The Mini-International Neuropsychiatric Interview (M.I.N.I.): The Development and Validation of a Structured Diagnostic Psychiatric Interview for DSM-IV and ICD-10

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The Mini-International Neuropsychiatric Interview (M.I.N.I.) is a short structured diagnostic interview, developed jointly by psychiatrists and clinicians in the United States and Europe, for DSM-IV and ICD-10 psychiatric disorders. With an administration time of approximately 15 minutes, it was designed to meet the need for a short but accurate structured psychiatric interview for multicenter clinical trials and epidemiology studies and to be used as a first step in outcome tracking in nonresearch clinical settings. The authors describe the development of the M.I.N.I. and its family of interviews: the M.I.N.I.-Screen, the M.I.N.I.-Plus, and the M.I.N.I.-Kid. They report on validation of the M.I.N.I. in relation to the Structured Clinical Interview for DSM-III-R, Patient Version, the Composite International Diagnostic Interview, and expert professional opinion, and they comment on potential applications for this interview.

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DEVELOPMENT

Structured diagnostic interviews are being used with increasing frequency in psychiatry. First used to standardize data collection in psychiatric epidemiology studies, structured diagnostic interviews have now become the norm for ensuring that patients who enter multicenter clinical trials consistently meet diagnostic criteria across sites. More recently, in response to demands for accountability in the delivery of clinical care, structured clinical interviews are being adopted to ensure diagnostic precision for outcome tracking in nonresearch settings. In contrast to the usual clinical interview, structured diagnostic interviews allow comparisons across clinical centers and have the capacity to reduce variability in diagnosis in the interest of improving quality of care.

History of Psychiatric Structured Interviews

Figure 1[1–12] lists the most widely used psychiatric structured interviews in the order in which they appeared over the past 40 years, grouped by length of administration time.

The Present State Examination (PSE), constructed by Wing and colleagues in 1959 and modified in at least nine subsequent editions,[22,2] was the first standardized structured clinical interview to be adopted on an international basis in psychiatry. Its use grew from a concern that patients with similar ailments were being given different diagnostic labels in different countries. There was a need to get different groups to agree to speak the same diagnostic criteria. The PSE operationalized these diagnostic criteria for the clinical interview. This contribution was a major stimulus to international collaborative studies in psychiatry and promoted the adoption of international criteria for psychiatric diagnosis.

The evolution of structured diagnostic interviews and their level of sophistication paralleled the evolution of in-

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Figure 1. Time Duration of Structured Psychiatric Interviews, Listed in Order of Creation*

	Long (45 minutes or longer)	Medium (15 minutes)	Short (5–10 minutes)
Older	PSE		
	DIS		
	SADS		
	SCID		SDDS
	CIDI		PRIME-MD
Newer	M.I.N.I.-Plus	M.I.N.I.	M.I.N.I.-Screen

*Abbreviations: PSE = Present State Examination; DIS = Diagnostic Interview Schedule; SADS = Schedule for Affective Disorders and Schizophrenia; SCID = Structured Clinical Interview for DSM-III-R diagnoses; CIDI = Composite International Diagnostic Interview for ICD-10; PRIME-MD = Primary Care Evaluation of Mental Disorders; SDDS = Symptom-Driven Diagnostic System for Primary Care; M.I.N.I. = Mini-International Neuropsychiatric Interview.

ternationally acceptable diagnostic criteria and the increase in the predictive power of these criteria. Since structured diagnostic interviews were first developed in academic centers, they reflected the academician's interest in detail, accuracy, and precision. The downside of this detailed approach was that many of the early interviews were long and often difficult and cumbersome to use. They required extensive training and often also called for experience and technical expertise in psychiatry or psychology. Frequently, they collected data on a large number of disorders and disorder subtypes, reflecting the unique interest of the individual developers rather than a data-driven plan. As a result, these interviews were costly to administer. All of the above problems became obstacles to their widespread clinical use. Table 1[1–12] outlines the characteristics of each interview.

With the shift of the primary care/family medicine sector to that of a gatekeeper of healthcare and increasingly that of a provider of psychiatric treatments, the need for a very short psychiatric screening instrument increased. The Symptom-Driven Diagnostic System (SDDS),[11] the Primary Care Evaluation of Mental Disorders (PRIME-MD),[12] and, more recently, the M.I.N.I.-Screen evolved to meet these needs. These instruments are all one-page, paper-and-pencil, largely patient-rated screening instruments that can be used in a family practice waiting room. All, however, have clinician evaluations to follow up on the positive patient responses.

Why Yet Another?

With such a plethora of diagnostic interviews, why create yet another? We saw a need for a structured interview that would bridge the gap between the detailed, academic, research-oriented interview and the ultrashort screening tests designed for primary care. Shorter than the typical research interview but more comprehensive than the screening test, such an instrument could provide a less costly alternative in international clinical trials and be used in clinical settings in psychiatry. With this in mind, we began the development of the Mini-International Neuropsychiatric Interview (M.I.N.I.). [*Editor's note*. The M.I.N.I. 5.0.0 is published in this supplement following this article, with the permission of the authors. For reprint information, see the note at the end of this article.]

Goals in the Design of the M.I.N.I.

Our central goals in the design of the M.I.N.I. were for it to be

- short and inexpensive
- simple, clear, and easy to administer
- highly sensitive, i.e., a high proportion of patients with a disorder should be detected by the instrument
- specific, i.e., have the ability to screen out patients without disorders
- compatible with international diagnostic criteria, including the International Classification of Diseases (ICD-10)[13] as well as the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R)[14] and later the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)[15]
- able to capture important subsyndromal variants
- useful in clinical psychiatry as well as research settings

From the outset, we confronted the problem of achieving a balance between brevity and simplicity on one hand and accuracy on the other. We wanted the instrument to have the ability to detect a substantial proportion of patients without incorrectly labeling a disproportionate number of patients without disorders. As a result, we were faced with the trade-off between optimal sensitivity and positive predictive value. Imperfect sensitivity could lead to false negative errors, while imperfect positive predictive value could lead to false positive errors. Thus, a major question we faced in the initial design was where to sacrifice accuracy and where not to. We made the assumption that specialist consultants would prefer a test with a few false positives over a test with multiple false negatives. We therefore decided to design each disorder module to be a little overinclusive, i.e., to err, if necessary, on the side of accepting a few more false positives rather than that of missing true cases.

The M.I.N.I. was not intended to replace psychiatrists. Rather, like a laboratory test in medicine, it was designed to capture routine and repetitive information, maximizing the efficiency of the medical encounter and leaving the specialist time for other critical tasks. We felt that this could be best accomplished if the design permitted it to be administered by professional interviewers ("health information technicians") who would function as less costly "physician extenders."

Table 1. Overview of Structured Diagnostic Interviews in Psychiatry*

Interview	Rater Qualifications	Format	Designed For	Duration (Minutes)	Time Frame	Diagnostic Output
PSE [1,2]	Trained mental health professionals	Closed-ended; optional rater inquiries	Medical and psychiatric patients; epidemiology	15–60	Last month	Descriptive syndromes
DIS[3,4]	Lay interviewers with 1 week of intensive training	Closed-ended only; no probes	Community respondents; also patients	45–75	Lifetime; past month; past 6 months; past year	DSM-III-R diagnoses
SADS[5,6]	Trained mental health professionals	Open and closed-ended	Medical and psychiatric patients; community	90–120	Previous weeks	RDC categories
SCID[7]	Trained mental health professionals	Open-ended followed by closed-ended; optional rater inquiries	Medical and psychiatric patients; epidemiology	45–60	Current episode	DSM-III-R diagnoses
CIDI[8]	Trained mental health professionals	Closed-ended; optional rater inquiries	Medical and psychiatric patients; epidemiology	120–180	Current and lifetime	ICD-10 and DSM-III-R
M.I.N.I.[9,10]	Limited training	Closed-ended; optional rater inquiries	Clinical settings and research	15	Current; a few lifetime	DSM-IV and ICD-10
M.I.N.I.-Plus	Limited training	Closed-ended; optional rater inquiries	Research	45–60	Current and lifetime	DSM-IV and ICD-10
M.I.N.I.-Screen	Patient-rated	Closed-ended	Primary care	5	Current	DSM-IV and ICD-10 Screen
SDDS[11]	Patient-rated screen; clinician-rated interview	Closed-ended	Medical patients; primary care	3–10	Current	DSM-III-R diagnoses
PRIME-MD[12]	PQ: Patient-rated screen CEQ: Clinician-administered interview	Closed-ended	Medical patients; primary care	8	Current	DSM-III-R diagnoses

*Abbreviations: PSE = Present State Examination; DIS = Diagnostic Interview Schedule; SADS = Schedule for Affective Disorders; SCID = Structured Clinical Interview for DSM-III-R diagnoses; CIDI = Composite International Diagnostic Interview for ICD-10; PRIME-MD = Primary Care Evaluation of Mental Disorders; SDDS = Symptom-Driven Diagnostic System; M.I.N.I. = Mini-International Neuropsychiatric Interview; RDC = Research Diagnostic Criteria.

If You Are Going to Cut, Where Do You Cut?

Almost all of the existing structured diagnostic interviews in psychiatry are modularized by disorder. As a general rule, in structured diagnostic interviews, there are two screening questions. If the patient answers these questions in the negative, no further questions are asked in that disorder module, and the patient is identified as not having the disorder. If the patient responds positively to one or both of the screening questions, more detailed symptom questions are asked. If these symptoms are endorsed, further branching tree logic leads to questions about any associated disability, and additional questions are used to rule out illness, drugs, and acute bereavement as possible causes of the disorder. If these questions suggest the presence of a typical case, then further branching leads to questions on the chronology and time frame (current, past, or lifetime) of the disorder.

One question we asked during the development of the M.I.N.I. was whether all of the items in this diagnostic decision tree contributed equally. Pareto,[16] who asked a similar question, realized that approximately 20% of the items contributed about 80% of the weight. In designing the M.I.N.I., we made the assumption that screening and symptom questions tend to constitute the core 20% that contributes most of the weight to making diagnostic decisions. We therefore elected to retain these questions but to drop the disability, illness, and drug rule-out questions. We also decided to focus only on time frames immediately relevant to current clinical states. Almost all of the disorder modules therefore focus on current symptoms. An exception is bipolar disorder, in which a past history of mania or hypomania may be very relevant to an apparent current depressive episode. These decisions made it possible for us to develop a short instrument that collected the most routine information, leaving the specialists to focus on ruling out or exploring other disorders, a role more suited to their skills.

How Long Is Too Long?

Discussion with users led us to conclude that the M.I.N.I. should not exceed 15 minutes to administer and the M.I.N.I.- Screen (for the primary care setting) should not exceed 5 minutes if they are to be widely adopted. In designing these instruments, we tried to adhere to these guidelines, and the results of the validation studies suggest that we succeeded in doing so.

Table 2. Disorder Diagnoses Available on the M.I.N.I.*

Disorder	Time Frame
Major depressive disorder	Past 2 wk
Dysthymic disorder	Past 2 y
Suicidality	Current
Mania	Lifetime and current
Panic disorder	Lifetime and current
Agoraphobia	Current
Social phobia	Current
Specific phobia	Current
Obsessive-compulsive disorder	Current
Generalized anxiety disorder	Current
Alcohol dependence	Current
Alcohol abuse	Current
Drug dependence (nonalcohol)	Current
Drug abuse (nonalcohol)	Current
Psychotic disorder	Lifetime and current
Anorexia nervosa	Past 3 mo
Bulimia	Past 3 mo
Posttraumatic stress disorder	Current
Antisocial personality disorder	Lifetime

*"Current" is defined as "in the past month" for all diagnoses except generalized anxiety disorder, which has a 6-month time frame and alcohol abuse/dependence and drug abuse/dependence for which a 12-month time frame is allowed.

How Many Disorders Are Too Many?

In addressing how many disorders to include, we were guided by two considerations: (1) what other structured interviews included, and (2) evidence pointing to the most common disorders in the community. The Structured Clinical Interview for DSM-III-R (SCID), Composite International Diagnostic Interview (CIDI), Diagnostic Interview Schedule (DIS), and PSE ask about approximately 20 disorders each. The Symptom-Driven Diagnostic System for Primary Care (SDDS-PC) and PRIME-MD achieved brevity by focusing on the six most common disorders seen in primary care.

In choosing the most common disorders to include in the M.I.N.I., we relied on data from epidemiologic studies, such as the Epidemiologic Catchment Area study[17] and the National Comorbidity Survey.[18] We gave priority to disorders that had a 12-month prevalence of 0.5%. We chose the top 19 disorders (Table 2), including 17 Axis I disorders, a suicidality module, and one Axis II disorder (antisocial personality disorder). We included the latter because it tends to be stable over time and consistent across studies of personality disorders, and because it has significant impact on clinical decisions and prognosis.

THE M.I.N.I. FAMILY

M.I.N.I.

We started with the M.I.N.I., developing it in a clinician-rated and a patient-rated format. Over time, colleagues throughout the world provided valuable input and suggested countless improvements in the design. We listened and adopted many of their suggestions. Soon, we realized that what had started as a brief, simple instrument was evolving into a structured interview too detailed and broad in the scope of disorders and subtypes assessed. This defeated the original aim of the M.I.N.I. as a short interview that was simple to administer. Yet the many ideas and suggestions from academic colleagues were too good to ignore. So we split the one instrument into two. The M.I.N.I. went back to its short simple structure, although it retained many of the new suggestions, and the more detailed M.I.N.I.-Plus was born.

M.I.N.I.-Plus

The M.I.N.I.-Plus emerged as the structured interview for the obsessional academic who needs all the bells and whistles, all the subtypes and time-frames, and all the disorders that might reasonably be included in clinical research studies. The M.I.N.I.-Plus now includes 23 disorders. It features questions on rule-outs, disorder subtyping, and chronology (e.g., age at onset) and includes modules for somatization disorders (e.g., hypochondriasis, body dysmorphic disorder, pain disorder), conduct disorder, attention-deficit/hyperactivity disorders, adjustment disorders, premenstrual dysphoric disorder, and mixed anxiety-depressive disorders. The M.I.N.I.-Plus also features a number of novel design algorithms to handle psychotic disorders and hierarchical rule-outs in the event that a patient has more than one disorder at a time. The format of the M.I.N.I.-Plus, however, is still less complex than that of the other longer interviews.

Clinical research studies focusing on one disorder (e.g., bipolar disorder or social phobia) often require the investigator to rule out other potential confounding Axis I disorders. It is permissible to use one module from the M.I.N.I.-Plus together with the shorter modules from the M.I.N.I. to rule out confounding disorders (in a mix-and-match format).

M.I.N.I.-Screen

The pressing need for a screening instrument for primary care that tapped more than the six disorders covered by the SDDS[11] and the PRIME-MD[12] (including the need to ask about some disorders more common in primary care than all those assessed by these instruments) but retained the brevity of these instruments led to the development of the M.I.N.I.-Screen.

M.I.N.I.-Kid

Structured instruments for child and adolescent psychiatry have been long and cumbersome in the past. The growth of the field of child and adolescent psychopharmacology has prompted calls for more extensive studies in these age groups. Colleagues asked that we develop a M.I.N.I.-Kid to screen for the common disorders of children and adolescents. Our major goals in designing the M.I.N.I.-Kid were to develop an instrument that would be shorter and easier to administer than others currently

available while retaining essential accuracy, in the spirit of the original M.I.N.I.. The M.I.N.I.-Kid frames questions in language that is easy for children and adolescents to understand. Plans for the validation of this instrument are underway.

VALIDATION

Agreement With the SCID-P and the CIDI

Methods.

Sites and subjects. Two parallel studies[9,10] were conducted to test the validity of M.I.N.I. diagnoses at two sites, the University of South Florida in Tampa and INSERM (National Institute for Mental Health) in Paris. These studies used a version of the M.I.N.I. that included several lifetime diagnoses that are now confined to the M.I.N.I.-Plus.

To achieve adequate representation of the major psychiatric disorders and a sufficient number of nonpatient controls, the following minimum recruitment quotas were set for each site: major depressive disorder (N = 60), mania (N = 30), anxiety disorder (N = 60), psychotic disorder (N = 50) with an alcohol or drug-dependence disorder (N = 50), and adult controls (N = 50). Recruitment quotas were fulfilled using the primary lifetime diagnosis on the SCID-P (U.S. subjects) or the CIDI (French subjects). All subjects had to be 18 years of age or older. Subjects with dementia, mental retardation, or serious medical illness were excluded.

Procedures. Each of the U.S. subjects first completed the patient-rated version of the M.I.N.I. (M.I.N.I.-PR) and were then administered the clinician-rated M.I.N.I. (M.I.N.I.-CR) followed by the SCID-P. Each of the French subjects was administered the clinician-rated M.I.N.I. followed by the CIDI. Eighty subjects (40 at each site) were administered both the SCID-P and the CIDI. For these subjects, the SCID-P was administered before the CIDI for 20 subjects at each site and after the CIDI for the remaining 20 subjects. To test the reliability of the M.I.N.I., 42 subjects at each site were administered the M.I.N.I. by two interviewers (as an interrater reliability test) and subsequently by a third blind interviewer 1 to 2 days after the initial rating (as a test-retest reliability test).

Diagnostic standards. The diagnostic standards for these studies were the SCID-P[7] for the U.S. subjects and the CIDI[8] for the French subjects.

Statistical analyses. For each of the 17 Axis I disorders generated by the M.I.N.I., diagnostic concordance with the standard instrument (SCID-P or CIDI) was assessed using Cohen's kappa,[19–21] sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and efficiency. Separate analyses were performed for the clinician- and patient-rated versions of the M.I.N.I. in the SCID-P comparison. Interrater and retest reliability were assessed using Cohen's kappa.

Results.

Patient characteristics. A total of 636 subjects (330 in the United States and 306 in Paris) completed the two studies. Since 40 subjects at each site participated in both studies, 370 subjects (308 psychiatric and 62 controls) were available for the SCID-P comparison and 346 (296 psychiatric and 50 controls) were available for the CIDI comparison. Both sites reached or exceeded minimum recruitment quota for specific diagnoses, with exception of mania (French site).

The two samples were evenly distributed by gender. Mean ages were 44.8 years for the U.S. site and 42.2 years for the French site.

Concordance of M.I.N.I.-CR with SCID-P diagnoses. The results for the comparison of the clinician-rated M.I.N.I. with the SCID-P are summarized in Table 3. In general, M.I.N.I. diagnoses were characterized by good or very good kappa values, with only a single value (for current drug dependence) below 0.50. The operating characteristics of the M.I.N.I. were very good. Sensitivity was 0.70 or greater for all but three values (dysthymia, obsessive-compulsive disorder, and current drug dependence). Specificities and negative predictive values were 0.85 or higher across all of the diagnoses. PPVs were very good (above 0.75) for major depression, lifetime mania, current and lifetime panic disorder, lifetime agoraphobia, lifetime psychotic disorder, anorexia, and posttraumatic stress disorder (PTSD). They were good (0.60–0.74) for current mania, generalized anxiety disorder (GAD), current agoraphobia, obsessive-compulsive disorder (OCD), current alcohol dependence, lifetime drug dependence, and bulimia. They were acceptable, but in a lower range (0.45–0.59) for dysthymia, current psychotic disorder, lifetime simple phobia, current and lifetime social phobia, and current drug dependence.

Concordance of the M.I.N.I.-PR with SCID-P diagnoses. The results for comparison of the patient-rated version of the M.I.N.I. with SCID-P diagnoses are summarized in Table 4. Although patient-generated diagnoses, using the M.I.N.I.-PR, were characterized by lower kappa scores compared to clinician-generated diagnoses, agreement was acceptable (0.45–0.59) for major depressive disorder, lifetime mania, current and lifetime panic disorder, current and lifetime agoraphobia, lifetime psychotic disorder, OCD, GAD and PTSD. Agreement was good (0.60–0.74) for alcohol dependence, lifetime drug dependence, and anorexia. Agreement, however, was poor (below 0.45) for diagnoses with high comorbidity such as dysthymia, simple phobia, social phobia, and current drug dependence. Agreement was also poor for the more severe psychopathology (current mania and current psychotic disorder). Patients who were actively psychotic or manic often appeared distracted and had difficulty focusing on the questions and completing the patient-rated form. Based on these findings, we have decided to restrict the use of the

Table 3. Concordance Between M.I.N.I.-CR and SCID-P Diagnoses*

Disorder (N = 370)	M.I.N.I.-CR	SCID-P –	SCID-P +	Kappa	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
		TN	FN					
	+	FP	TP					
Major depressive disorder		177	6	0.84	0.96	0.88	0.87	0.97
		24	163					
Dysthymia[a]		359	2	0.52	0.67	0.99	0.45	0.99
		5	4					
Current mania		314	7	0.67	0.82	0.95	0.63	0.98
		18	31					
Lifetime mania		277	14	0.73	0.81	0.94	0.76	0.95
		19	60					
Current panic disorder		263	14	0.76	0.84	0.93	0.80	0.95
		19	74					
Lifetime panic disorder		233	14	0.80	0.88	0.93	0.85	0.94
		18	105					
Current agoraphobia		249	13	0.67	0.85	0.88	0.69	0.95
		34	74					
Lifetime agoraphobia		240	20	0.73	0.82	0.92	0.81	0.92
		21	89					
Current social phobia		279	9	0.51	0.81	0.86	0.46	0.97
		44	38					
Lifetime social phobia		284	10	0.60	0.81	0.90	0.57	0.97
		33	43					
Current simple phobia		305	7	0.50	0.78	0.90	0.43	0.98
		33	25					
Lifetime simple phobia		309	11	0.55	0.70	0.93	0.52	0.97
		24	26					
Generalized anxiety disorder		232	9	0.70	0.91	0.86	0.71	0.96
		38	91					
Obsessive-compulsive disorder		343	8	0.63	0.62	0.98	0.68	0.98
		6	13					
Current psychotic disorder		296	6	0.53	0.84	0.89	0.46	0.98
		37	31					
Lifetime psychotic disorder		266	10	0.76	0.88	0.92	0.77	0.96
		22	72					
Current alcohol dependence		312	8	0.67	0.80	0.95	0.64	0.98
		18	32					
Current drug dependence		322	18	0.43	0.45	0.96	0.50	0.95
		15	15					
Lifetime drug dependence		282	14	0.64	0.77	0.92	0.65	0.95
		26	48					
Anorexia[a]		359	1	0.90	0.90	1.00	0.90	1.00
		1	9					
Bulimia[a]		353	1	0.78	0.92	0.99	0.69	1.00
		5	11					
Posttraumatic stress disorder		297	9	0.78	0.85	0.96	0.82	0.97
		14	50					

*Abbreviations: M.I.N.I.-CR = Mini-International Neuropsychiatric Interview, Clinician-Rated; SCID-P = Structured Clinical Interview for DSM-III-R, Patient Version; TN = true negatives; FN = false negatives; FP = false positives; TP = true positives.
[a]Kappa scores may not be valid since number of cases meeting SCID-P criteria was < 5%.

Table 4. Concordance Between M.I.N.I.-PR and SCID-P Diagnoses*

Disorder (N = 330)	M.I.N.I.-PR	SCID-P –	SCID-P +	Kappa	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Efficiency
		TN	FN						
	+	FP	TP						
Major depressive disorder		143	34	0.55	0.77	0.79	0.75	0.81	0.78
		39	114						
Dysthymia[a]		316	5	0.11	0.17	0.98	0.11	0.98	0.96
		8	1						
Current mania		254	15	0.29	0.55	0.86	0.30	0.94	0.82
		43	18						
Lifetime mania		230	22	0.49	0.66	0.87	0.55	0.91	0.83
		35	43						
Current panic disorder		219	25	0.59	0.70	0.89	0.69	0.90	0.84
		27	59						
Lifetime panic disorder		175	32	0.52	0.72	0.81	0.67	0.85	0.78
		41	82						
Current agoraphobia		203	27	0.48	0.68	0.83	0.58	0.88	0.79
		42	58						
Lifetime agoraphobia		201	39	0.55	0.63	0.89	0.73	0.84	0.81
		24	66						
Current social phobia		217	10	0.31	0.76	0.75	0.30	0.96	0.75
		72	31						
Lifetime social phobia		225	9	0.39	0.80	0.79	0.36	0.96	0.79
		61	35						
Current simple phobia		239	10	0.25	0.66	0.79	0.23	0.96	0.78
		62	19						
Lifetime simple phobia		259	16	0.30	0.52	0.87	0.31	0.94	0.84
		38	17						
Generalized anxiety disorder		179	17	0.45	0.80	0.73	0.51	0.91	0.75
		66	68						
Obsessive-compulsive disorder		302	10	0.50	0.50	0.97	0.56	0.97	0.95
		8	10						
Current psychotic disorder		240	11	0.34	0.69	0.82	0.32	0.96	0.80
		54	25						
Lifetime psychotic disorder		187	11	0.48	0.86	0.74	0.50	0.94	0.77
		66	66						
Alcohol dependence		264	4	0.60	0.89	0.90	0.52	0.99	0.90
		30	32						
Current drug dependence		273	20	0.30	0.39	0.92	0.35	0.93	0.87
		24	13						
Lifetime drug dependence		250	19	0.62	0.69	0.93	0.69	0.93	0.88
		19	42						
Anorexia[a]		318	4	0.66	0.60	0.99	0.75	0.99	0.98
		2	6						
Bulimia[a]		308	5	0.40	0.55	0.97	0.35	0.98	0.95
		11	6						
Posttraumatic stress disorder		247	19	0.57	0.68	0.91	0.63	0.93	0.87
		24	40						

*Abbreviation: M.I.N.I.-PR = Mini-International Neuropsychiatric Interview, Patient-Rated.
[a]Kappa scores may not be valid since number of cases meeting SCID-P criteria was very small.

Table 5. Concordance Between M.I.N.I.-CR and CIDI Diagnoses: Nonpsychotic DSM-III-R Disorders*

Disorder	N	M.I.N.I.-CR	CIDI –	CIDI +	Kappa	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
		–	TN	FN					
		+	FP	TP					
Major depressive disorder	343[a]		134	10	0.73	0.94	0.79	0.82	0.93
			36	163					
Current manic episode	342[a,b]		307	3	0.65	0.86	0.96	0.56	0.99
			14	18					
Lifetime manic episode	343[a]		263	13	0.63	0.77	0.92	0.64	0.95
			24	43					
Alcohol dependence	346		245	16	0.82	0.83	0.97	0.91	0.94
			8	77					
Drug dependence	346		271	7	0.81	0.89	0.95	0.81	0.97
			13	55					
Panic disorder	346		280	19	0.68	0.67	0.97	0.81	0.94
			9	38					
Agoraphobia	346		274	24	0.58	0.59	0.95	0.71	0.92
			14	34					
Social phobia	346		254	16	0.54	0.72	0.88	0.55	0.94
			34	42					
Simple phobia	346		261	35	0.43	0.46	0.93	0.60	0.88
			20	30					
Generalized anxiety disorder	345[c]		215	6	0.36	0.88	0.72	0.34	0.97
			82	42					
Lifetime bulimia	346		308	9	0.53	0.63	0.96	0.52	0.97
			14	15					

*Abbreviation: CIDI = Composite International Diagnostic Interview.
[a]Three patients excluded because of missing data (i.e., CIDI temporal data for the diagnosis of both affective and psychotic symptoms).
[b]One patient excluded because of missing data (i.e., CIDI data concerning last episode).
[c]One patient excluded because of missing data (i.e., CIDI temporal data).

patient-rated version to those patients who appear to have less severe psychopathology.

Concordance of M.I.N.I.-CR with CIDI diagnoses. Good results were obtained when M.I.N.I. diagnoses were compared with the CIDI[8] (Tables 5 and 6). Kappa values were good or very good for most diagnoses, with only two values (for simple phobia and GAD) falling below 0.50. Sensitivity was 0.70 or greater for all but 4 values (panic, agoraphobia, simple phobia, and lifetime bulimia). Specificity was 0.70 or greater for all diagnoses. Negative predictive values were also very good. Positive predictive values were acceptable for lifetime bulimia (0.52), current manic episode (0.56), and social phobia (0.55), but poor for GAD (0.34). For psychotic disorders, concordance between instruments was very good whether the comparison with the CIDI was based on a diagnostic, a syndromal, or a symptomatic approach. Patients without disorders, symptoms, or syndromes were identified with high specificity, resulting in very good negative predictive values. Sensitivity values were very good, and positive predictive values were good or very good. Where discrepancies between the M.I.N.I. and the CIDI existed, they could be attributed largely to the coexistence of affective and psychotic symptoms. In 17% of the cases, the CIDI identified psychotic symptoms but could not link them directly to a diagnosis (e.g., criterion "A" for schizophrenia was present during a nonsevere affective disorder.)

Length of interview. Some sections of the SCID-P[7] (the introductory clinical and demographic section and the somatoform disorders and adjustment disorders modules) and of the CIDI[8] (demographic section and the tobacco, somatoform disorders, organic disorders, and sexual dysfunction modules) are not explored by the core M.I.N.I. To facilitate comparison of the administration time of the interviews, these sections of the SCID-P and the CIDI were not administered in these studies, artificially shortening the lengths of the SCID-P and the CIDI.

Nevertheless, the mean time duration of the M.I.N.I. was about half that of the SCID-P (18.7 ± 11.6 minutes vs. 43 ± 30.6 minutes) and about one fourth that of the CIDI (21 ± 7.7 minutes versus 92 ± 29.8 minutes). These findings held for the SCID-P, when normal controls were in-

Table 6. Concordance Between M.I.N.I.-CR and CIDI Diagnoses: Psychotic DSM-III-R Symptoms, Syndromes, or Disorders

Psychotic Symptoms, Syndrome, or Disorder	N	M.I.N.I.-CR	CIDI –	CIDI +	Kappa	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
			TN	FN					
		+	FP	TP					
Current psychotic disorder	343	–	272	5	0.69	0.89	0.92	0.64	0.98
		+	24	42					
Current psychotic syndrome[a]	305	–	241	4	0.68	0.90	0.91	0.62	0.98
		+	23	37					
Current psychotic symptoms[a]	305	–	238	7	0.76	0.87	0.94	0.75	0.98
		+	15	45					
Lifetime psychotic disorder	343	–	237	10	0.70	0.87	0.89	0.70	0.96
		+	29	67					
Lifetime psychotic syndrome[a]	306	–	218	4	0.75	0.94	0.90	0.71	0.98
		+	24	60					
Lifetime psychotic symptoms[a]	306	–	211	11	0.82	0.87	0.95	0.87	0.95
		+	11	73					

[a]Paris data only.

Table 7. Time Duration of M.I.N.I.-CR and SCID-P Interviews (N = 368)

Median by Primary SCID-P Diagnosis	M.I.N.I. (min)	SCID-P (min)	Reduction (%)
Anxiety	17	35	51%
Depression	17	35	51%
Mania	20	41	51%
Psychosis	17	60	72%
Alcohol/drug	18	40	55%
Normal control	7	17	59%
Median total	15	35	57%
Mean ± SD total	18.7 ± 11.6	43.0 ± 30.6	

Table 8: Reliability of M.I.N.I.-CR (N = 84)*

Diagnoses	Interrater Kappa	Test/Retest Kappa
Major depressive disorder	1.00	0.87
Current mania	0.79	0.35
Lifetime mania	0.89	0.63
Current panic disorder	0.92	0.68
Lifetime panic disorder	0.97	0.79
Current agoraphobia	0.97	0.73
Lifetime agoraphobia	0.92	0.81
Current social phobia	0.94	0.65
Lifetime social phobia	0.88	0.68
Current simple phobia	0.88	0.63
Lifetime simple phobia	0.88	0.52
Generalized anxiety disorder	0.98	0.78
Obsessive-compulsive disorder	1.00	0.85
Current psychotic disorder	0.81	0.77
Lifetime psychotic disorder	0.90	0.83
Current alcohol abuse	0.90	0.85
Current alcohol dependence	1.00	0.86
Current drug abuse	0.88	0.89
Current drug dependence	0.91	0.96
Lifetime drug dependence	0.94	0.86
Anorexia	1.00	0.78
Bulimia	1.00	1.00
Posttraumatic stress disorder	0.95	0.73

*Dysthymia was excluded from these analyses because the number of cases was small.

cluded (15 vs. 35 minutes) and when they were excluded (18 vs. 40 minutes). As shown in Table 7, the M.I.N.I. provided a reduction in the median administration time over the SCID-P of more than 50% for patients with primary diagnoses of anxiety, major depression, and mania and of more than 70% for those with a primary diagnosis of psychotic disorder.

Normal controls. There was no evidence of an inflated rate of false positives in the nonpsychiatric patient normal control group at either of the two sites in these studies.

Interrater and retest reliability. Table 8 provides kappa values for the interrater reliability tests. All of the kappa values were above 0.75, and the majority (70%) were 0.90 or higher, indicating excellent interrater reliability.

Table 8 also presents kappa values for comparisons between initial and retest M.I.N.I.-CR diagnoses. Fourteen of the 23 (61%) values were above 0.75, and only one value (for current mania) was below 0.45. These results indicate very good retest reliability. Since a second interviewer was used for the retest (introducing an additional potential source of error), the analysis would be expected to produce a very conservative estimate of the stability of the M.I.N.I.-CR diagnoses.

Summary of Validation Studies

Readers interested in a more detailed exposition of the reliability and validity data and psychometric properties of the M.I.N.I. are referred to references 9 and 10.

Overall, the results were very positive. The data suggest that the M.I.N.I. succeeds in reliably and validly elic-

iting symptom criteria used in making DSM-III-R and ICD-10 diagnoses and does so in less than half the time needed for the SCID-P or the CIDI. Small differences between the shorter M.I.N.I. and the longer interviews were consistently in the direction of the M.I.N.I. being slightly more inclusive. For a more than 50%-reduction in administration time compared with the longer interviews, sensitivity and specificity were very good.

Although the clinician-rated version of the M.I.N.I. (M.I.N.I.-CR) was superior to the patient-rated version (M.I.N.I.-PR), the patient-rated version has utility in certain settings, especially for outpatients with anxiety and mood disorders, rather than for patients with more severe psychopathology (e.g., psychotic disorders).

Limitations. These validation studies had several limitations. First, the number of patients who were diagnosed positively was low for some diagnoses (e.g., dysthymia, OCD, anorexia, and bulimia). Better PPVs might have been obtained for these diagnoses if the base rate of patients with these disorders had been higher. Secondly, there were instrument discrepancies in time requirements for some disorders. The CIDI and the version of the M.I.N.I. used in the parallel studies employed six-month time requirements for current alcohol and drug dependence, while the SCID-P employed a one-month requirement. As a result, the M.I.N.I. had better concordance with the CIDI than the SCID-P for these disorders. Instrument differences in exclusionary rules also influenced some of the results. Diagnoses of social and simple phobia, for example, are precluded on the SCID-P and the CIDI, but not the M.I.N.I., if the subject meets criteria for psychotic disorder or if the phobic fear is related to another Axis I disorder. Since both of these diagnoses were highly comorbid, it is not surprising that concordance was low for the M.I.N.I. with both of the other instruments.

Finally, there may have been instrument differences in focus that influenced some of the results. The PPV value for current psychotic disorder was low in the M.I.N.I. versus SCID-P comparison. Better PPV values were obtained for current psychotic disorder when the "gold standard" was the CIDI. More than half of the subjects who were administered both the SCID-P and the CIDI and were classified as false positives in relation to the SCID-P met CIDI criteria for current psychotic disorder. This raises the possibility that the SCID-P may miss some diagnoses of psychotic disorder.

Agreement With Expert Opinion

Methods.

Sites and subjects. A study[22] was designed to examine whether M.I.N.I. diagnoses generated by general practitioners in primary care settings were compatible with expert diagnoses generated by psychiatrists. The study was conducted in four countries: France, Italy, Spain, and the United Kingdom.

Approximately 10 general practitioners in each of the participating countries agreed to participate and provide approximately 10 patients. All patients had to be 18 years or older. Patients suffering from dementia, mental retardation, or serious medical illnesses were excluded.

Table 9. Concordance Between M.I.N.I.-CR and Expert Diagnoses, Primary Care Patients

Disorder (N = 409)	Kappa	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Major depressive disorder	0.68	0.86	0.84	0.75	0.92
Dysthymia	0.41	0.41	0.96	0.54	0.93
Generalized anxiety disorder	0.62	0.67	0.92	0.79	0.97
Panic disorder with agoraphobia	0.48	0.44	0.97	0.70	0.90
Social phobia	0.66	0.83	0.95	0.58	0.99

Procedures. To ensure adequate representation of psychiatric disorders in the primary care settings, an enriched sample of patients was sought. To achieve this end, all patients were asked to complete the General Health Questionnaire (GHQ-12)[23] before seeing their doctors. A majority of the patients with low GHQ-12 scores were excluded from further interviews. The remaining patients were administered the modules of the M.I.N.I. about the 11 most common disorders and subsequently (within 3 days) evaluated by a psychiatrist.

For the purpose of this study, the M.I.N.I., which had originally been developed simultaneously in English and French, was translated into Spanish and Italian.

Diagnostic standard. The diagnostic standard for this study was expert opinion. All of the experts were psychiatrists who were well known to the scientific community in their respective countries. Many were professors of psychiatry. The experts provided a DSM-IV diagnosis using whatever source of information they considered to be the most appropriate and were accustomed to using patient interviews, patient and family interviews, open questions, or diagnostic instruments.

Results.

Patient characteristics. A total of 409 patients, approximately 100 in each of the four countries, were administered the M.I.N.I. and subsequently rated by an expert. Sixty-two percent of the subjects were women. Since the sample was enriched (by excluding patients with low GHQ-12 scores), 61% of the subjects met criteria for at least one of the 11 psychiatric diagnoses explored. The most frequent disorders diagnosed were major depressive disorder (39.4%), GAD (25.7%), and social phobia (10.5%). Other disorders (e.g., OCD, alcohol and/or substance abuse or dependence, and panic disorder with agoraphobia) constituted fewer than 10% of the diagnoses.

Concordance with expert opinion. Agreement between M.I.N.I. diagnoses generated by general practitioners and expert psychiatrist diagnoses was found in 85% of the pa-

tients. The results are summarized in Table 9 for the five most common disorders. Agreement was highest for the most common disorders: major depressive disorder (0.68), GAD (0.62), and social phobia (0.66).

RECENT DEVELOPMENTS AND FUTURE DIRECTIONS

Upgrade to DSM-IV

Based on the results of these validation studies, we strengthened several questions on the M.I.N.I. and made other data-driven improvements to enhance its sensitivity, specificity, and PPVs. Studies of the development and validation of the Psychotic Disorders module against diagnoses made by the CIDI and experts have recently been completed.[24]

The M.I.N.I. was the first structured interview upgraded to be consistent with the DSM-IV[15] and its time frames, which moved the DSM system closer to the ICD-10 than the DSM-III-R. The M.I.N.I. is also compatible with the ICD-10 system.

Foreign Language Translations

The M.I.N.I., M.I.N.I.-Plus, and M.I.N.I.-Screen are currently the focus of an international collaborative project to adopt a standard version of all 3 tests across 30 language translations and to ensure adherence to the phenomenological accuracy of the questions across the languages. This project will be completed as of Spring 1998. The resulting translations will be made available for downloading from the Internet at no cost (*http://www.medical-outcomes.com*).

Computer Versions

A computerized version of the M.I.N.I. is now available. The M.I.N.I. has also been included in an interactive voice recognition/computer-assisted telephone interview that is integrated with a medical screening/triage interview for medical and primary care telephone screening of large samples of patients. A dynamic client-server version for the Internet is being developed. Studies are underway to assess the value of computerized versions of the M.I.N.I..

Potential Applications

Research. Although the M.I.N.I. provides less disorder subtyping (e.g., in the psychotic disorder section) than the SCID-P, it covers a much broader range of diagnoses than other short structured interviews such as the SDDS[11] and the PRIME-MD[12] and is considerably shorter than the SCID-P[7] and the CIDI. [8] The M.I.N.I., or modules of the M.I.N.I., can be used by academic researchers and pharmaceutical companies for rapid screening of homogenous samples for clinical trials and epidemiologic studies. The Depression module of the M.I.N.I., for example, was recently used to screen for depression in a survey of 78,463 adults in the European community.[25] For this pan-European prevalence study, house-to-house interviews were conducted by lay interviewers in six countries: Belgium, France, Germany, the Netherlands, Spain, and the United Kingdom.

Clinical practice and primary care. The M.I.N.I. has potential applications as a diagnostic screening tool for psychiatric hospital admissions and outpatient clinic evaluations.

Managed care. The M.I.N.I. can be used as a first step in outcome tracking and continuous quality improvement (CQI) programs. We anticipate that in the emerging healthcare delivery systems, there will be an increasing need for health information technicians whose role in mental health will be primarily to gather health information using the structured assessments and to track outcomes. The M.I.N.I. was designed not only for use by physicians but also by health information technicians or "physician extenders," who are not psychiatrists or doctoral level psychologists.

In the emerging competitive healthcare environment, brief structured diagnostic interviews such as the M.I.N.I. can be used by providers (hospitals, outpatient care clinics, managed care companies) and government agencies to negotiate mental health contracts. Databases can be generated from the computerized M.I.N.I. to assist physicians, hospitals, and actuaries in calculating precise capitated costs and negotiating payments. In capitated systems, where purchasers and providers share risks, it is important to anchor costs to diagnoses and comorbidity. Psychiatrists and other providers negotiating "mental health carve-out contracts" can undersell themselves if they ignore the diagnostic mix or level of comorbidity in a given sample. The use of brief structured interviews, such as the M.I.N.I., also has the potential to reduce "diagnostic drift" (in the direction of diagnoses that provide the best reimbursement) and to increase the confidence of purchasers in provider-generated data.

Note. To receive a complimentary copy of the M.I.N.I., the M.I.N.I.-Plus, or the M.I.N.I.-Kid (revised for compatibility with DSM-IV), contact Dr. David V. Sheehan at the Institute for Research in Psychiatry, University of South Florida College of Medicine, 3515 East Fletcher Avenue, Tampa, FL 33613 or access the website (*http://www.medical-outcomes.com*).

REFERENCES

1. Wing JK. A standard form of psychiatric present state examination. In: Hare EH, Wing JK, eds. Psychiatric Epidemiology. London, England: Oxford University Press; 1970:93–131
2. Wing JK, Cooper JE, Sartorious N. Measurement and Classification of Psychiatric Symptoms: An Instructional Manual for the PSE and CATEGO Program. London, England: Cambridge University Press; 1974
3. Robins LN, Helzer JE, Ratcliff K, et al. Validity of the Diagnostic Interview

Schedule, Version II: DSM-III diagnoses. Psychol Med 1982;12:855–870
4. Robins LN, Helzer JE, Croughan J, et al. National Institute of Mental Health Diagnostic Interview Schedule: its history, characteristics and validity. Arch Gen Psychiatry 1981;38:381–389
5. Feigner JP, Robins E, Guze S, et al. Diagnostic criteria for use in psychiatric research. Arch Gen Psychiatry 1972;26:57–63
6. Endicott J, Spitzer RL. A diagnostic interview: the Schedule for Affective Disorders and Schizophrenia. Arch Gen Psychiatry 1978;35:837–844
7. Spitzer RL, Williams JBW, Gibbon M, et al. Structured Clinical Interview for DSM-III-R. Washington, DC: American Psychiatric Press; 1990
8. World Health Organization. Composite International Diagnostic Interview (CIDI), Version 1.0. Geneva, Switzerland: World Health Organization; 1990
9. Sheehan DV, Lecrubier Y, Harnett-Sheehan K, et al. The validity of the Mini-International Neuropsychiatric Interview (M.I.N.I.) according to the SCID-P and its reliability. Eur Psychiatry 1997;12:232–241
10. Lecrubier Y, Sheehan DV, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): a short diagnostic structured interview: reliability and validity according to the CIDI. Eur Psychiatry 1997;12: 224–231
11. Broadhead WE, Leon AC, Weissman MM, et al. Development and validation of the SDDS-PC screen for multiple mental disorders in primary care. Arch Fam Med 1995;4:211–219
12. Spitzer RL, Williams JBW, Kroenke K, et al. The PRIME-MD 1000 study: validation of a new system for diagnosing mental disorders in primary care. Presented at the 7th annual National Institute on Mental Health International Research Conference on Mental Health Problems in the General Health Section; September 21, 1993; McLean, Va
13. World Health Organization. International Classification of Diseases, Tenth Revision. Geneva, Switzerland: World Health Organization; 1992
14. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised. Washington, DC: American Psychiatric Association; 1987
15. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. Washington, DC: American Psychiatric Association; 1994
16. Burr JT. The tools of quality part IV: Pareto charts. Quality Prog 1990;23: 11–59
17. Regier DA, Myers JK, Kramer M, et al. The NIMH Epidemiologic Catchment Area Program: historical context, major objectives and study population characteristics. Arch Gen Psychiatry 1984;41:934–941
18. Kessler LG, McGonagle KM, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the U.S.: results from the National Comorbidity Survey. Arch Gen Psychiatry 1994;51:8–20
19. Cohen J. A coefficient of nominal agreement for nominal scales. Psychol Meas 1960;20:37–46
20. Shrout PE, Spitzer RL, Fleiss JL. Quantification of agreement in psychiatric diagnosis revisited. Arch Gen Psychiatry 1987;44:172–177
21. Fleiss JL. Statistical Methods for Rates and Proportions. 2nd ed. New York, NY: John Wiley & Sons; 1981
22. Lecrubier Y. Final Report: Validation of the M.I.N.I. in Four European Countries. INSERM 302 Hopital La Salpetriere, pavillon Clerambayult, 47 boulevard de l'Hopital 75651 Paris cedex.
23. Goldberg DP. The Manual of the General Health Questionnaire. Slough, England: National Foundation for Educational Research: 1978
24. Amorim P, Lecrubier Y, Weiller E, et al. DSM-III-R Psychotic Disorders: procedural validity of the Mini-International Neuropsychiatric Interview (M.I.N.I.): concordance and causes for the discordance with the CIDI. Eur Psychiatry 1998;1(13). In press
25. Lepine JP, Gastpar M, Mendlewicz J, et al. Depression in the community: the first pan-European study DEPRES (Depression Research in European Society). Int Clin Psychopharmacol 1997;12:19–20

Disclosure of Off-Label Usage

The authors of this article have determined that, to the best of their clinical estimation, no investigational or off-label information about pharmaceutical agents has been presented that is outside Food and Drug Administration–approved labeling.

Editor's Note:

The complete M.I.N.I. 5.0.0 follows this article on pages 34–57.