Supplementary: Identifying Psychiatric Manifestations in Outpatients with Depression and Anxiety: A Large Language Model-Based Approach

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Supplementary Table 1: The description of clinical-related features extracted from EMRs and DSM/ICD.

Group	Symptom Name	Symptom Description
Perception	Feeling Unreal	The individual feels that the surrounding environment, objects, or oneself appear unreal or distorted.
	Hyperesthesia	Ordinary sensory stimuli are perceived by the individual as unusually intense or unbearable.
	Haptic hallucination	The individual subjectively experiences tactile sensations such as being touched or pressed, but without corresponding objective stimuli.
	Visual hallucination	The individual sees objects or scenes that do not actually exist.
	Auditory pseudohallucination	The individual experiences auditory hallucinations but recognizes that these sounds do not originate from the external environment.
	Senestopathia	The individual feels an undefined, uncomfortable emotion or sensation arising from a specific area within their body.
	Comment Hallucination	The individual hears voices without an external source commenting on their actions or personality.
	Depersonalization	The individual's perception of themselves changes, feeling their identity or sense of existence to be unreal or detached from themselves.
	Derealization	The individual feels that the surrounding environment or the world has become unreal or strange, making it difficult to empathize and connect with it.
Emotion	Pessimism and hopelessness	The individual has a long-term negative attitude towards the future or life situation, feeling hopeless.
	Sadness	The individual experiences intense emotional depression and discouragement, usually associated with loss or pain.
	Impatience	The individual exhibits excessive impatience and anxiety when dealing with waiting, delays, or long processes.
	Worry	The individual exhibits persistent anxiety and unease about possible adverse situations or events in the future.
	Recurring thoughts of death	The individual frequently and unconsciously focuses their thoughts on death or things related to death.
	Excitement	The individual exhibits a high degree of emotional excitement, usually accompanied by behavioral activity and irritability.
	Anxiety	The individual experiences persistent tension, restlessness, worry, or fear, and usually finds it difficult to self-regulate.
	Panic	The individual experiences a sudden and intense fear, usually accompanied by physiological reactions such as rapid heartbeat and shortness of breath.
	Fear	The individual has an excessive, intense fear of certain situations, events, or things.
	Anhedonia	The individual is unable to experience pleasure or satisfaction from activities that were previously enjoyable.
	Tearing	The individual's tears flow involuntarily, usually accompanied by emotional fluctuations.
	Excessive worrying with anxious	The individual is unable to control frequent worries about potential future problems or crises, usually accompanied by anxiety.
	Uncontrollable restlessness	The individual finds it difficult to control persistent feelings of unease, usually accompanied by excessive worry and fear about the future.
	Guilt	The individual experiences self-blame and shame due to mistakes or failures.
	Apathy	The individual's mood changes dramatically and fluctuates greatly, and is easily affected by life events.
	Depression	The individual lacks the appropriate emotional response to external things or the environment, and emotional expression is significantly reduced.
	Perturbed and uneasy	The individual's mood is persistently low, accompanied by negative emotions such as sadness and disappointment.
	Anxiety and unease	The individual feels in a state of persistent anxiety, feeling nervous and uneasy about upcoming events.
	Irritability	The individual's emotions are more sensitive and fragile, and they are easily angered or triggered by external stimuli.
	Poor self-perception	The individual has a negative or poor emotional evaluation of their overall condition, often feeling physically and mentally unwell.
	Low self-evaluation	The individual feels inferior about their abilities, worth, or achievements, lacking confidence and self-affirmation.
	Decreased self-confidence	The individual's self-confidence declines, and they feel doubtful about their ability to complete tasks or cope with challenges.
	Self-blame	The individual continues to feel excessive guilt for their mistakes or failures, unable to forgive themselves.
Somatic Symptoms	Tremor	Rapid, involuntary muscle movements in localized areas or throughout the body, typically difficult to control completely.
	Diaphoresis	Excessive secretion of sweat on the individual's skin surface, often accompanying emotional fluctuations or tension.
	Nausea	The individual experiences gastric discomfort, potentially accompanied by the urge to vomit, inducing physical discomfort.
	Trembling	Involuntary shaking or quivering of localized areas or the entire body, potentially triggered by nervousness or cold.
	Abdominal discomfort	The individual experiences discomfort in the abdominal region, which may include sensations of pain, pressure, or other abnormal perceptions.
	Tachypnea	The individual's respiratory rate significantly increases, typically accompanying emotional tension or physical exertion.
	Feeling of Increased Muscle Tension	The individual subjectively feels muscle tightness, usually accompanying anxiety or emotional tension.
	Tension headache	Pain in the head region caused by mental stress or prolonged tension, typically presenting as a persistent dull ache.
	Xerostomia	The individual experiences dryness in the oral cavity due to lack of saliva secretion.
	Epigastric discomfort	The individual feels discomfort in the upper abdominal area, often accompanied by mild gastric distress or hunger sensations.
	Weight loss	Unexplained reduction in the individual's body weight, typically with significant changes over a short period.
	Weight gain	Notable increase in the individual's body weight over a short time, potentially related to uncontrolled eating or metabolic abnormalities.
	Lightheadedness	The individual experiences a sensation of heaviness in the head and unsteady gait, often accompanied by dizziness.
	Unable to relax	The individual remains in a persistent state of tension, finding it difficult to relax physically or mentally or enter a state of relaxation.
	Tachycardia	Abnormally rapid heart rate in the individual, typically accompanying anxiety or stress responses.
	Palpitations	The individual's self-perception of abnormal heartbeats, often accompanied by accelerated heartbeat, noticeable pulsations, or chest tightness.
	Somatization symptoms	The individual experiences physical symptoms without clear medical explanation, typically closely related to mental state.
	Somatic anxiety	Physical discomfort symptoms accompanying anxiety emotions in the individual, such as palpitations, sweating, dizziness, etc.
	Somatoform pain disorder	The individual experiences physical pain symptoms, although no clear organic pathology can be found through medical examination.
	Autonomic symptoms	Manifestations of autonomic nervous system dysfunction, such as tachycardia, sweating, dizziness, etc., often related to anxiety and stress responses.
	Psychomotor tension	The individual experiences involuntary tension or stiffness in the muscles, potentially accompanying anxiety or psychological stress.
Thought	Mind going blank	The individual suddenly experiences difficulty thinking, with an interruption in the thought process, falling into a brief state of mental blankness.
	Experience of being revealed	The individual experiences the sensation that their thoughts or emotions are known to others without being expressed verbally.
	Delusion of being followed	The individual has a persistent, unfounded belief that they are being pursued by others or non-human forces.
	Delusion of persecution	The individual holds an erroneous belief, without factual basis, that they are being maliciously harmed or unfairly treated.
	Delusion of being monitored	The individual believes they are under covert surveillance by external forces or others, despite a lack of concrete evidence.
	Ideas of reference	The individual persistently believes that others are discussing them behind their back, even in the absence of actual evidence.
	Delusion of reference	The individual firmly and irrationally believes in special connections between themselves and certain people or events.
	Delusion of jealousy	The individual holds an irrational belief that their intimate partner is unfaithful, despite the absence of clear evidence.
	Obsessive doubt	The individual experiences persistent doubt about their actions or decisions, despite having repeatedly verified them previously.
	Obsessive rumination	The individual experiences persistent, involuntary recollection of past events, finding it difficult to disengage from these thoughts.
	Obsessive cogitation	The individual engages in excessive and repetitive contemplation of issues with no practical significance, finding it challenging to cease this thought process.
	Obsessive impulse	The individual experiences strong, recurrent urges to carry out actions they recognize as unreasonable or inappropriate.
	Flight of thought	The individual experiences accelerated thought processes, with a rich variety of content and a constant influx of new ideas or plans.
	Thought derailment	The individual experiences scattered thinking, difficulty concentrating, and a tendency to jump from one unrelated thought to another.
	Inhibition of Thought	The individual's thought progression is markedly slowed, often requiring more time than usual to process information or make decisions.
	Accelerated Associative Thinking	The individual experiences a rapid increase in associated content during thought processes, with faster thought connections and often large leaps in association.
	Looseness of thought	The individual experiences a relaxation of thought processes, manifested as a lack of continuity or organization in thought content.
	Worthlessness	The individual feels they have no significance or value, often co-occurring with depressive states.
	Hopelessness	The individual feels there is no hope for the future, believing that future change or improvement is impossible.
	Helplessness	The individual feels powerless to change their current situation or control problems and events in their life.
	Negative ideation	The individual experiences recurrent negative thoughts, often involving negation or pessimistic projections about the future and life.
	Delusion of influence	The individual firmly believes they are being controlled or influenced by powerful external forces, unable to control their own actions or thoughts.
	Suicidal ideation with plan	The individual has detailed suicide plans, including considerations and preparations for timing, methods, and specific means.
	Delusion of guilt	The individual firmly believes they have committed an unforgivable crime or error, even in the absence of any evidence.
	Motor Slowness	Significant slowing of an individual's movements and behaviors, potentially manifesting as sluggishness in physical activities or daily routines.
	Avoidance behavior	Deliberate evasion of certain objects, situations, or people by an individual to prevent psychological or situational discomfort.
	Increased energy	Individual experiences a surge in physical and mental energy, demonstrating willingness and ability to engage in increased activities.

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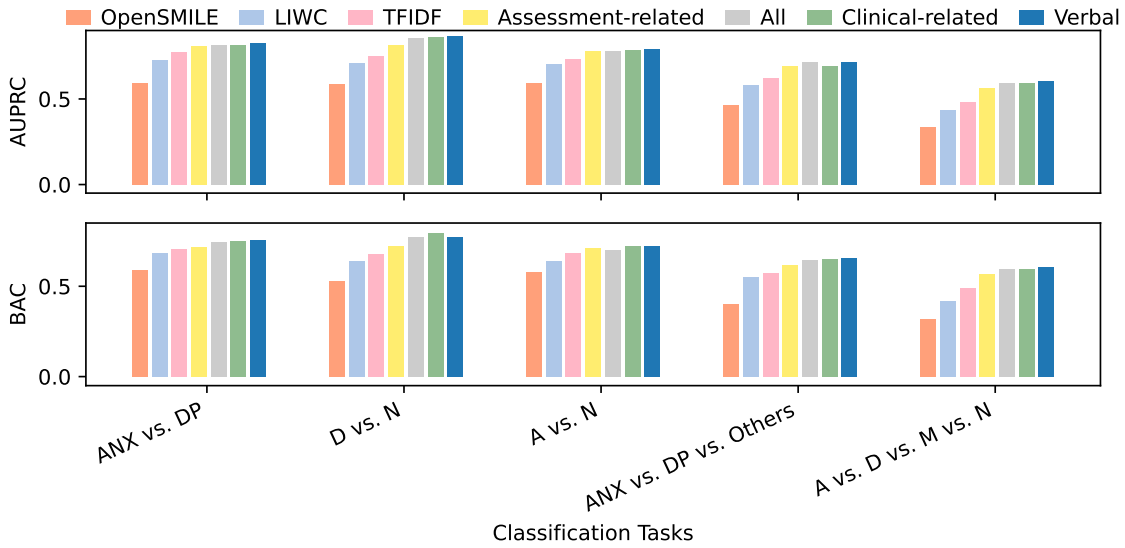
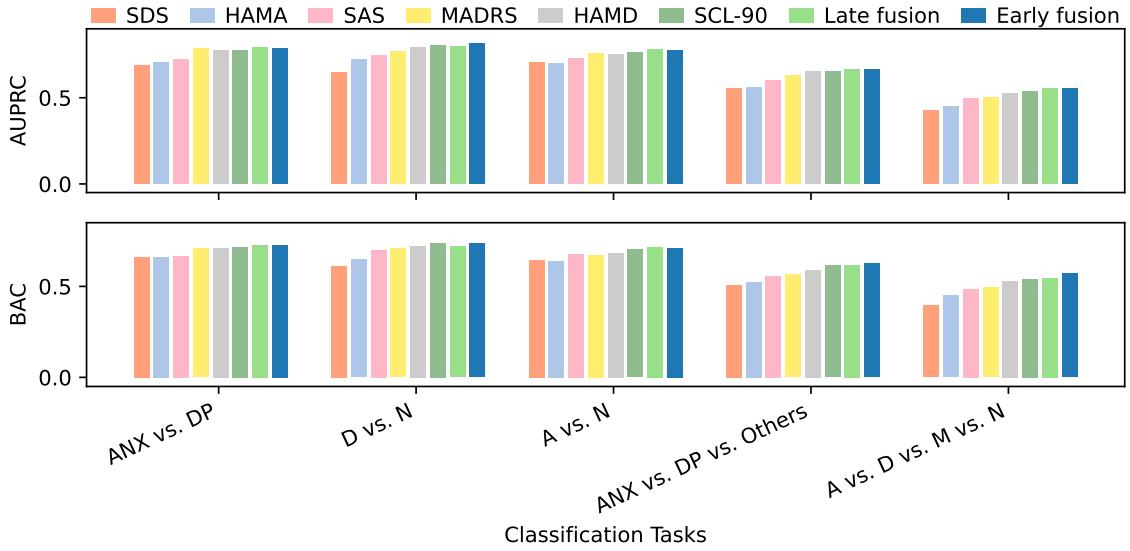
Table 1 continued from previous page

Group	Symptom Name	Symptom Description
	Decreased energy	Marked decrease in an individual's physical and mental energy, characterized by a lack of vitality for daily activities.
	Psychomotor excitement	Uncontrollable increase in an individual's psychological and physical activities, manifesting as elevated mood and increased actions.
	Psychomotor inhibition	Significant reduction in an individual's psychological and physical activities, characterized by depressed mood and behavioral slowness.
	Compulsive checking	Repetitive verification of completed tasks or situations by an individual, despite their established validity.
	Difficulty initiating sleep	Difficulty initiating sleep, typically manifesting as the prolonged time required to fall asleep.
	Decreased appetite	Significant decrease in an individual's desire for food intake, characterized by unwillingness or lack of initiative to obtain nourishment.
	Increased Appetite	Marked increase in an individual's food intake demands, with noticeably higher consumption than usual.
	Hypersomnia	Excessive sleep requirements experienced by an individual, frequently feeling drowsy and exhibiting prolonged sleep episodes in various settings.
	Non-restorative sleep	Poor sleep quality characterized by easy awakening and typically lacking the restorative feeling of deep sleep.
	Anhedonia	Lack of interest or motivation in previously enjoyable activities, commonly observed in depressive states.
	Decreased interest	Significant enhancement of interest in daily activities, hobbies, or novel experiences, accompanied by heightened emotional activity.
	Decreased libido	Marked reduction in an individual's interest in sexual activities, often accompanied by depressed mood or physical fatigue.
	Decrease in speech and activity	Significant reduction in an individual's speech and physical movements, exhibiting a state of slowness and passivity.
	Increase in speech and activity	Increased verbal output and more frequent, significantly increased physical movements, indicating emotional excitement.
	Suggestibility	High susceptibility to others' words or ideas, characterized by a lack of independent judgment and self-determination.
	Hypobulia	Decreased motivation and reduced enthusiasm, difficulty maintaining persistence towards goals or activities.
	Abulia	Complete lack of motivation or volition, characterized by persistent disinterest in goals and activities.
	Hyperbulia	Abnormally enhanced motivation and willpower in specific situations, excessive attachment to certain goals.
	Impulsive behavior	Sudden, difficult-to-control impulsive actions in certain situations, typically without rational consideration.
	Negative behavior	Exhibition of a series of negative behavioral responses, such as withdrawal, avoidance, or self-destructive tendencies.
	Self-harming behavior	Conscious self-harm, typically manifested through cutting, hitting, etc., aimed at alleviating psychological distress or gaining attention.
	Early Awakening	Waking earlier than usual with difficulty returning to sleep, often associated with anxiety or depressive states.
	Indecisiveness	Difficulty in making prompt decisions, often manifesting as repeated hesitation.
	Ambivalence	Evident hesitation in daily decision-making processes, characterized by lack of confidence and difficulty in reaching conclusions.
	Fatigue	Sensation of mental or physical exhaustion, often accompanied by feelings of weakness and desire for rest.
	Passive engagement	Lack of initiative in interactions with others, typically appearing passive and negative.
	Uncooperative engagement	Displaying an attitude of refusal to cooperate and collaborate in interactions with others.
Cognition	Intact Calculation Ability	Individual demonstrates normal capacity in mathematical computations and numerical tasks.
	Recent memory impairment	Individual exhibits difficulty accurately recalling events or information from the recent past.
	Intact comprehension and abstract thinking ability	Individual's ability to understand and engage in abstract thought appears normal, consistent with cognitive function.
	Intact Judgment Ability	Individual shows no significant cognitive or affective bias in decision-making processes; judgment appears intact.
	Hypoprosexia	Individual displays markedly decreased attention span, easily distracted or struggles to focus on specific tasks.
	Partial insight	Individual partially recognizes the presence of their illness or certain symptomatic abnormalities but lacks comprehensive understanding of their implications.
	Lack of insight	Individual struggles to recognize their illness or psychological abnormalities, denying the existence of any mental health issues.
Chief Complain	Irritability (in children and adolescents)	Children or adolescents react excessively to external stimuli, exhibiting emotional lability leading to anger or aversion.
	Irascibility (in children and adolescents)	Children or adolescents display a propensity for intense anger or temper outbursts in response to minor provocations or frustrations.
	Sense of impending doom	Individual experiences an intense fear and conviction of imminent death.
	Suspiciousness	Individual exhibits excessive distrust or skepticism towards others' motives or actions without reasonable basis.
	Impulsivity	Individual experiences strong behavioral urges and acts upon them rapidly without prior planning, potentially leading to risky outcomes.
	Overthinking	Individual engages in persistent, excessive thinking about certain events, struggling with decision-making, often accompanied by anxiety.
	Auditory verbal hallucinations	Individual perceives voices in conversation or commentary in the absence of actual auditory stimuli in the environment.
	Agitation	Individual exhibits heightened restlessness, irritability, and emotional fluctuations, often accompanied by physical hyperactivity.
	Rumination	Individual repeatedly dwells on a particular topic or idea without reaching new conclusions or finding resolution.
	Lags in response	Individual's response to external stimuli is significantly slower than normal.
	Social withdrawal	Individual tends to avoid social activities, demonstrating extreme introversion and preference for solitude.
	Feeling afraid	Individual experiences intense apprehension towards specific situations, events, or objects.
	Feeling of memory decline	Individual perceives a weakening in their ability to retain information, particularly regarding recent events.
	Feeling of tension	Individual experiences a high degree of mental or physical strain, finding it difficult to relax.
	Lethargy	Individual displays sluggishness or lack of enthusiasm for daily activities.
	Incoherent speech	Individual's speech is disorganized, lacking logical structure and difficult to comprehend.
	Feeling down	Individual exhibits persistent low mood and dissatisfaction, often accompanied by diminished interest in daily activities.
	Somatic complaints	Individual reports physical discomfort without clear medical explanation for the origin of symptoms.
	Reduced speech	Individual demonstrates a marked decrease in verbal output, showing reluctance to engage in conversation.
	Insomnia	Individual struggles to obtain adequate sleep, manifesting as difficulty falling asleep, staying asleep, or returning to sleep after waking.
	Negativism	Individual maintains a pessimistic attitude towards life or events, displaying a negative and unmotivated mindset.
	Pressured speech	Individual exhibits elevated mood, characterized by increased verbalization, rich content, and rapid speech.
	Unable to control emotion	Individual is prone to anger, overreacting to minor stimuli or frustrations, demonstrating emotional instability.
	Fidget	Individual experiences anxiety and restlessness, struggling to remain still, often manifesting as frequent standing, pacing, or fidgeting.



Supplementary Figure 1: The classification results for different feature sets. Abbreviation: "ANX" represents Anxiety Disorder, "DP" represents depression Disorder, "A" represents participants with anxiety symptoms, "D" represents participants with depressive symptoms, "M" represents participants with mixed anxiety and depressive symptoms, and "N" represents participants without anxiety and depressive symptoms.



Supplementary Figure 2: The classification results for different assessment scales. Early fusion combines features before classification, and late fusion merges individual classifier outputs by simply averaging the output probabilities. Abbreviation: "ANX" represents Anxiety Disorder, "DP" represents depression Disorder, "A" represents participants with anxiety symptoms, "D" represents participants with depressive symptoms, "M" represents participants with mixed anxiety and depressive symptoms, and "N" represents participants without anxiety and depressive symptoms.

Prompt Template for Assessment-Related Features Generation (Peer-Rating Scale)

This is a dialogue between a psychiatrist and a patient. Based on the following conversation, please rate the symptom severity according to the {scale} scale, referring to the symptom description and symptom evaluation description:

Interview Dialogue

{dialogue}

Patient: {age}-year-old {gender}
Symptom to evaluate: {symptom}
Symptom description: {symptom_desc}
Scoring range: {score_range}
Symptom evaluation description: {symptom_desc}
Please review the dialogue content provided above: determine whether the specified symptom was mentioned in the conversation; If the symptom was not discussed at all, respond with 'null'; If the symptom was indeed mentioned, assign an appropriate score based on the symptom evaluation description provided; Provide only the numerical score without any explanation or reasoning for your choice.
The scoring rating is:

Prompt Template for Assessment-Related Features Generation (Self-Rating Scale)

You are playing the role of a patient who has just finished an interview with a psychiatrist. Your conversation content is as follows:

Interview Dialogue

{dialogue}

The patient you are portraying is a {age}-year-old {gender}.
After the conversation, you need to complete a {scale} self-assessment scale.
Symptom to evaluate: {symptom}
Symptom description: {symptom_desc}
Scoring range: {score_range}
Symptom evaluation description: {score_desc}
Please provide your assessment. If this symptom wasn't discussed in your conversation, please answer 'null'. If it was mentioned, please provide an appropriate score based on the description of the symptom evaluation. Give only the score without explaining the reasoning behind it.
The scoring rating is:

Supplementary Table 2: Prompt templates for assessment-related feature generation.

Prompt Template for Clinical Annotations Extraction from EMRs

This is a record of the chief complaint, present illness history, and psychiatric examination of a patient documented by a psychiatrist:
EMR: {EMR}
The patient is a {age}-year-old {gender}. Based on the information recorded by the doctor, determine whether the record mentions that the patient exhibits {symptom_name} symptoms. Please respond with either "Yes" or "No", without any explanation. You need to make a rigorous judgment. You should only respond with "Yes" if the symptom or its synonyms are explicitly mentioned in the case !!

Prompt Template for Clinical Interview Dialogue Quality Evaluation

The following is a psychiatric diagnostic dialogue. In the field of mental health, doctors perform psychiatric evaluations through interviews. You need to carefully analyze the dialogue and assign a score based on the evaluation criteria:

Consultation Dialogue

{dialogue}

Next, please rate the quality of the consultation dialogue according to the following psychiatric evaluation quality criteria:
Patient-centered communication: During the psychiatric assessment, the focus should be on the patient's concerns. The patient's narrative should be the main focus, reporting their medical history and encouraging them to describe their personal experiences and feelings in their own words. The conversation should be directed to key symptoms when appropriate. The examiner should avoid asking about symptoms of interest only from the doctor's perspective without considering the patient's concerns. It is crucial to avoid questioning the patient like a police officer interrogating a suspect.
Respect and care for the patient: Throughout the psychiatric assessment, the examiner's actions and words should demonstrate respect and concern for the patient. However, it is important to note that direct verbal expressions of respect and concern are often of limited effectiveness.
Effective communication skill: The success of communication depends largely on the patient's feelings and assessments. If the patient feels that the doctor does not understand them, does not allow them to fully express themselves, or the assessment is interrupted by communication problems, it indicates that there is a problem with the doctor's communication skills. Common communication skills include observation, listening, and asking questions.
Abide by the "three no's" principle: The "three no's" principle of psychiatric assessment refers to: no argument, no interruption, and no moral/legal judgment of the patient. In a psychiatric assessment, the patient's mental symptoms may affect his or her language, emotions, behavior, and even daily living habits. Therefore, the assessor should sympathize with these pathological manifestations, avoid arguing with the patient, and avoid scolding or discriminating against the patient. The assessor should remain neutral and emotionally stable.
Flexible conversational approach: During the assessment, patients should be encouraged to speak freely and be provided with appropriate guidance. Topics and questions should be tailored to the individual, and the timing of questions is also important. Be good at guiding the conversation naturally. In psychiatric assessments, it is best to ask more open-ended questions. In addition, patients should not feel that they are being ordered around or interrogated. Questions that may cause anxiety in patients should usually be asked at the end, and sensitive questions should not be asked too early before a good relationship with the patient is established.
Based on these five criteria, each criterion was scored on a 10-point scale, with 6 points and above indicating that the doctor followed the corresponding guidelines and 1-5 points indicating that the doctor violated the relevant regulations.
Your response should be in JSON format, with the following structure: "1": score, "2": score, "3": score, "4": score, "5": score. Please return the answer JSON content directly without any additional content.

Prompt Template for EMR Quality Evaluation

The following is a clinical written by a psychiatrist for a patient, which includes two sections: Chief Complaint and Present Illness History. Please carefully analyze the quality of the clinical and assign a score based on the evaluation criteria:
Chief Complaint: {ChiefComplaint}
Present Illness History: {PresentIllnessHistory}
Chief Complaint: Should reflect the main symptoms of the disease, the onset speed, and the course of the condition.
Present Illness History: Describes the clinical manifestations of the onset and development of the disease chronologically, up to the current state of the patient at the time of admission. The key elements include:

1. **Cause or precipitating factors:** If there are any mental stressors, the nature, intensity, and duration of the stressor should be described. Determine if the patient's workplace environment is related to the onset of symptoms, and assess for any occupational poisoning, physical illnesses, major surgeries, or drug overdoses/allergies.
2. **Onset speed and early symptoms:** In clinical practice, the onset is generally classified as acute, subacute, or chronic based on the time from a relatively normal mental state to the appearance of significant psychiatric disorders. Onsets within 2 weeks are considered acute, 2 weeks to 3 months as subacute, and more than 3 months as chronic. The onset speed guides diagnosis and prognosis. For example, delirium tends to present acutely, whereas dementia usually has a chronic onset. Acute cases of schizophrenia generally have a better prognosis compared to chronic ones.
3. **Course of the illness:** Based on the duration of the disease, describe the progression and evolution of the illness chronologically day-by-day, month-by-month, or year-by-year. Descriptions should be objective, and the continuity of the disease process should be noted. Clinical symptoms of diagnostic significance should be recorded in detail with examples.
4. **General condition after onset:** Discuss changes in learning ability, work, daily habits, and sleep according to the specific disease. Also, note the patient's interactions with their environment and their attitude towards recognizing their abnormalities, as these factors significantly aid in diagnosis. Be sure to inquire about any incidents of self-harm, harm to others, or destructive behavior during the illness. Information on menstrual cycles and sexual activity should also be gathered.
5. **Diagnosis and treatment status:** For recurrent cases, record previous diagnoses, the number of hospitalizations, treatments, and the effectiveness of those treatments, all of which serve as a reference for ongoing care.

You need to assign a score for each of the elements mentioned above. The scale is out of 10, where a score of 6 and above means the doctor adhered to the corresponding guideline, and a score of 1-5 indicates that the doctor violated the respective rule. Your response should be in JSON format with the following structure: {"Chief Complaint": score, "Present Illness History 1": score, "Present Illness History 2": score, "Present Illness History 3": score, "Present Illness History 4": score, "Present Illness History 5": score}. Please return the answer directly without any additional content.

Supplementary Table 3: Prompt templates used for the clinical-related annotations generation, dialogue quality evaluation, and EMR quality evaluation.

Prompt Template for Clinical-Related Features Generation

你是一个优秀的人工智能助手，能够通过医生和患者的问诊对话，辅助医生判断患者是否表现出某个症状。
以下是问诊对话的内容:

问诊对话

{dialogue}

患者是一位{age}岁的{gender}性
请判断患者是否表现出{symptom}的症状，其含义为：{symptom_desc}
用“是”或者“否”直接进行作答，无需进行解释。你的判断是:

Supplementary Table 4: Prompt templates for clinical-related feature generation (Chinese version).

Prompt Template for Assessment-Related Features Generation (Peer-Rating Scale)

这是一个精神科医生和患者的对话，请根据以下对话给患者的{scale}量表，参考症状描述和症状评估描述，对条目进行打分评估:

问诊对话

{dialogue}

患者是一位{age}岁的{gender}性
目前你需要评估症状:{symptom}, 症状描述为:{symptom_desc}
评分范围为:{score_range}, 症状评估描述:{score_desc}
请你根据上面对话内容，判断对话中是否提到了该症状。如果你们刚才的对话中没有谈到这个症状，请回答null；如果提到了，请根据症状评估描述，返回合理的评分。直接给出评分即可，无需给出评分原因。

Prompt Template for Assessment-Related Features Generation (Self-Rating Scale)

你在扮演一位患者，你刚刚和精神科医生进行完问诊对话，你们的谈话内容为:

问诊对话

{dialogue}

你扮演的患者是一位{age}岁的{gender}性
谈话结束后，你需要做一个{scale}自测量表，目前你需要评估的症状为: {symptom}, 症状描述为:{symptom_desc}
评分范围为:{score_range}, 症状评估描述:{score_desc}
请给出你的判断，如果你们刚才的对话中没有谈到这个症状，请回答null；如果提到了，请根据症状评估描述，返回合理的评分。
直接给出评分即可，无需给出评分原因。

Supplementary Table 5: Prompt templates for assessment-related feature generation (Chinese version).

Prompt Template for Clinical Annotations Extraction from EMRs

这是一份精神科医生记录的来诊患者的主诉、现病史、精神检查:
[病例开始]
{EMR_content}
[病例结束]
患者是一位{age}岁的{gender}性
请你根据上面医生记录的内容，判断记录中是否提到患者表现出{symptom}症状，请直接回答是或者否，不需要进行解释。
你需要严谨的给出判断，只有在病例中出现了症状的名称或者同义词时，你才可以回答是！！

Prompt Template for Clinical Interview Dialogue Quality Evaluation

以下是一段精神科问诊对话，在精神疾病领域，医生会通过问诊来实施精神检查，你需要对仔细分析对话，并根据评价标准来给出评分:

问诊对话

{dialogue}

接下来，请你对问诊对话的质量进行打分，打分时参考如下精神检查质量评价:
1.以被检查者为中心的交流方式
精神检查时应尽量围绕被检查者所关心的问题进行，应采用被检查者主导的病史报告方式，鼓励他们用自己的语言讲述个人经历和体验，并在适当的时机将话题引导至对关键症状的描述上。检查中，应避免不顾被检查者的关注点而直接就医生所关注的症状进行询问，切记不要像询问犯罪嫌疑人的警察那样向被检查者提问。
2.尊重和关注患者
检查者在精神检查过程中的行为及言语中表达，应该体现出对被检查者的尊重和关注。但需要检查者注意的是，用言语直接表达的尊重和关注往往作用有限。
3.运用沟通技巧
沟通的效果如何主要靠被检查者的感受和评价，如果被检查者认为医生没有理解他，没有让他充分表达或检查过程因为沟通的原因而中断，均属于沟通技巧问题。观察、倾听、提问是常用的沟通技巧。
4.坚持“三不”原则
精神检查的“三不”原则是指“不陷入争辩、不轻易打断、不对患者进行法律和道德评判”。在精神检查过程中，被检查者的精神症状会影响其语言、情绪、行为方式甚至生活习惯，作为检查者应该理解这些病态表现，不要与被检查发生争执，或训斥、歧视他们，要保持中立和情绪的稳定。
5.灵活交谈方式
检查过程中，鼓励患者自由阐述，适当引导。谈话内容与询问要因人而异，提问要注意时机，善于因势利导。精神检查中，最好多问开放性问题。另外，不要让被检查者感到命令或被审问。凡是可能引起被检查者疑虑不安的问题，一般放在最后提问，在没有与被检查者建立良好的沟通关系前，不应冒昧的提出。
你需要针对以上5点，每一点分别给出分数。评分为10分制，6分及以上代表医生遵守了响应的守则；1-5分代表医生违反了上述规则。
你的回答格式为一个json，格式为{“1”: score, “2”: score, “3”: score, “4”: score, “5”: score}，请直接返回答案，不要输出其他内容。

Prompt Template for EMR Quality Evaluation

以下是一份精神科医生，为来访患者撰写的病例的，包含主诉和现病史两部分，请你仔细分析病例的质量，并根据评价标准来给出评分:
[病例开始]
主诉: {ChiefComplaint}
现病史: {PresentIllnessHistory}
[病例结束]
主诉:体现疾病的主要表现、起病缓急及病程。
现病史:按时间先后描述疾病起始及其发展的临床表现，直至入院时的现状。主要包括以下内容:
1. 起病原因或诱因：如有精神刺激，应说明刺激的性质、强度和持续时间；从事工作的环境与发病有无关系，注意有无职业性中毒；有无躯体疾病、重大手术或药物过量、过敏等
2. 起病缓急及早期表现：临床工作中一般按照从精神状态大致正常到出现明显精神障碍的时间长短分为急性、亚急性和慢性起病，时间在2周之内者为急性起病，2周到3个月为亚急性起病，3个月以上为慢性起病。起病急缓对疾病的诊断和预后判断有提示意义。如谵妄多为急性起病，而痴呆多为慢性起病；急性起病的精神分裂症较慢性起病者预后好。
3. 发病过程：根据病程的不同，可按时间先后，逐日、逐月或逐年地描述疾病的发展和演变过程。描述表现时应客观，注意病程的连贯性。对有诊断意义的临床症状需详细记载并举例说明。
4. 发病后的一般情况：如学习、工作、饮食起居及睡眠等，可根据不同的病种酌情叙述。此外，与周围环境的接触情况、对自身异常的认识态度等都对疾病的诊断有重大意义。不要遗漏对病中有无自伤、伤人、毁物等情况的询问，以便今后护理防范。月经周期及性生活情况也应询问。
5. 诊疗情况：若为复发病例，对既往的诊断、住院次数、治疗及疗效应详细记载，以供诊治的参考。
你需要根据以上标准的每一点分别给出分数。评分为10分制，6分及以上代表医生遵守了响应的守则；1-5分代表医生违反了上述规则。你的回答格式为一个json，格式为{”主诉”: score, ”现病史1”: score, ”现病史2”: score, ”现病史3”: score, ”现病史4”: score, ”现病史5”: score}，请直接返回答案，不要输出其他内容。

Supplementary Table 6: Prompt templates used for the clinical-related annotations generation, dialogue quality evaluation, and EMR quality evaluation (Chinese version).

Prompt Template for ANX/DP classification

You are an artificial intelligence expert in the field of psychiatry, and your current objective is to understand dialogues between psychiatrists and patients, and to assist physicians in making diagnoses. The patient may only be suffering from one of the following two mental health conditions:
1. Anxiety
2. Depression
Below is the dialogue between the doctor and patient:

Interview Dialogue

{dialogue}

Please determine which disorder the patient is suffering from, and provide your answer simply as either 1 or 2.

Prompt Template for ANX/DP classification (Chinese version)

你是一个精神科领域的人工智能专家，你现在的目标是理解精神科医生和患者的对话，并辅助医生做出诊断。患者只可能患有以下两种精神疾病之一：
1. Anxiety
2. Depression
下面是医生和患者的对话：
[问诊开始]
{dialogue}
[问诊结束]
请判断患者患有的疾病，直接给1或者2即可。

Supplementary Table 7: Prompt templates for ANX/DP classification.

Supplementary Table 8: Literature Review of related data-driven studies on identifying depression (DP) and general anxiety disorders (ANX).

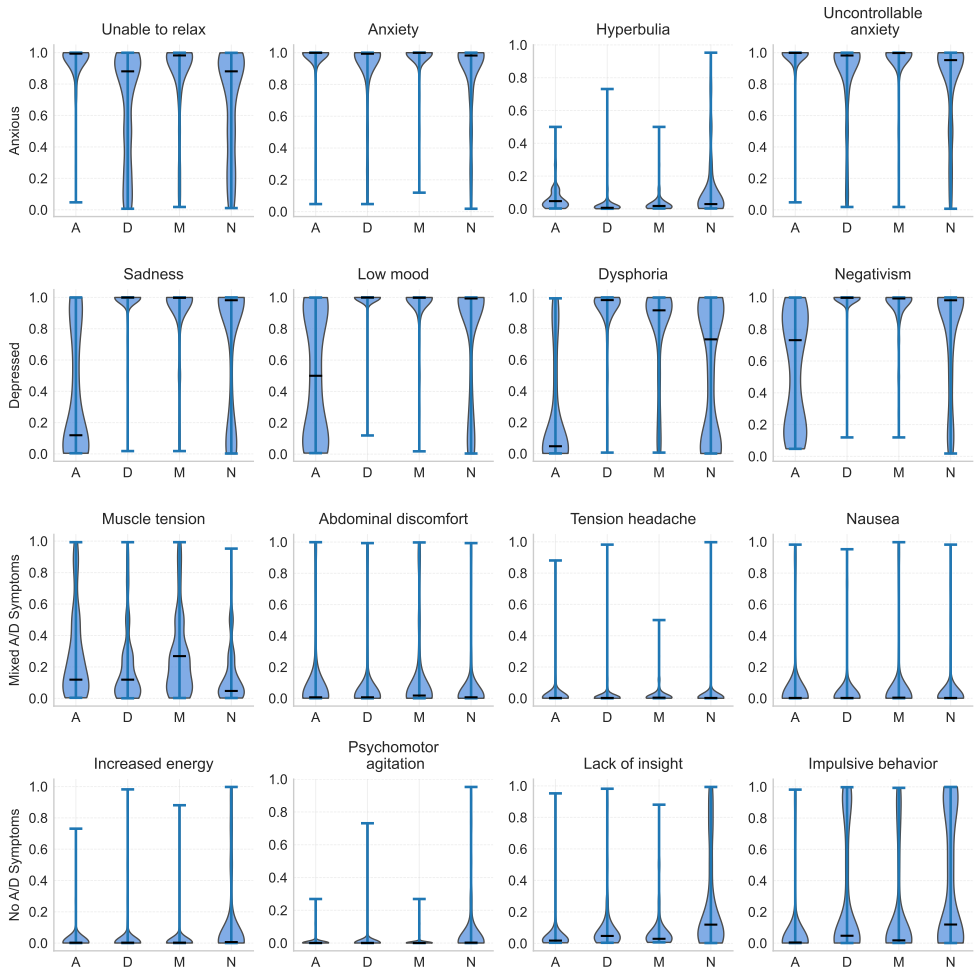
Task	Aspect	Reference	Year	Dataset	Data Source	Computational Features	Classifier	Performance (ACC/BAC/AUC)
DP vs. No-DP	Verbal	Qureshi SA, et al. [17]	2020	AVEC dataset: 138 samples split into 5 classes (normal, mild, moderate, moderate-severe, and severe)	Interview transcriptions of human-computer interaction experiment	Sentence encoding network	LSTM	ACC=66%, F1=0.60 (5-class classification, with CV)
	Non-verbal	Scherer S, et al.[21]	2013	AVEC dataset: DP-severe = 18; DP-low = 18	Audio and video recordings of human-computer interaction experiment	Acoustic features	SVM	F1-avg=0.738; ACC=75%
		Harati A, et al.[6]	2021	Ellipsis dataset: 12872 sessions from 10,932 speakers (6450F and 4482M)	Audio recordings of response of open ended questions.	Acoustic features	CNN/LSTM	PHQ-8<10 vs. PHQ-8 $\leq$ 10: AUC=0.79
		Espinola CW, et al.[5]	2021	DP = 22 (17M, 5F); HC = 11(6M, 5F)	Audio recordings of medical evaluation interview	Acoustic features	Various of Classifiers	ACC=60% to 89.14%
		Low L-SA, et al.[14]	2011	DP = 68 (19M, 49F); HC = 71 (27M, 44F) (between 14 and 18 years old)	Video recordings of family interaction	Acoustic features	GMM-SVM	ACC = 67-87% (with CV)
		Ooi KEB, et al.[16]	2013	DP (at risk) = 15 (6M, 9F); HC (not at risk) = 15 (6M, 9F) (all adolescent, age 12 to 13 years)	Audio recordings of child-adult interaction	Acoustic Features	GMM/Bayesian classifier	ACC = 73% (with CV)
		Huang Z, et al.[8]	2020	SH2-FS dataset: Train: DP = 97; HC = 364 Test: DF=23; HC=105 AVEC dataset: Train: 107; Test: 35	Audio recordings of free speech in naturalistic environments	Acoustic Features	CNN	AVEC dataset: BAC=91%, F1-avg=0.915; SH2-FS: BAC=73%, F1-avg=0.625
		Sanchez MH, et al.[20]	2011	DP-severe = 16; DP-low = 16	Audio recordings of structured clinical interview	Prosodic and Spectral Features	SVM	ACC = 81.3% (with CV)
		Taguchi T[22]	2018	DP = 36 (22M, 14F); HC = 36(16M, 20F)	Audio recordings of reading out the number and verbal fluency task	Second dimension of MFCC	SDA	ACC = 81.9% (no CV)
	Multiple modalities	Joshi J, et al.[10]	2013	BlackDog dataset: DP = 30; HC = 30	Audio and video recordings of clinical interview	Audio: acoustic features; Video: Spatio-temporal descriptor	SVM	Audio: ACC = 78.3 to 83.3%; Video: ACC = 78.8 to 81.7%; Audio + Video = 66.7 to 91.7% (no CV and obtained by fine-tuning the parameters)
		Lu Y, et al.[15]	2020	Ellipsis dataset: 16,000 sessions from roughly 11,000 speakers	Audio recordings of response of open ended questions.	Acoustic model and NLP model	Acoustic: CNN/LSTM NLP: ULMFiT method	PHQ-8<10 vs. PHQ-8$\leq$10: Acoustic: AUC=0.803 NLP: AUC=0.830
		Alghowinem S, et al.[1]	2015	BlackDog dataset: DP = 30; HC = 30(30M, 30F) Pitt dataset: DP-severe = 19; HC(Symptom-free) = 19(14M, 24F) AVEC dataset: DP-severe = 16; DP-low = 16 (9M, 23F)	BlackDog dataset: Audio and video recordings of open ended questions interview. Pitt dataset: Audio and video recordings of HRSD clinic interview. AVEC dataset: Audio/Video recordings of human-agent interaction	Eye activity and head pose	SVM	BlackDog: ACC=76.7% Pitt: ACC=94.7% AVEC: ACC=68.8% All three combined: ACC=73.1 (with CV)
		Dibeklioğlu H, et al.[4]	2015	Pitt dataset: DP-severe = 58; DP-low = 37 (multi-session data)	Audio and video recordings of HRSD clinic interview.	Facial movement, head movement, and Audio	LR	Facial: ACC=81.44% Head: ACC=79.59% Audio: ACC=69.73% All three combined: ACC=88.93% (with CV)
		Valstar M, et al.[25]	2016	DAIC-WOZ (NA)	Audio/Video recordings of human-agent interaction	Audio: acoustic features; Video: facial and eye expressions	SVM	Test data: Audio: F1-avg = 0.50; Video: F1-avg = 0.72; Audio + Video: F1-avg = 0.72
		Alghowinem S, et al.[2]	2018	BlackDog dataset: DP = 30; HC = 30	Audio and video recordings of open ended questions interview.	Audio: acoustic and conversational features; Video: Eye and heald movement features	SVM	Audio: BAC = 81.7%; Video: BAC = 63.3 to 78.3%; Audio + Video = 63.3 to 86.7% (with CV)
		Joshi J, et al.[10]	2013	BlackDog dataset: DP = 30; HC = 30	Audio and video recordings of open ended questions interview.	Facial and upper body movement	SVM	Facial: ACC=71.%, F1 = 0.73; Body movement: ACC=76.7%, F1=0.8 (with CV)
		Yang L, et al.[27]	2016	AVEC dataset: DP-severe = 7; DP-low = 28	Audio/Video recordings of human-agent interaction	Facial expression, facial movement features	SVM	Test Set: F1=0.724; BAC=75.4%;
		Xu, et al.[26]	2023	DP = 50; SCZ = 103; HC = 75	Audio/Video recordings of semi-structured interview	Text: linguistic and semantic features Audio: acoustic and conversational features; Video: facial expression Kinect: body movement	Various of Classifiers	DP vs. HCs: BAC=82.3%; AUPRC=0.879

Continued on next page

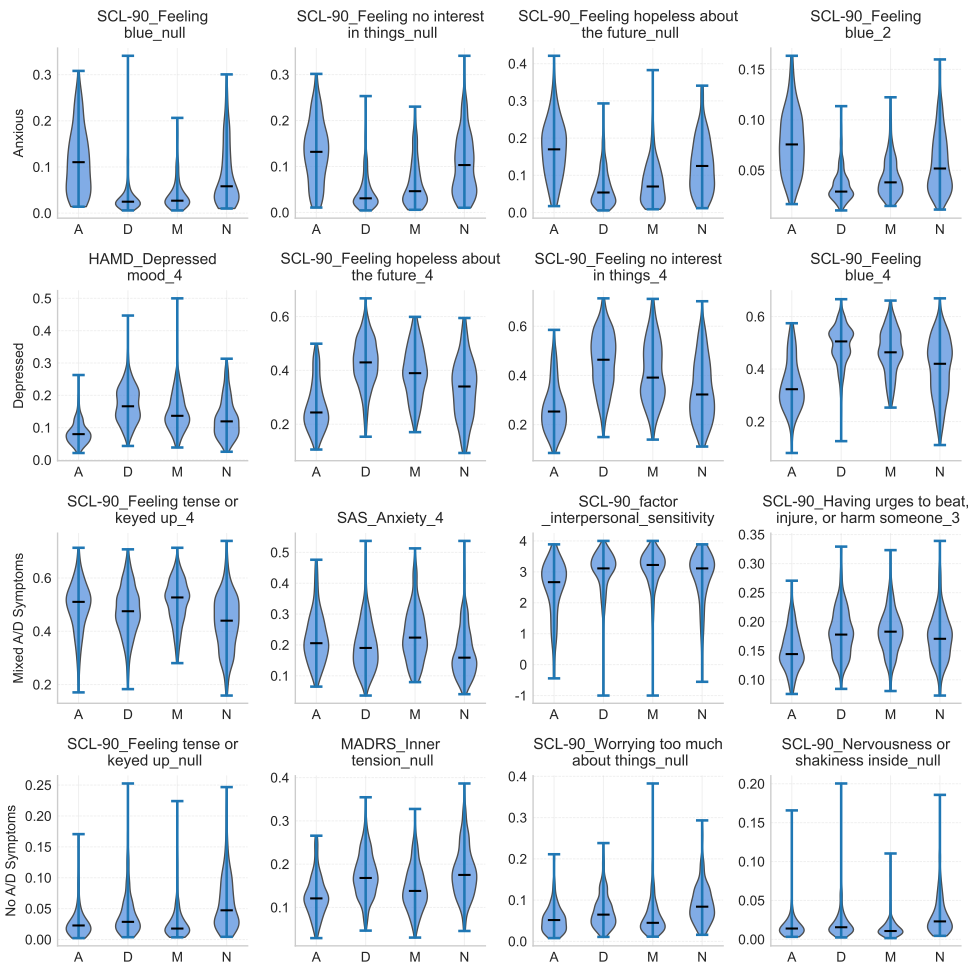
Table 8 continued from previous page

Task	Aspect	Reference	Year	Dataset	Data Source	Computational Features	Classifier	Performance (ACC/BAC/AUC)
ANX vs. No-ANX	Text	Teferra, B. G. et al.[23]	2023	ANX-severe = 620; ANX-low = 1380	Transcripts of online interview audio recordings	Linguistic features	LR; Transformer	Test set: AUROC = 0.64
		Yu, Y. et al.[28]	2023	1039 users	Social media posts	Linguistic features	SVM	SAS Pearson's r=0.322
		Kim, J. et al.[11]	2020	633385 posts with ANX/DP labels	Social media posts	Linguistic features	GB; CNN	DP vs. No-DP: ACC=75.1% ANX vs. No-ANX: ACC=77.8%
		Burkhardt, H. et al.[3]	2022	6,500 Patients	Therapy dialog	Linguistic features; Sentence encoding network	RF	Test set: AUROC = 0.652; F1 = 0.444
	Speech	Kwon, N. et al.[12]	2022	ANX-severe = 241; ANX-low = 50	Call recording	Acoustic Features; i-vector; x-vector	MLP; CNN	BAC = 62% (with CV)
	Multiple modalities	Jiang, Z. et al.[9]	2024	ANX-severe = 16; ANX-low = 49	Audio-visual recordings of remote interviews	Linguistic features; semantic features; acoustic features; demographics; facial landmarks	GB	LLAMA-65B: AUROC = 0.64; ACC = 74% Acoustic: AUROC = 0.53; ACC = 60% Voted: AUROC = 0.72; ACC = 75%
DP vs. ANX	Cognition	Richter, T. et al.[19]	2020	DP/ANX-severe = 59; DP/ANX-low = 66	Cognitive–behavioral tasks	Behaviour features	DT	DP/ANX-severe vs. DP/ANX-low: ACC = 70% ANX-severe vs. DP-severe: ACC = 71%
		Richter, T. et al.[18]	2021	86 Patient with ANX and/or DP	Cognitive–behavioral tasks	Behaviour features	RF	ANX/DP vs. HC: SPE = 76.81%; SEN = 69.66% ANX vs. DP: ACC=73.4%
	Questionnaire	Liu, K. et al.[13]	2022	DP = 26; ANX = 26	Three symptom questionnaires	Scale elements	SVM	BAC = 55%-81%
		Hilbert, K. et al.[7]	2017	ANX = 19; DP = 14	Symptom questionnaires	Scale elements	SVM	ACC = 67.5%
		Tennenhouse, L. G. et al.[24]	2022	ANX = 96; DP = 64	Patient-reported	Report items	RL; MLP	AUROC = 0.79–0.83

CV = Cross Validation; ACC = Accuracy; F1 = F1 Score; BAC = Balanced Accuracy; SVM = Support Vector Machine; CNN = Convolutional Neural Network; LSTM = Long Short-Term Memory; GMM = Gaussian Mixture Model; MFCC = Mel-frequency Cepstral Coefficients; SDA = Stacked Denoising Autoencoder; NLP = Natural Language Processing; HRSD = Hamilton Rating Scale for Depression; LR = Logistic Regression; RF = Random Forest; GB = Gradient Boosting; MLP = Multi-Layer Perceptron; DT = Decision Tree; SPE = Specificity; SEN = Sensitivity; AUROC/AUC = Area Under the Receiver Operating Characteristic Curve



Supplementary Figure 3: Violin plots of the distribution of top four silent clinical-related features (p-value < 0.01) across diagnostic groups (Anxious [A], Depressed [D], Mixed Anxiety/Depression [M], and No Anxiety/Depression [N]). Each feature, identified in the plot titles, was selected based on statistical significance (lowest p-values) within its respective diagnostic group and exhibited higher median values than other groups.



Supplementary Figure 4: Violin plots of the distribution of four silent assessment-related features (p-value < 0.01) across diagnostic groups (Anxious [A], Depressed [D], Mixed Anxiety/Depression [M], and No Anxiety/Depression [N]). Each feature, identified in the plot titles, was selected based on statistical significance (lowest p-values) within its respective diagnostic group and exhibited higher median values than other groups. Feature nomenclature follows the format: Scale_SymptomName_Rating, where a 'NULL' rating indicates the absence of symptom identified by LLM.

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