The Composite International Diagnostic Interview (CIDI-Auto): problems and remedies for diagnosing panic disorder and social phobia

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ABSTRACT *In a recent study of treatment for panic disorder in primary care, the Composite International Diagnostic Interview (CIDI-Auto) was used to provide psychiatric diagnoses. However, during and after data collection, it was discovered that the CIDI appeared to place, or fail to place, a substantial number of people into diagnostic categories in ways that conflicted with the investigators' clinical experience. The wording of questions in the panic module, coupled with a lack of structured follow-up probes, resulted in apparent false negatives for panic disorder. Moreover, patients who would otherwise meet criteria for panic disorder or social phobia did not receive a diagnosis based on rules that may be discordant with clinical practice and, at times, the design of the DSM-IV.*

For this study, changes were made to the interview, including additional probes for the panic disorder module and modification of the decision rules used to assign or rule out diagnoses of panic disorder and social phobia. The changes resulted in greater inclusion of patients in the panic disorder and social phobia diagnostic categories and we argue that these changes to the CIDI-Auto increase the clinical validity of this instrument. We did not examine the false positive rate for the unmodified or modified CIDI, but this is an important issue that needs to be evaluated in future research.

Key words: Composite International Diagnostic Interview, panic disorder, social anxiety disorder, structured diagnostic interview

Choosing the instruments to use in a research protocol can be a time-consuming process of decisions about inclusion and exclusion, based on factors such as validity, research burden, and importance of variables to the question at hand, among others. Unfortunately, it is an all too familiar experience to realize after the data have been collected that there are insufficiencies in the measures selected. It may be that there are insufficient data to answer a question, or it may become apparent that a measure is either inaccurate or conflicts with the investigator's experience.

In our recent study on improving treatment for panic disorder in primary care (Hazlett-Stevens et al., 2002; Roy-Byrne et al., 2003), we employed the computer-assisted, interviewer-administered version of the Composite International Diagnostic Interview (CIDI-Auto) (World Health Organization, 1997a) to provide DSM-IV diagnoses for participants in our study. The CIDI-Auto creates a database of responses and is a convenient and reliable tool for arriving at diagnoses. We chose to use the CIDI-Auto for several reasons, including the fact that the CIDI is well regarded and widely used, the cost-effectiveness of using lay interviewers, the efficiency of entering data and reducing errors, and the practicality of using it in a telephone interview.

Several studies have examined the reliability and validity of the CIDI and CIDI-Auto. The CIDI has been found to have excellent inter-rater reliability (Andrews and Peters, 1998), which is one of the

primary reasons for its widespread use. With regard to validity, however, whereas some studies have demonstrated excellent agreement with clinicians for some diagnoses, such as obsessive compulsive disorder (OCD) (Peters and Andrews, 1995), the CIDI has been found to have questionable validity for most of the anxiety disorders, including social phobia and panic disorder. For example, when compared with the paper-and-pencil version of the CIDI, the CIDI-Auto had excellent agreement for social phobia (kappa = 0.92) and moderate agreement for panic disorder (kappa = 0.54). However, when compared with psychiatrists' diagnoses in an inpatient psychiatry setting, the self-administered CIDI-Auto diagnosed 51% of patients with neurotic disorders (the class of disorders that includes anxiety disorders when International Classification of Diseases (ICD) criteria are used), whereas the psychiatrists diagnosed such disorders in 2% of patients; the resulting kappa was 0.03 (Rosenman, Korten and Levings, 1997). When using ICD criteria and comparing the CIDI-Auto with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (Wing et al., 1990) in the general population, concordance was poor (kappa = 0.24) for panic disorder without agoraphobia and fair (kappa = 0.41) for social phobia (Brugha, Jenkins, Taub, Meltzer and Bebbington, 2001). In mental health outpatients, concordance for the self-administered CIDI-Auto compared with clinicians' diagnoses was poor for social phobia (kappa = 0.27); concordance for panic disorder could not be calculated due to a base rate less than 10% (Komiti et al., 2001). Finally, in a study involving patients in an anxiety disorders clinic, the CIDI-Auto was compared with consensus diagnosis of two clinicians for six anxiety disorders, including panic disorder and social phobia. Agreement between the CIDI-Auto and consensus diagnosis was poor for panic disorder (kappa = 0.23) and social phobia (kappa = 0.39; Peters and Andrews, 1995). In general, across comparisons of the CIDI-Auto with clinicians' diagnoses or the SCAN, the CIDI-Auto generates approximately twice as many diagnoses per patient as the comparison interview (Peters and Andrews, 1995; Rosenman et al., 1997; Brugha et al., 2001; Komiti et al., 2001).

In the present study, we discovered several areas in which the CIDI-Auto conflicted with the investigators' clinical experience. The main problems encountered were apparent false negatives for panic disorder due to underendorsing items required for a diagnosis and apparent false negatives for panic disorder and social phobia due to exclusion criteria. As such, the investigators wished to have confidence that the diagnoses were as clinically accurate as possible, and where a question about accuracy existed, the investigators wished to err on the side of inclusion versus exclusion of potentially qualified subjects. With this in mind, we set out to examine each area of apparent discrepancy and determine the best course of action for systematically obtaining valid diagnoses.

Method

Subjects

Participants were primary care patients from clinics affiliated with University of Washington, Seattle; University of California, Los Angeles; and University of California, San Diego. Screening of patients took place in the clinics at a variety of times on several days each week for approximately 12 months. A total of 7,477 patients were screened and, of these, 1,117 patients were eligible and agreed to participate in an interview. Of these patients, a total of 698 patients actually completed the telephone interview (the remaining 419 patients failed to complete an interview, either because they failed to attend for their interview, were unable to be reached, or refused the interview when called).

Procedure

Adult patients arriving for an appointment with their primary care provider were approached in the waiting room and asked to complete a screening questionnaire that included symptoms of panic disorder and either social phobia and post-traumatic stress disorder or depression and generalized anxiety disorder, depending on when they were screened. Patients who were fluent in English, had access to a telephone, and screened positive for any disorder were asked to participate in a telephone interview that included the CIDI-Auto. For panic disorder patients only, exclusion criteria from the screening questionnaire were age greater than 70, pregnancy or planned pregnancy, psychiatric disability insurance, current treatment by a psychiatrist, or a plan to leave the area in the ensuing 12 months. Patients

screening positively for panic disorder and meeting these criteria were not asked to participate in the interview, but these criteria did not apply to patients screening negatively for panic disorder, as they were recruited for a telephone interview only and were not asked to participate in the treatment study. A randomly selected subset of patients (N = 175) screening negatively for all of the disorders was asked also to complete a telephone interview.

Patients who were eligible for the interview and consented to participate were contacted and scheduled for an interview conducted via telephone. The telephone interview was comprised of the diagnostic interview (CIDI-Auto) followed by a variety of questionnaires, including the Anxiety Sensitivity Index (ASI; Peterson and Reiss, 1987), three questions about the frequency of panic attacks in the recent past, and the Social Phobia Inventory (SPIN; Conner et al., 2000). All patients were paid $20 for participating in the interview. Patients receiving a diagnosis of panic disorder and not meeting any additional exclusion criteria (suicidal ideation, probable drug or alcohol abuse, psychosis, life-threatening physical illness) were asked to participate in a treatment study for panic disorder.

Measures

CIDI-Auto

The CIDI-Auto (World Health Organization, 1997a) is the computerized version of the Composite International Diagnostic Interview, version 2.1. The CIDI-Auto is a highly structured and standardized interview that mirrors the pencil-and-paper version of the CIDI, including probe-flow charts and skip patterns. The interviewer-administered form was used in a telephone interview for the present study, with lay interviewers reading each question and entering answers into a computer, creating a database of responses and automatically generating diagnoses. In an effort to minimize the burden on the interviewee, we chose to administer portions of the CIDI, rather than the entire instrument. The layout and programming of the CIDI made this easy to do; we administered selected modules and, within modules, skipped sections that did not seem crucial to our research questions (for example, specific phobia). The modules included in this study were panic disorder, social phobia, major depression, and post-traumatic stress disorder. A subsample of patients (N = 204) also completed the generalized anxiety disorder module. For the present study, DSM-IV diagnoses were obtained from the interview and each patient completing the interview received a diagnostic code of 1 (inclusion criteria not met), 5 (inclusion criteria met, exclusion criteria not met), or 3 (inclusion criteria met, exclusion criteria met) for each module.

Across a number of reliability and validity studies of the paper and pencil version of the CIDI, inter-rater reliability was found to be good to excellent and test-retest reliability was good for modules other than dysthymia, bipolar II, and specific phobia (Wittchen, 1994). When the computerized version of the CIDI is compared with the paper-and-pencil version, diagnostic agreement in mental health outpatients was higher than agreement between the CIDI-Auto and other diagnostic instruments for both panic disorder (kappa = 0.54) and social phobia (kappa = 0.92; Peters, Clark and Carroll, 1998). Further discussion of the validity of this instrument can be found above.

Anxiety Sensitivity Index

The Anxiety Sensitivity Index (ASI) (Peterson and Reiss, 1987) assesses beliefs about the negative consequences of anxiety. This questionnaire is particularly useful in assessing patients with panic disorder and has been shown to predict development of panic disorder in college students (Shear et al., 2000), adolescents (Hayward, Killen, Kraemer and Taylor, 2000), and militia (Schmidt, Lerew and Jackson, 1997). The ASI has 16 items, rated from 0 (not at all) to 4 (severe). The ASI has adequate test-retest reliability (Shear et al., 2000) and is internally consistent, both in prior studies (Shear et al., 2000) and the present study ($\alpha = 0.86$).

Panic frequency

Three questions were asked about frequency of panic attacks for patients who met inclusion criteria for panic disorder. These questions included:

- the number of full panic attacks in the past week;
- the number of limited-symptom panic attacks in the last week; and
- the panic attack frequency question from the Panic Disorder Severity Scale (PDSS) (Shear et al., 1997).

The latter question assesses the number of full and limited-symptom panic attacks in the past month, rated on a 0 *(no panic)* to 4 *(more than once a day, most days)* scale. The correlations between the PDSS question and the frequency in the last week of full panic episodes ($r(255) = 0.50$, $p < 0.01$) and limited symptom episodes ($r(255) = 0.44$, $p < 0.01$) indicate that these items share important elements of panic frequency while measuring different aspects of the experience.

Social Phobia Inventory

The Social Phobia Inventory (SPIN) (Connor et al., 2000) is a 17-item scale designed to assess severity of social anxiety. The scale distinguishes between individuals with and without social phobia (Connor et al., 2000). The measure consists of symptoms indicating fear, avoidance, or physical discomfort rated for the previous week on a scale ranging from 0 (not at all) to 4 (extremely). The scale demonstrates good test-retest reliability and internal consistency, good convergent validity when compared with interviewer-administered and paper-and-pencil measures, and adequate discriminant validity when compared with measures of general health, disability, and specific phobias (Connor et al., 2000). Finally, the SPIN distinguishes between a clinical population of social phobia patients and healthy volunteers (sensitivity = 73%; specificity = 84%; Connor et al., 2000). The internal consistency of the SPIN in the present study was excellent ($\alpha = 0.96$).

False negatives for panic disorder due to under-endorsing key symptoms

After the recruitment phase of the study had begun, the interviewers began to note that the wording of some of the questions in the panic disorder module and the lack of structured follow-up probes was resulting in what appeared to be false negatives for panic disorder. There was no structured interview to verify this, but the interviewers, among them a clinical psychologist, deduced this based on unstructured follow-up conversations with patients in which they, for example, discussed with the patient the reasons for which they were not qualified to participate in the treatment study for panic disorder. For example, one of the questions in the CIDI module asks 'In the past 12 months, after having one of these attacks, was there a month or more when you changed your everyday activities because of fear of the attacks?' This question appeared to leave it up to the respondent to determine what is meant by a 'change in everyday activities'. We found that it was common, for example, for a patient who had a panic attack in a store and then reduced the frequency with which she shopped in that store to fail to regard this as a change in everyday activities. Another question asks the patient whether the attacks 'begin suddenly and then get worse within the first few minutes of the attack?' A patient whose attacks come on suddenly and reach peak intensity instantaneously, but without a subsequent increase in intensity, would answer no to this question even though that is clearly not its intent. Another question in the panic module asks, 'Have you more than once had an attack like that which was totally unexpected?' A patient who has become accustomed to having panic attacks might not endorse unexpected attacks despite the unexpected nature of their first panic attack.

Our approach to the problem

To assist in obtaining accurate diagnoses, the CIDI was supplemented with additional probes in an effort to minimize the number of false negatives for panic disorder in our sample. As a result, an addendum (Appendix A) was added to the interview protocol. Using the addendum, the interviewer provided the patient with an initial description of a panic attack and asked the patient if he or she had had a recent similar experience. If so, the interviewer asked the patient to provide a description of his or her panic attack(s). If not, and if the patient had screened positively for panic disorder, the interviewer asked the patient to describe any similar experiences in an attempt to discover the source of the discrepancy. The second part of the addendum provided structured probe questions to be asked when a person answered 'no' to key items in the panic disorder module. The key items were questions that ruled out a diagnosis if the respondent answered 'no'. It is important to emphasize that, while using the addendum, the interviewer continued to ask all of the CIDI questions, but added the probe questions to the interview only for 'no' responses to key items. If the patient's answers to the probe questions provided evidence that the patient met criteria for a 'yes'

Table 1. Frequency of 'no' responses to key panic disorder items and frequency with which responses changed with addendum

Item	Question content	N	'No' responses	Responses changed		
				N	Per cent of total	Per cent of 'no'
D54	Ever had an attack	269	115	4	1.5	3.5
D56	More than one totally unexpected	153	25	5	3.3	20.0
D58	Begin suddenly and get worse	124	14	10	8.1	71.4
D59a	Often worried about another	108	28	10	9.3	35.7
D59b	Something terrible happening	107	33	21	19.6	63.6
D59c	Changed everyday activities	107	44	30	28.0	68.2

answer to the question, their initial 'no' response was changed and 'yes' was entered into the computer as the final response for the item.

The addition of structured probes and follow-up questions in our addendum was consistent with the directions given in the *CIDI-Auto Interviewer's Manual* (World Health Organization, 1997b) stating that the interviewer should do their best to ensure that interviewees are responding to the *intent* of the question and are not contradicting themselves. The manual further states that any probes added to the interview should be non-directive in nature (World Health Organization, 1997b) and we believe that our probes achieved that goal.

Results

A total of 269 patients completed a CIDI interview with an addendum for the panic disorder module. Table 1 illustrates the frequencies of 'no' responses to the key items and, therefore, the frequency with which the addendum probe questions were used. In addition, the frequency with which the probe resulted in a change in a response is noted in the latter three columns. Of the total group of 269 respondents, 170 did not receive a panic disorder diagnosis on the CIDI despite the use of the addendum, 82 respondents received a panic disorder diagnosis on the CIDI and would have done so regardless of the use of the addendum, and 17 respondents received a panic disorder diagnosis that they would not have received if the addendum had not been used. Thus, the addendum resulted in a 21% increase in the number of panic disorder patients diagnosed in this sample. There was no difference on ASI scores between patients whose responses had been changed on the CIDI and those who had not ($t = 1.16$; $p = 0.25$).

False negatives for panic disorder due to CIDI exclusion criteria

The second dilemma posed by the CIDI-Auto was the designation of '3' and '5' when diagnoses are assigned. According to the *CIDI Administrator's Guide* (World Health Organization, 1997a), a patient receives a code of 5 when a diagnosis for a particular disorder is made and receives a code of 3 for a particular disorder when the patient meets the inclusion criteria, but also meets at least one exclusion criterion. A total of 698 interviews were completed and 146 patients received a diagnosis coded 5 for panic disorder and 146 patients received a code of 3 for panic disorder. The remaining patients (n = 406) received no diagnosis of panic disorder. Therefore, equal numbers of patients received 3s and 5s for panic disorder. This was troubling to the investigators because, although a patient receiving a 3 met all the inclusion criteria for panic, a 3 is not considered a diagnosis and therefore large numbers of patients who might benefit from treatment would be excluded from the study.

Our approach to the problem

To determine whether the patients being excluded were truly unlikely to have panic disorder, the scoring algorithm (Peters, Slade and Cooper, 1998) for the CIDI-Auto was examined. The scoring algorithm provides an assignment of 3 for panic disorder under the following conditions:

1. The panic appears not to be clinically significant. For this criterion to be met, the patient must have responded 'no' to *all* of the following:
   a. The patient told a doctor about their panic.
   b. The patient told another professional about their panic.
   c. The patient took medication for panic.
   d. The panic attacks 'interfere with . . . life and activities a lot.'
2. The panic appears to be better accounted for by another mental disorder. This is scored positively when *an*y of the following are present, with an age of onset preceding or concurrent with the age of onset for panic disorder and symptoms occurring at least as recently as symptoms of panic disorder:
   a. Social phobia
   b. Specific phobia
   c. Obsessive-compulsive disorder
   d. Post-traumatic stress disorder

The second criterion operationalizes the hierarchical structure of the CIDI. Within the CIDI, the diagnoses are organized in such a way that some diagnoses take precedence over others, after accounting for onset and recency. For example, if social phobia is present at the same time as panic disorder, social phobia takes precedence and a diagnosis of social phobia is given, whereas a diagnosis of panic disorder is not assigned (coded 3). Further, the rules for social phobia, discussed below, make it impossible for a patient to receive a diagnosis of panic disorder comorbid with social phobia.

Results

Differences in ASI scores were examined for patients who received code of 3 for panic disorder compared with those who received a diagnosis of panic disorder (code of 5) on the CIDI. The ASI scores were significantly different ($t(250) = 3.26$, $p < 0.01$) but the mean for the patients with a code of 3 for panic disorder ($M = 36.17$; $SD = 13.01$) was actually higher than the mean for the patients receiving a diagnosis of panic disorder ($M = 31.17$; $SD = 11.32$). ASI scores were not available for patients who had no diagnosis of panic disorder.

To clarify the situation and facilitate our decisions about including or excluding diagnoses coded 3, we

Table 2. Reasons for receiving a panic disorder diagnosis coded '3'

	N	Per cent	Diagnosis recoded
No interference,[1] no social phobia,[2] no PTSD[3]	17	11.6	Yes
No interference,[1] no social phobia,[2] **concurrent or prior PTSD**	3	2.1	Yes
No interference,[1] **concurrent or prior social phobia,** no PTSD[3]			
Panic occurs only in social situations	2	1.4	No
Panic occurs in non-social situations	2	1.4	Yes
No interference,[1] **concurrent or prior social phobia *and* PTSD**			
Panic occurs only in social situations	1	0.7	No
Panic occurs in non-social situations	4	2.7	Yes
Interference, no social phobia,[2] **concurrent or prior PTSD**	21	14.4	Yes
Interference, **concurrent or prior social phobia**, no PTSD[3]			
Panic occurs only in social situations	6	4.1	No
Panic occurs in non-social situations	42	28.8	Yes
Interference, **concurrent or prior social phobia *and* PTSD**			
Panic occurs only in social situations	6	4.1	No
Panic occurs in non-social situations	42	28.8	Yes
Total: 146			
No panic = 15			
recoded panic = 131			

Note. Bold indicates a condition that, alone, is sufficient for a diagnosis code 3.

[1] Response to a series of questions (consulting a doctor, taking medication, interference) was 'no'.

[2] Patient did not have social phobia or onset of social phobia was after first panic attack.

[3] Patient did not have PTSD or onset of PTSD was after first panic attack.

set out to identify, *for all patients* with a code of 3 for panic, the reason that they received a 3 (it should be noted that, in the present study, we did not administer the obsessive-compulsive disorder module or the specific phobia module and these diagnoses as exclusions were, therefore, not examined). The numbers of patients meeting each possible combination of the exclusion criteria are indicated in Table 2. The final column of this table provides an indication of whether the diagnosis was recoded as panic.

Assessing clinical significance

As stated above, if patients say they did not visit a doctor or other professional about their panic, they did not take medication for their panic, and panic does not interfere with their life and activities a lot, they receive a code of 3 and no diagnosis of panic disorder. However, these patients meet all of the inclusion criteria, including answering 'yes' to questions about at least one of the following:

- often worrying about having another attack;
- worrying about something terrible happening such as dying, losing control, or going crazy; or
- making changes in their everyday activities because of fear of the attacks.

The investigators deemed that answering 'yes' to one of these questions provided sufficient clinical evidence that the panic attacks interfered with the patient's life and answering 'no' to the interference question, alone, should not exclude them from receiving a panic diagnosis.

Comorbid social phobia

The CIDI-Auto assigns a patient a '3' for panic disorder if the patient has a diagnosis of social phobia and the social phobia began prior to or at the same time as the panic attacks and continued at least as long as the panic attacks. As described above, this reflects the hierarchical nature of the CIDI. However, earlier onset, in and of itself, does not necessarily guarantee that the social phobia accounts for the panic disorder. In fact, in studies comparing social phobia and panic disorder, onset of social phobia tends to occur much earlier than onset of panic disorder, even when the panic is not better accounted for by the social phobia (Gelernter, Stein, Tancer and Uhde, 1992; Ball, Otto, Pollack, Uccello and Rosenbaum, 1995) and one study found that 66% of patients with comorbid panic disorder and social phobia had an earlier onset for social phobia than for panic disorder (Andersch and Hanson, 1993). To make a determination of whether social phobia accounts for panic disorder, one needs more information about the context of the panic attacks. Fortunately, the CIDI and the addendum provided this information.

If a patient meets diagnostic criteria for social phobia and panic disorder, the final question in the CIDI panic module asks whether the patient's panic attacks occur only in social situations (the same is true for specific phobia, which was not administered in the present study). However, this question is not taken into consideration when the panic module is scored. Age of onset is the deciding factor, even when patients say that they have panic in non-social situations. Table 2 indicates that, of the 105 patients with comorbid social phobia occurring prior to or concurrent with the onset of panic, 15 patients (14%) reported that their panic attacks occurred *only* in social situations. For these patients, we examined their addendums to obtain descriptions of their panic attacks. The descriptions tended to be consistent with their report of the panic occurring in social situations. For example, they described panic in situations in which they were 'around people' or 'the centre of attention'. The investigators assumed that people in this category were most likely suffering from social phobia and not panic disorder.

Of the 105 patients with comorbid social phobia occurring prior to or concurrent with panic, 90 (86%) reported having panic attacks 'in other situations as well [as social situations]'. A review of these patients' descriptions of their panic attacks was consistent with this report. For example, these patients described their panic attacks as occurring in a variety of situations, such as at home, at work, while driving, on the bus, during sleep, and 'anywhere' or 'at any time'. It was determined that, although the onset of social phobia was prior to or concurrent with the onset of panic disorder, these patients appeared to have comorbid panic disorder. Therefore, this panic disorder exclusion criterion was removed when the patient said that their panic occurred in other situations as well as social situations.

Comorbid post-traumatic stress disorder

Unfortunately, the CIDI does not provide the same type of data for PTSD comorbid with panic disorder as it does for social phobia comorbid with panic disorder. There are no questions asking whether a patient's panic attacks occurred only in situations related to PTSD, probably because it is difficult for a patient (and often a clinician) to make such a distinction. When examining patients' descriptions of the attacks in the addendum, there were no clear patterns of descriptors that coincided with PTSD symptoms, although the occasional patient made reference to traumatic events or symptoms (for example, 'in a fire', 'waking up from a nightmare'), but these accounted for only about 7% of the descriptions. The remaining descriptions were indistinguishable from traditional descriptions of panic. Because it was impossible to confidently distinguish PTSD-related panic from panic not attributable to PTSD in patients with both diagnoses, the investigators opted to remove this as an exclusion criterion. In other situations, however, a different rule might be necessary.

Analyses of reassigned diagnostic status

A one-way analysis of variance was completed examining ASI scores for patients who had an original diagnosis (code 5) compared with patients who originally had a code of 3 that was changed to a diagnosis or to no diagnosis. The ANOVA was significant ($F(2, 249) = 5.30$, $MSE = 148.90$, $p < 0.01$) and *post hoc* analyses revealed differences between patients originally receiving a diagnosis of panic disorder ($M = 31.16$; $SD = 11.32$) and patients whose diagnosis was recoded from 3 to a diagnosis of panic disorder ($M = 36.18$; $SD = 13.25$). However, the mean ASI score for the patients whose diagnosis was changed from a 3 to a panic disorder diagnosis was actually higher than patients who originally qualified for a diagnosis of panic disorder on the CIDI. Of note, patients for whom a code of 3 was recoded as panic disorder did not differ from patients for whom a code of 3 was recoded as no diagnosis ($M = 36.07$; $SD = 11.38$).

No significant differences were found when comparing the 3 groups (original diagnosis, original code 3 changed to diagnosis, and original code 3 changed to no diagnosis) on frequency of full panic attacks in the last week or frequency of limited symptom episodes in the last week. A one-way analysis of variance was significant ($F(3,249) = 3.98$, $MSE = 0.83$, $p < 0.05$) when the four groups were compared on the PDSS panic frequency question and post hoc analyses revealed that patients with an original diagnosis of panic disorder ($M = 1.42$, $SD = 0.78$) had significantly lower scores on this item than patients who had a 3 that was recoded to a panic disorder diagnosis ($M = 1.75$, $SD = 1.05$).

False negatives for social phobia due to CIDI exclusion criteria

As part of our treatment study, we assessed patients for social phobia as a comorbid diagnosis. Upon commencing data analysis, we were again faced with the 3 versus 5 dilemma described above for panic disorder. Of the 698 patients interviewed for social phobia, 160 received a social phobia diagnosis and 54 received a code of 3 for social phobia. The remaining 482 patients received no diagnosis. Therefore, 25.2% of the patients meeting inclusion criteria for social phobia also met an exclusion criterion and therefore received a diagnosis code of 3. A diagnosis code of 3 was less common than in panic disorder, but a large number of patients were still excluded from this diagnostic group.

Our approach to the problem

Similar to panic disorder, above, we set out to determine the reason for obtaining a 3 for social phobia in an effort to aid us in making decisions about the validity of a diagnosis. The scoring algorithm (Peters, Slade and Cooper, 1998) was reviewed and it was determined that patients were coded 3 for social phobia if any of the following conditions were met:

1. The social phobia appears not to be clinically significant. For this criterion to be met, the patient must have responded 'no' to *all* of the following questions:

    a. The patient told a doctor about their fear of social situations.
    b. The patient told another professional about their fear of social situations.
    c. The patient took medication for fear of social situations.
    d. The fear of social situations attacks 'interferes with . . . life and activities a lot.'

2. The patient had a diagnosis of panic disorder, with an onset prior to the onset of social phobia.

Results

Scores on the SPIN were examined for differences between patients receiving a diagnostic code of '3', no diagnosis (5), and a diagnosis of social phobia (1). A one-way analysis of variance was significant ($F(2, 429) = 270.95$, $p < 0.01$) and *post hoc* analyses revealed that all three groups were different from one another. Scores on the SPIN followed the expected pattern, with patients with a diagnosis of social phobia having the highest mean score (M = 38.10, SD = 12.31), followed by patients with a diagnostic code of 3 (M = 32.89, SD = 14.37) and patients with no diagnosis (M = 10.80, SD = 10.43) having the lowest scores.

Table 3 illustrates the pattern of responses to exclusion criteria for the 54 people who obtained a 3 for social phobia. The final column indicates whether patients meeting the associated criteria were reclassified as having social phobia or as not having social phobia. Because our main study pertained to the treatment of panic disorder and not to the treatment of social phobia, we took a more conservative approach when reclassifying 3s as 5s. Therefore, the following is a description of the logic we used to change 3s to 1s or 5s.

Assessing clinical significance

Unlike panic disorder, there is not a series of questions in the social phobia module that could provide further evidence of clinical significance. The CIDI does, however, contain a question about whether patients become upset (anxious, apprehensive, or uneasy) when they are in or anticipating social situations. Patients reporting that they had not consulted a doctor or other professional or taken medication for their fear or avoidance of social situations and that the fear or avoidance of social situations did not interfere with their life and activities a lot, were reclassified as having social phobia only if they said that, when they were in situations where they could be the centre of attention, they usually became anxious, apprehensive, or uneasy and they did not have panic disorder that had an earlier age of onset than their social fears.

Table 3. Reasons for receiving a diagnosis of social phobia coded '3'

	Frequency	Per cent	Diagnosis recoded
No interference,[1] no panic disorder,[2] no upset[3]	6	11.1	No
No interference,[1] no panic disorder,[2] upset	30	55.6	Yes
No interference,[1] **prior panic,** no upset[3]			
Panic occurs only in social situations	0	0.0	Yes
Panic occurs in non-social situations	0	0.0	No
No interference,[1] **prior panic,** upset			
Panic occurs only in social situations	0	0.0	Yes
Panic occurs in non-social situations	3	5.6	No
Interference, **prior panic**, no upset[3]			
Panic occurs only in social situations	0	0.0	Yes
Panic occurs in non-social situations	1	1.9	No
Interference, **prior panic**, upset			
Panic occurs only in social situations	1	1.9	Yes
Panic occurs in non-social situations	13	24.1	No
Total: 54			
No social phobia = 23			
Social phobia = 31			

Note: bold indicates a condition that, alone, is sufficient for a diagnosis code 3.

[1] = Response to a series of questions (consulting a doctor, taking medication, interference) was 'no'.

[2] = Patient did not have panic disorder or onset of panic disorder was concurrent with or after onset of social phobia.

[3] = Response to 'When you were in these situations where you could be the center of attention . . . did you usually become anxious, apprehensive, or uneasy?' was 'No'.

Prior panic disorder

Patients meeting criteria for panic disorder that was present prior to their social fears were reclassified as having social phobia if they said that the panic occurred only in social situations and its onset predated that of social phobia symptoms, regardless of their responses to the interference criterion. If they said that their panic occurred in non-social situations, we could not confidently determine that the social phobia existed as an independent disorder and these patients were therefore reclassified as not having social phobia.

Analyses of reassigned diagnostic status

Based on these revised criteria, we reclassified 31 of 54 (57%) patients as having social phobia and 23 patients (43%) as not having social phobia. An ANOVA examining differences in SPIN scores between the revised diagnostic groups (no original diagnosis, original social phobia diagnosis, reclassified social phobia diagnosis, reclassified no diagnosis) was significant ($F(3, 428) = 180.22$, $p < 0.01$), with significant differences between patients who had no original diagnosis of social phobia compared with the each of the other groups ($p < 0.01$). There were no differences between patients with an original diagnosis of social phobia and those whose status had been changed from 3 to a social phobia diagnosis. The difference between the patients who originally had no diagnosis and the patients who had their status changed from a 3 to no diagnosis is probably due to the fact that patients whose diagnostic status was changed met all of the inclusion criteria for social phobia and, therefore, were likely to have significantly more fears of social situations than patients not meeting inclusion criteria.

Discussion

Instruments such as the CIDI have a valuable place in research. Structured interviews may be required for a number of different research applications, most notably when interviews of large numbers of subjects are necessary. In large studies, it is generally not feasible to hire clinicians to provide diagnostic assessments, and it is preferable to use instruments such as the CIDI that can be administered by lay interviewers or even without an interviewer, saving considerable expense. In addition, a structured interview helps to assure that data collected are reliable across sites; another important feature for an instrument used for large studies. For such applications, the CIDI can be a useful instrument. However, it is subject to the limitations of any structured interview. That is, the results are only as valid as the interview itself.

In the present study, we developed probes for the panic module that we would recommend for use with the CIDI. Other problems, such as the logic of exclusions and the areas in which the CIDI is at odds with the DSM are correctable and exclusion criteria need to be revised. In the meantime, the purpose of the present paper is to recommend one approach to the use of the CIDI. The approach described here is an appropriate one to use, for example, for treatment studies in which the treatment used is likely to be beneficial for people with a variety of anxiety disorders and denying treatment to individuals with a diagnosis of questionable clarity would do more harm than good. In the present study, our treatment consisted of cognitive-behavioural therapy (CBT) combined with pharmacotherapy for panic disorder. The pharmacotherapy was based on an algorithm in which selective serotonin reuptake inhibitors (SSRIs) were the preferred first option. Both CBT and SSRIs are known to be effective for a variety of anxiety and mood disorders and relaxing diagnostic criteria was therefore in the best interest of patients in our study. A different approach would be appropriate when, for example, a treatment is known to work only for a specific disorder, has more serious side-effects, or is otherwise associated with greater risks.

The study under discussion was a treatment study for panic disorder and, as such, it was important that we did not miss patients with panic disorder; the number of apparent false negatives obtained using the unmodified CIDI was unacceptable. Analyses of other measures assessing panic symptoms, such as the ASI and indicators of panic frequency, revealed that patients receiving a code of 3 for panic disorder on the CIDI actually had higher scores than patients with a diagnosis. This reinforced our belief that many of the 3s for panic disorder were false negatives. We added an addendum to the panic module to clarify key symptoms for patients, using probes that contained words or phrases that were easier for the patient to understand or provided an example that a clinician might use. Probes were used when patients answered 'no' to a key question, with the

intent being clarification for the patient and confirmation that they did not, in fact, meet the criterion. We believe that this level of deviation from the CIDI protocol provides a minimal risk of including false positives, while also reducing the number of false negative diagnoses obtained.

We also modified the exclusion criteria for panic disorder after examining additional information provided by the CIDI and our addendum. Based on this information, we chose to exclude from a panic disorder diagnosis only those patients who had concurrent social phobia and stated that their panic attacks occurred only in social situations. In doing so, we chose to err on the side of possibly over-diagnosing panic disorder, recognizing that some of the patients, particularly those with concurrent PTSD, might not be suffering from panic disorder per se.

We also examined the criteria used to exclude patients from a diagnosis of social phobia and, with additional information from other questions, chose to exclude from the diagnosis patients with comorbid panic disorder who said that their panic occurred in non-social situations and patients without panic disorder who answered 'no' to all questions assessing clinical significance and said that they were not 'anxious, apprehensive, or uneasy' in social situations. We reassigned patients with a code of 3 for social phobia to the diagnosis category if they had comorbid panic disorder and said that the panic occurred only in social situations or if they answered no to the clinical interference questions but said that they were anxious, apprehensive, or uneasy in social situations.

Overall, the CIDI-Auto has several advantages that, at first glance, made it appear to be an ideal instrument to use for diagnoses in our study of treating panic disorder in primary care. However, nearly 20% of patients whom we would have considered to have panic disorder would not have received a panic diagnosis had we not included follow-up probe questions in our CIDI Addendum. Of the total number of patients we believe had a diagnosis of panic disorder, nearly half (131 of 277) would have been excluded if we followed the logic of the CIDI and included only those patients with a '5' for panic disorder. Similarly, 16% (31 of 191) of the patients we considered to have a diagnosis of social phobia were initially excluded from having a social phobia diagnosis by the CIDI.

In the development of the CIDI-Auto, considerable effort was undertaken to attend to the details of diagnostic classification set forth in the DSM-IV. However, the CIDI-Auto uses decision rules that do not directly correspond with DSM-IV criteria. For example, it is impossible, using the CIDI-Auto, for a patient to have both panic disorder and social phobia. This is because of the hierarchical nature of the CIDI and the fact that it assigns diagnostic status for these comorbid conditions solely on the basis of age of onset. In clinical practice, a determination would be made about the validity of both diagnoses, taking additional information into account, such as a patient's description of their panic disorder and the settings in which attacks take place. We have made an effort to make our diagnoses more consistent with this practice by taking additional information into account and allowing for comorbid diagnoses where they appear to be appropriate. Lending support to these decisions, Komiti et al. (2001) found that the only diagnostic category that was influenced when hierarchical rules were not applied was panic disorder, for which the kappa value jumped from 0.17 to 0.39 when the CIDI-Auto was compared with clinician diagnoses.

Differentiating comorbid diagnoses is a complex goal that often troubles clinicians and may ultimately be too complicated for a fully structured interview to address adequately. The CIDI criteria for ruling out comorbid diagnoses make for a clean and systematic approach. However, the reality of clinical diagnosis is not nearly as clean or systematic. It is important to note that we administered only a handful of modules and, had more modules been administered (notably OCD and specific phobia), more patients would have been excluded. It is therefore important, when using the CIDI, for researchers to be aware of the CIDI decision rules for comorbidity and to determine if these rules are consistent with the nature and goals of the study.

The extent to which the unmodified CIDI generates false positive diagnoses is an important issue that was not addressed in the current study. Many of the prior studies reported that the CIDI results in a greater number of diagnoses per patient than clinicians (for example, Peters and Andrews, 1995; Rosenman et al., 1997), although there was less consistency when individual diagnoses were examined. Across the studies investigating the validity of

the CIDI when compared to clinician diagnoses, the CIDI was more likely to assign patients with a social phobia diagnosis than were the clinicians (for example, Peters and Andrews, 1995; Brugha et al., 2001; Komiti et al., 2001). However, in one of these studies, the self-administered CIDI-Auto assigned a diagnosis of panic disorder to one-third the number of patients that the clinicians did (Komiti et al., 2001) whereas other studies indicate that the clinicians diagnosed 67–78% of the number of patients diagnosed by the CIDI (Peters and Andrews, 1995; Brugha et al., 2001).

There are several issues to be aware of when comparing results from these studies with those obtained in the present study, prior to concluding that our approach may worsen the problem of the already substantial false positive rate of the CIDI. First, the studies described above indicate that, in addition to false positives, false negatives exist when the CIDI is compared with other diagnostic methods (Peters and Andrews, 1995; Komiti et al., 2001; Brugha et al., 2001). In fact, in the Komiti et al. (1992) study, in which 62 patients were diagnosed with panic disorder by the clinicians and 24 were diagnosed with panic disorder by the CIDI, only 12 patients received a diagnosis from both clinicians and the CIDI. Second, there is no mention of diagnostic codes of '3s' and '5s' in the studies described above and, therefore, it is possible that some of the studies included '3s' when they were reporting rates of diagnosis. Finally, none of the studies uses the current version of the CIDI-Auto (version 2.1), examines the interviewer-administered version, or is from a primary care sample. The bottom line is that, in the present study, we did not investigate, nor do we have data available to determine, the presence of false positives and the relative rate of false positives in the unmodified CIDI versus the CIDI with the modifications we have discussed. As we have already argued, the application for which the CIDI is being used must be taken into account when decisions are made about accepting the CIDI decision rules versus modifying them. In the present study, it was more important that we include patients who might benefit from treatment for panic, rather than exclude those who might not have panic disorder; in other circumstances, the converse might be true.

In the present study, we did not set out to conduct a validation of the CIDI and, as a result, confirmatory information we collected was limited. As we have stated above, a second 'gold standard' interview was not used as a comparison for the CIDI. Such an interview would have been useful, particularly in answering questions about false positive rates, but also to confirm that false negatives were indeed false negatives. Future studies, dedicated to validation of the CIDI, should incorporate such an interview to examine definitively the effects of modifications to the CIDI.

As noted elsewhere (for example, Andrews and Peters, 1998), it is difficult to assess the absolute validity of a diagnostic interview, because clinicians' diagnoses, the measure with which interviews are most commonly compared, are not themselves perfectly reliable. It is recommended that the CIDI-Auto be evaluated closely and the criteria for including cases refined so that the clinical validity of diagnoses can be increased. Further studies are required to determine the logic of the diagnostic rules and any changes to the CIDI-Auto should be based on data and clinical consensus. This could provide a great improvement for the CIDI-Auto and make it a more clinically valid and useable instrument.

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References

Andersch SEO, Hanson, LCF. Comorbidity of panic disorder and social phobia. Eur J Psychiatry 1993; 7: 59–64.

Andrews G, Peters L. The psychometric properties of the Composite International Diagnostic Interview. Social Psychiatry and Psychiatric Epidemiology 1998; 33: 80–8.

Ball SG, Otto MW, Pollack MH, Uccello R, Rosenbaum JF. Differentiating social phobia and panic disorder: a test of core beliefs. Cog Ther Res 1995; 19: 473–82.

Brugha TS, Jenkins R, Taub N, Meltzer H, Bebbington PE. A general population comparison of the Composite International Diagnostic Interview (CIDI) and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). Psychol Med 2001; 31: 1001–13.

Conner KM, Davidson JR, Churchill LE, Sherwood A, Foa E, Weisler RH. Psychometric properties of the Social Phobia Inventory (SPIN)- New self-rating scale. Br J Psychiatry 2000; 176: 379–86.

Gelernter, CS, Stein, MB, Tancer, ME, Uhde, TW. An examination of syndromal validity and diagnostic subtypes in social phobia and panic disorder. J Clin Psychiatry 1992; 53: 23–7.

Hayward C, Killen JD, Kraemer HC, Taylor CB. Predictors of panic attacks in adolescents. J Am Acad Child Adolesc Psychiatry 2000; 39: 207–14.

Hazlett-Stevens H, Craske M G, Roy-Byrne PP, Sherbourne C D, Stein MB, Bystritsky A. Predictors of willingness to consider medication and psychosocial treatment for panic disorder in primary care patients. Gen Hosp Psychiatry 2002; 24: 316–21.

Komiti AA, Jackson HJ, Judd FK, Cockram AM, Kyrios M, Yeatman R, Murray G, Hordern C, Wainwright K, Allen N, Singh B. A comparison of the Composite International Diagnostic Interview (CIDI-Auto) with clinical assessment in diagnosing mood and anxiety disorders. Australian and New Zealand Journal of Psychiatry 2001; 35: 224–30.

Peters L, Andrews G. Procedural validity of the computerized version of the Composite International Diagnostic Interview (CIDI-Auto) in the anxiety disorders. Psychol Med 1995; 25: 1269–80.

Peters L, Clark D, Carroll F. Are computerized interviews equivalent to human interviewers? CIDI-Auto versus CIDI in anxiety and depressive disorders. Psychol Med 1998; 28: 893–901.

Peters L, Slade T, Cooper L. DSM-IV scorer for CIDI 2.1 (SPSS Syntax File). Sydney, Australia: World Health Organization, 1998.

Peterson RA, Reiss S. Anxiety Sensitivity Index Manual. Palos Heights IL: International Diagnostic Systems, 1987.

Rosenman SJ, Korten AE, Levings CT. Computerised diagnosis in acute psychiatry: validity of CIDI-Auto against routine clinical diagnosis. J Psychiatric Res 1997; 31: 581–92.

Roy-Byrne PP, Sherbourne CD, Craske MG, Stein MB, Katon W, Sullivan G, Means-Christensen A, Bystrisky A. Moving treatment research from clinical trials to the real world. Psychiatric Serv 2003; 54: 327–32.

Schmidt NB, Lerew DR, Jackson RJ. The role of anxiety sensitivity in the pathogenesis of panic: Prospective evaluation of spontaneous panic attacks during acute stress. J Abnormal Psychology 1997; 106: 355–64.

Shear MK, Brown TA, Barlow DH, Money R, Sholomskas DE, Woods SW. Multicenter collaborative Panic Disorder Severity Scale. Am J Psychiatry 1997; 154: 1571–5.

Shear MK, Feske U, Brown C, Clark DB, Mammen O, Scotti J. Anxiety disorders measures. In American Psychiatric Association ed. Handbook of Psychiatric Measures. Washington DC: American Psychiatric Association, 2000.

Wing JK, Babor T, Brugha T, Burke J, Cooper JE, Giel R, Jablenski A, Regier D, Sartorius N. SCAN. Schedules for Clinical Assessment in Neuropsychiatry. Arch Gen Psychiatry 1990; 47: 589–93.

Wittchen H-U. Reliability and validity studies of the WHO-Composite International Diagnostic Interview (CIDI): a critical review. J Psychiatric Res 1994; 28: 57–84.

World Health Organization. CIDI-Auto, Version 2.1: Administrator's Guide. Sydney, Australia: World Health Organization, 1997a.

World Health Organization. Composite International Diagnostic Interview, Core Version 2.1: Interviewer's Manual. Sydney, Australia: World Health Organization, 1997b.

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Appendix A: Addendum to the CIDI Panic Module for the CCAP Study

INSTRUCTIONS TO INTERVIEWERS: Please add the following questions to your CIDI interview for all patients. The first questions occur just after finishing the social phobia module, prior to beginning the panic module. The rest of the questions occur within the panic module and should only be asked if the patient says 'No' to the indicated module question. The CIDI question number (e.g., D54) indicates the point in the interview at which the follow-up probe should be used (the CIDI question is printed as well). Read each question as written and probe for details as necessary. Make sure to record Yes and No answers as indicated.

Prior to beginning the panic module:
Now I'd like to ask you about other types of anxiety. As opposed to anxiety in social situations, these next questions will be about anxiety in other situations or in situations when you may not expect to be anxious. These will refer to sudden attacks of intense anxiety.

A panic attack is an episode where, sometimes for no apparent reason, you become suddenly anxious or afraid, together with a number of feelings such as heart racing, faintness, shortness of breath, sweating, or shaking. These attacks come on very suddenly, usually reach their peak in a minute or two, and typically last anywhere from seconds to 10 minutes. Based on this description, have you had any panic attacks in the past 12 months?

YES = 1
NO = 2

IF YES: Can you describe these panic attacks to me? Tell me when they occur, where they occur, what they feel like, and how long they last?

IF NO: Can you tell me about what you experience that may be similar to this?

INSTRUCTIONS TO INTERVIEWERS: Now that you have an idea about the patient's experience of panic, use this to guide you in your interpretation of future answers and to determine if you need to probe or clarify.

During the panic module:
Now I want to ask you some more questions about these attacks. Some of these questions will refer to different time periods or try to understand another perspective by using different words. I apologize if it feels like you've already answered some of these questions.

D54 'Now I would like to ask you about attacks of fear that could happen anywhere. In your entire lifetime, have you ever had an attack when all of a sudden, you felt frightened, anxious, or very uneasy?'

Yes ☐ No ☐

IF NO:
1. Can you tell me how this description differs from what you experience?
2. So, during your attacks, you don't feel afraid or uncomfortable?

FINAL ANSWER (input into computer):

Yes ☐ No ☐

D56 'In answering the following questions, think only of attacks that occurred when you were not in a life threatening situation. Have you more than once had an attack like that which was totally unexpected?'

Yes ☐ No ☐

IF NO:
1. So you wouldn't say that any of your panic attacks occurred 'out of the blue' or when you didn't expect one?
2. Do they ever occur when you are not feeling particularly anxious about something?
3. Do they occur out of your sleep?
4. In what situations do your panic attacks occur? Only in those situations?

FINAL ANSWER (input into computer):

Yes ☐ No ☐

D58 'During your attacks of feeling frightened or anxious, did these problems begin suddenly and then get worse within the first few minutes of the attack?'

Yes ☐ No ☐

IF NO:
Can you describe them for me? How do they usually start and how long to do they last? When do they reach their peak? (INTERVIEWER: A panic attack should have a fairly rapid onset and reach a peak in 10 minutes or less. Should be a *discrete period* of *intense fear* or *discomfort*.)

FINAL ANSWER (input into computer):

Yes ☐ No ☐

D59A 'In the past twelve months, after having one of these attacks, was there a month or more when you often worried that you might have another attack?'

Yes ☐ No ☐

IF NO:
1. So after your experience of panic, you weren't concerned about having additional panic attacks?
2. (If they say they were concerned) How often did you have these concerns? Daily? Weekly? A few times a month?

FINAL ANSWER (input into computer):

Yes ☐ No ☐

D59B 'In the past twelve months, after having one of these attacks, was there a month or more when you were worried that the attacks might lead to something terrible happening, like dying, losing control, or going crazy?'

Yes ☐ No ☐

IF NO:
1. Did you worry that the attacks might mean there was something seriously wrong with you? What did you think they might mean?
2. Did you worry that you might be having a heart attack or an asthma attack?
3. Did you worry that you might hurt yourself or someone else during the attack?

4. Did you worry that you had an unknown serious medical or psychological problem?

FINAL ANSWER (input into computer):

Yes ☐ No ☐

D59C 'In the past twelve months, after having one of these attacks, was there a month or more when you changed your everyday activities because of fear of the attacks?'

Yes ☐ No ☐

IF NO:

1. Was there anything you routinely did to ease your fear about having more attacks?
2. Did you visit the doctor's office more frequently or go to the ER?
3. Was there anything you stopped doing or did less frequently because of fear of the attacks? Like, did you not go out in public as much or did you stop going certain places? Or stop driving your car?
4. Did you change what you did for less than a month? How long?

FINAL ANSWER (input into computer):

Yes ☐ No ☐