevalence of MD observed[11].

In a US survey of 3080 students, 49.0% of them presented depressive symptoms and 47.0% Burnout Syndrome[12]. In Iran, Poorolajal et al.[10] evaluated the incidence of MD in 1259 with 518 (41.1%) students, 124 (9.9%) reported a history of psychoactive substance use,

204 (16.2%) reported suicidal ideation and 103 (8.2%) attempted suicide at least. In the analysis of 150 students attended by a medical school's mental health program in the United States, 35% had depression, 35% anxiety, 25% adaptation problems, 20% attention deficit, 5% eating problems, and 5%. of substance abuse[1].

In Brazil, Paula et al.[13] evaluated the incidence of depressive symptoms in 1024 medical students. The results showed a frequency of 28.8%, with a predominance in females. Still in Brazil, Rocha and Sassi[9] found similar results. In 2017, Adhikari et al.[14] conducted a cross-sectional study with 370 medical students in Nepal, and observed depression in 29.2% of cases, while 4.7% considered suicide during the course. In the same year, there were at least four suicide attempt cases among medical students at the University of São Paulo, Brazil. The expression #WeareTogether mobilized students and professors, and their reports sounded like a call for help against anxiety attacks, depression, and suicide attempts[15].

Concern about MD and suicide among medical students have been permeating and crossing decades. Over the past 45 years, 11 systematic reviews have been indexed in PubMed on the topic, dating back 130 years of this discussion[16]. These studies have raised concerns about how students' distress may affect their learning, their personal and professional development, as well as being a predictor for mental health problems including suicide.

Thus, the objectives of this study were to evaluate the incidence of risk for MD and suicide and identify the main MD in medical students, as well as their impact on quality of life.

METHODS

This is a prospective cross-sectional study of 775 medical students from a Brazilian Public University, characterized by being free and developed along 12 semesters: the first 4 dedicated to the basic cycle, the next 4 to the clinical cycle and the final 4 to the internship with supervised medical practices.

During the study period, 1089 students were regularly enrolled in this course and all of them were invited to participate in this research. Among them, 775 (71.2%) were included and of the 314 that did not participate: 313 were not present in the class periods reserved by the teachers for the application of the instruments and one student was absent after the study presentation, resulting in a 99% adherence.

The risk of MD was assessed using the Adult Self-Report (ASR)[17] adapted to Brazilian Portuguese[18,19,20]. The WHOQOL-100 was applied to evaluate the quality of life, which consists of one hundred questions referring to six major domains: a) Physical; b) Psychological; c) Level of Independence; d) Social Relations; e) Environment and; f) Spirituality/Religiosity/Personal beliefs[21].

ASR is a risk self-assessment inventory for MD for

adults aging 18-59, consisting of questions whose answer choices are: "not true / missing" (score = 0), "sometimes / somewhat true" (score = 1) or "often / true" (score = 2). The sum of the scores is converted to T-scores according to sex and age and are classified as "Normal", "Borderline" and "Clinical", indicating absence and suggesting lower or higher risk of MD, respectively[17].

Risk areas for ASR MD include a) Internalizing Problems - which include Anxiety Syndrome, Depression, Isolation, and Somatic Complaints; b) Externalizing Problems - which include Aggressive Behavior, Rule Breaking Behavior and Intrusive Behavior; c) Thought and Attention Problems Syndrome and: d) Critical Items - which encompass issues considered critical. In the suicide risk analysis, we considered those who answered the questions "Do I hurt myself on purpose or attempt suicide" and / or "I think of killing myself".

The instruments were applied in person, in the classroom, by the author, a Psychologist, responsible for teaching Psychology classes for students of the 11th and 12th periods of the course, being therefore known by the students and with great interpersonal relationships and empathy. For students from the 1st to the 10th period, the author requested space in some of the classes, provided by the responsible professor of medicine. All students individually received the results of their assessment, through interviews conducted by the author Psychologist, in a private environment, at the University premises, ensuring the confidentiality of the meeting, in order to avoid any embarrassment. Thus, it would be possible to ratify the information granted and provide guidance and referral of students with "Borderline" or "Clinical" scores, as well as give the same opportunity to those with "Normal" scores, if they wanted to.

In the statistical analysis, Student's t-test and Pearson/Yates chi-square test were applied. The forward stepwise multivariate logistic regression model was applied to identify the variables associated with the risk of suicide. For all tests, the significance level considered was 5%, with 95% test power (Statistica - Statsoft® 10.0).

The research was approved by the Institution's Ethics Committee on Human Research, under the number 2571.178 / 2011-08, and by university academic bodies such as the Health Sciences Sector, Medical Course Coordination and Graduate Program of the University.

RESULTS

This study had a total of 775 (71.2%) students, 319 males and 456 females, with a mean age of 22.1 years, and 95.1% were between 17 and 27 years old. The average academic achievement index was 80.2 ± 5.9, with a maximum score of 100.

According to ASR results, MD risk was identified in 54.3% of cases, with Internalizing Problems in 34.7% of cases, represented mainly by Anxiety/Depression and Isolation. Externalizing problems were observed at the "Clinical" level in 12.6% of the cases, mainly represented by Aggressive Behavior and Intrusive Behavior. Attention Problems were observed in 13.7% of the cases (Table 1). A higher frequency of all Internalizing Problems and Attention Problems was observed in females (Table 2).

Table 1. Frequency of cases classified as clinical for Internalizing, Externalizing and Total Problems by Adult Self Report (ASR)

Syndromes	Clinical results (n = 775)
Total problems	421 (54.3%)
Internalizing Problems	**269 (34.7%)**
Anxiety / Depression	130 (16.8%)
Isolation	98 (12.6%)
Somatic Complaints	42 (5.4%)
Externalizing Problems	**98 (12.6%)**
Aggressive Behavior	31 (4.0%)
Rule Breaking Behavior	12 (1.5%)
Intrusive Behavior	31 (4.0%)
Thought problems	29 (3.7%)
Attention problems	**106 (13.7%)**
Critical items / suicide risk	82 (10.6%)

Table 2. Frequency of cases classified clinical for as Internalizing, Externalizing and Total Problems by Adult Self Report (ASR), according to sex

Syndromes	Male (n = 319)	Female (n = 456)	p
Total problemS	139 (43.6%)	282 (61.8%)	0.02
Internalizing Problems	84 (26.3%)	**185 (40.6%)**	**< 0.001**
Anxiety / Depression	33 (10.3%)	97 (21.3%)	< 0.001
Isolation	36 (11.3%)	62 (13.6%)	< 0.01
Somatic Complaints	10 (3.1%)	32 (7.0%)	< 0.001
Externalizing Problems	37 (11.6%)	61 (13.4%)	0.36
Aggressive Behavior	09 (2.8%)	22 (4.8%)	0.05
Rule Breaking Behavior	07 (2.2%)	05 (1.1%)	0.21
Intrusive Behavior	13 (4.1%)	18 (3.9%)	0.43
Thought problems	9 (2.8%)	20 (4.4%)	0.48
Attention problems	23 (7.2%)	**83 (18.2%)**	**< 0.001**
Critical items / suicide risk	37 (11.6%)	45 (9.9%)	0.26

Note: Pearson / Yates Chi-Square Test

Suicide risk was observed in 82 cases (10.6%), with no difference regarding age (p=0.56), academic achievement index (p=0.24) and sex (p=0.26). In these students, there was a higher frequency of Internalizing Problems in ASR and Problems of Depression, Anxiety and Avoidant Personality in DSM-Oriented (Graph 1). The main variables pointed to the risk of suicide were Depression Problems, Internalizing Problems, Thought Problems and Antisocial Personality (Table 3). The presence of MD risk, considered with "Clinical" score for two or more ASR Syndromes or two DSM-Oriented Problems, was selected as an independent variable for suicide risk (p<0.001).

Graph 1. Adult Self Report Syndromes classified as Clinical and Suicide Risk
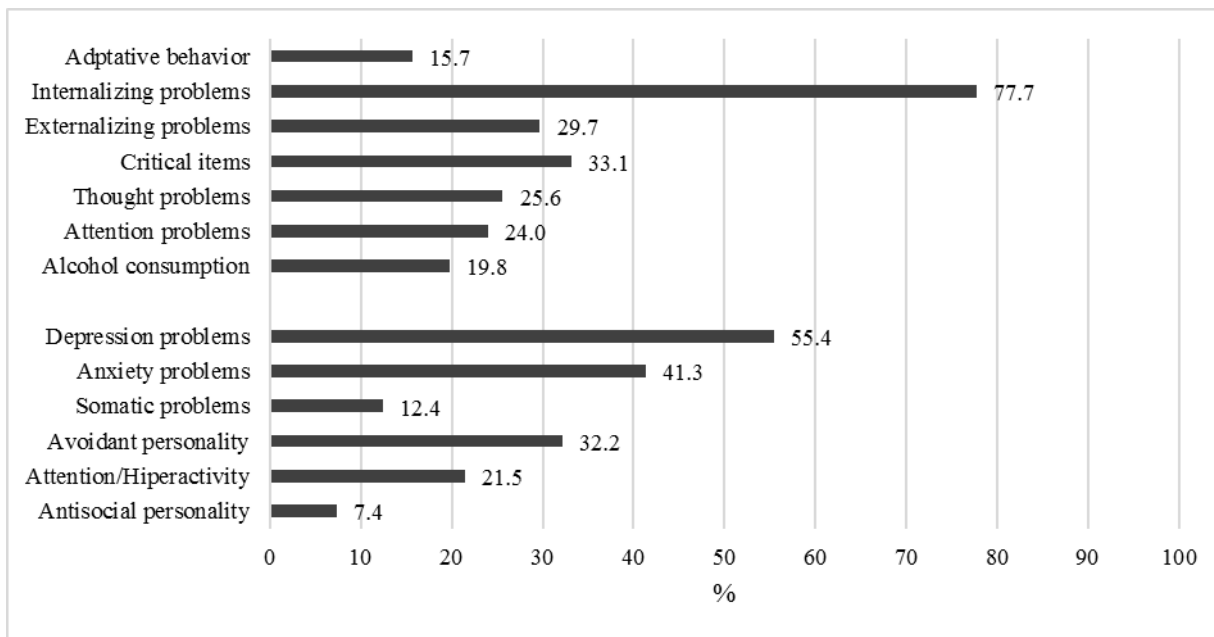
Table 3. Suicide risk according to Adult Self-Reporting (ASR) syndromes and DSM-oriented problems

Problems	OR	CI 95%	p
Year	0.94	0.84-1.06	0.35
Gender	1.32	0.89-1.97	0.16
Who the student resides with	0.97	0.82-1.15	0.79
General Adaptive Behavior	0.17	0.93-1.75	0.12
Internalizing Problems	**3.09**	**2.24-4.28**	**< 0.001**
Externalizing Problems	1.07	0.82-1.40	0.60
Probl. Thought	**2.96**	**2.17-4.03**	**< 0.001**
Probl. Attention	0.75	0.56-1.00	0.05
Alcohol consumption	1.05	0.78-1.42	0.70
Depression problems	**4.85**	**3.63-6.47**	**< 0.001**
Anxiety problems	0.94	0.71-1.26	0.72
Somatic Problems	1.31	0.91-1.87	0.13
Avoidant Personality	1.05	0.80-1.38	0.69
Attention problems	**0.67**	**0.48-0.92**	**0.01**
Antisocial Personality	**1.81**	**1.17-2.79**	**0.001**

Note: Logistic regression - dependent variable: Suicide risk; independent variables: Total ASR. OR = Odds Ratio; CI = confidence interval; Probl. = Problem. Behav. = Behavior.

"Poor" or "Moderate" Overall Quality of Life was observed in about 30% of students, 50% in the Physical and Psychological Domains and 30 to 40% in the domains Social Relations, Environment and Spirituality, Religion and Religious Beliefs. Only in the Independence Level Domain, 90% of students with "Good" or "Great" quality of life were observed. The General, Physical and Psychological domains, as well as the Independence and General Levels were worse in females (p <0.01).

Adaptive Operations at the "Clinical" level in

their areas - Friends, Family and Education - also caused worsening in the General, "Bad" or "Moderate" Quality of Life in about 60% of the cases (p <0.01).The presence at the "Clinical" level of all the Problems of the DSM-Oriented or ASR was also associated with "Bad" or "Moderate" Quality of Life in about 60% of the cases (p <0.001). The Spirituality and Psychological Domains were pointed out as protective for the risk of suicide, reducing the risk with "Normal" score by almost 3 times and 1.5 times, respectively (Table 4).

Table 4. Suicide risk according to World Health Organization Quality of Life (WHOQOL-100)

WHOQOL-100 DOMAINS	OR	CI 95%	p
Domain 1 (Physical)	0.88	0.64-1.21	0.44
Domain 2 (Psychological)	**2.69**	**1.88-3.83**	**< 0.001**
Domain 3 (level of independence)	0.67	0.47-0.96	0.03
Domain 4 (Social Relationships)	0.65	0.48-0.89	0.008
Domain 5 (environment)	1.44	1.01-2.05	0.04
Domain 6 (spirituality/religion/personal beliefs)	**1.33**	**1.11-1.60**	**< 0.01**

Note: Logistic regression - dependent variable: suicide risk; independent variable: quality of life. Or = Odds Ratio. CI = confidence interval

DISCUSSION

Over the past 130 years, attention has been drawn to the fact that the suicide rate among doctors is higher than the rate among the general population. However, the epidemiology of suicide deaths among doctors and medical students is not well known. For instance, it is not known whether medical students become future doctors at risk, whether medical schools are admitting at-risk individuals, or whether these institutions are the very reason for the risk of suicide.

Studies lack adequate and clear delineation of this population, who are typically young adults, from privileged social classes, with high intelligence coefficients and, in the last decades, predominantly women.

The fact is that all doctors and medical students are surrounded by a wealth of information warning about high rates of depression, Burnout syndrome and suicide, but there is a flagrant lack of consistent data in the international literature.

The first report of suicide in these students was made in 1869, with the evolution of 1,226 students, 41 deaths, 2 of them by suicide. Subsequently, Simon conducted a retrospective survey in 1968, examining deaths of students from 1947 to 1967, 163 deaths, with 31 suicide cases (19%), being the second leading cause of death after car accidents. The annual suicide rate ranged from 0 to 100/100,000, higher than the age-adjusted general population rate[22].

In 1967, a study by the Association of American Medical Colleges indicated 21 suicides between 1961

and 1967[Referencia]. Everson and Fraumeni, between 1967 and 1971, observed a suicide rate of 9%, while the rate in the general population was from 10.7 to 11.7%. In 1976, Thomas conducted a prospective study of 1,337 students with 2 suicides. The suicide rate in the population ranged from 9.8 to 13.2. Pepitone, Arreola and Rockwell, in 1981, found an annual rate of 18.4/100,000 among medical students[22,23].

Hays et al., between 1989 and 1994, found only 15 cases among 101 medical schools, with an annual rate of 0 to 11.7, lower than the general population's 14.9. After 15 years, Cheng et al., reported a rate of 2.3 suicides/100,000. While Laitman and Muller evaluating 446 students, found 34 suicides (7.6%), drawing attention to the variation of observed rates, which may be influenced by information provided by schools and even by the students themselves, due to the protection of personal or family privacy and reputation of schools, as well as limitations of different forms of data collection[22,23].

In Brazil, data from 1965 to 1985, from the study by Millan et al., verified an average annual suicide rate of 39.6, four times higher than the population (6.0 to 11.8). In the present study, the rate found was 10.6% with ratification of the results indicated by means of individual interviews[22,23].

All studies are from populations of different cultures, ethnicities, sex prevalence, socio-political conditions, medical curriculum and costs of academic education. Epidemiological profile, academic year, academic performance, marital status, sex and age are also not well defined. Interfering factors also include

student motivation to participate in or respond to suicide surveys, fear, privacy protection, and the preservation of the reputation of medical schools[24,25].

The lack of time for personal care among medical students is an almost indisputable factor, resulting from the numerous educational and clinical responsibilities to which they are subjected, which is a potential risk for the lack of diagnosis and follow-up of possible MD. On the other hand, the repercussion of medical suicide in the media may cause the feeling of increased suicide rates in this population[22].

Thus, the study of suicide is a challenge and should be directed to a prospectively centralized data collection platform, anonymous in terms of individual and educational institution, of mandatory notification, in order to allow a consistent study of the epidemiological profile and of risk factors involved in suicidal ideation and suicide among medical students[22,23]. Whether it is larger than the general age-adjusted population or not, and regardless of its actual rate of occurrence, MD in college students have been verified, causing distress among these young doctors and leading them to the risk of suicide.

In this study, 54.3% of the informants presented "clinical" results for MD risk. Internalizing problems were observed at the clinical level in 34.7% of cases, with anxiety/depression syndrome being the most frequent (16.8%). Curran et al.[23] reported that depression in college students is associated with poor social support and a higher number of stressful events. As students often move away from their place of residence, there may be significant disruption in their social ties and the number of people available to provide support, which can trigger or aggravate emotional problems.

The quality and quantity of established interpersonal relationships, as well as the feeling of belonging to a group and the connection with meaningful people, are known to play an important role in satisfaction and quality of life. Social isolation can create a condition prone to suicidal ideation and suicide[25,26], since the young person does not feel socially integrated and has not developed feelings of belonging.

This is especially important in the transition to university, when there may be changes caused by the loss of bonding with significant people such as a best friend or parents, in addition to the lack of involvement with others - social networks, colleagues, neighbors[27,28,29]. In the present study, it was found that interpersonal relationships are negatively associated with isolation levels and positively associated with life satisfaction levels. In this context, the feeling of loneliness and isolation is more pronounced in girls, while the highest levels of life satisfaction are found in boys.

Attention problems were observed in 13.7% of the students, but regarding the specific question "I have difficulty concentrating or paying attention for a long time", to which 27.3% of the students answered positively. Externalizing problems (12.6%) were less frequent, being characterized by aggressive behavior, rule breaking behavior and intrusive behavior.

There is also growing evidence that religiosity is associated with mental health. A positive association in 50% of cases and a negative one in 25% of them were shown in a review study. Religiosity was considered a protective factor for suicide, substance abuse, delinquent behavior, marital satisfaction, psychological distress and some diagnoses of functional psychosis[30].

This study is possibly the first one in which students were evaluated in person, with individual return of results, in a private environment, with absolute protection of student identification, enabling to check and confirm the information provided. Mainly and especially, this study allowed us to identify at-risk students, guide and direct them, modifying their evolution, minimizing and addressing the risk of suicide. It was also possible to identify their epidemiological profile characterized by being young adults with high academic performance index. With a male/female ratio of 1:1.4, the risk of MD is higher among girls and more prevalent in the 3rd and 4th years of the course, with no difference, however, in the risk of suicide.

Well-designed and consistent studies on MD and suicide in medical students should therefore be conducted to shed light on a warning of such importance and profound implications for teaching and learning in medical schools. This research originated in an ASR class when all students in a class asked to respond to the instrument as a clear distress call. This request extends to the present day, with each new class.

CONCLUSION

The prevalence of risk for mental disorders among medical students was 54.3% at the clinical level by the adult self report. The main risks of mental disorders observed were internalizing problems, anxiety, depression and avoidant personality / isolation.

The prevalence of suicide risk among medical students was 10.6%. The presence of risk for mental disorders was an independent predictor of Suicide risk, increasing it by 6 times. It was observed among students at risk of suicide a higher frequency of internalizing problems of the ASR and problems of anxiety, depression problems and avoidant personality of the DSM-oriented.

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