

Causes of schizophrenia reported by patients' family members in China

MICHAEL R. PHILLIPS, YONGYUN LI, T. SCOTT STROUP and LIHUA XIN

Background Better methods of assessing patients' and family members' causal models of illness are needed to improve adherence with biomedical interventions and to design services that meet the needs of consumers.

Aims To develop a quantitative measure suitable for assessing the relationship of causal beliefs to expressed emotion, stigma, care-seeking and adherence.

Method The Causal Models Questionnaire for Schizophrenia, which includes 45 causes identified during in-depth interviews with family members, was administered to 245 family members of 135 patients with DSM-III-R schizophrenia in Suzhou and Siping, China at the time of admission to hospital.

Results Respondents, who identified a mean of 2.5 causes (range 1–10, mode 2), attributed 84% of the cause of schizophrenia to social, interpersonal and psychological problems. Hence, their beliefs do not concur with Chinese professionals' ideas about the biomedical causes of schizophrenia. Multivariate analyses identified the socio-economic factors that influence family members' causal beliefs.

Conclusions Despite the complexity of causal models, measures can be developed that will help improve clinicians' communication with patients and understanding of help-seeking behaviours.

Declaration of interest None.

Patients' and family caregivers' causal models of illnesses, which often diverge from clinicians' biomedical models, directly affect care-seeking behaviour (Fosu, 1981) and adherence with biomedical interventions (Kelly *et al*, 1990). Relatives' causal beliefs and attributions are also related to their level of expressed emotion (particularly criticism) towards the patient (Harrison *et al*, 1998; Weisman *et al*, 1998), so decreasing caregivers' high expressed emotion (frequently a goal in the treatment of schizophrenia) requires an understanding of their causal beliefs.

It has, however, proven difficult to develop a satisfactory method of assessing causal models because individuals commonly consider multiple causal explanations at the same time and because beliefs about an illness may change over time. This paper describes the development of the Causal Models Questionnaire for Schizophrenia (CMQS) in China and reports preliminary results of administering this instrument to family members of persons admitted to hospital with schizophrenia.

METHOD

Development of the CMQS

In-depth interviews with over 500 family members of patients with schizophrenia from both urban and rural locations in China were conducted by M.R.P. during the provision of family counselling and the administration of an expanded Chinese version of the Camberwell Family Interview (Phillips & Xiong, 1995). These interviews generated a list of 45 folk explanations of schizophrenia that were grouped into six causal classes (listed in Table 1) and incorporated into the CMQS. The preliminary instrument was piloted on 100 family members of patients with schizophrenia. The instrument was then revised and a detailed instruction manual on the administration and coding of the

instrument was written (English translations of the questionnaire and coding manual are available from the first author upon request).

The final version of the CMQS, which takes 15–20 minutes to administer, includes four steps: (a) respondents, who are interviewed individually, are asked in an open-ended manner about their current and past beliefs about the causes of the first occurrence of the 'problem' that led to admission to hospital; (b) the 45 causes (excluding causes spontaneously reported) are read one at a time and respondents are asked whether they ever thought that the stated reason was a cause of the 'problem' – if so, they classify the strength of its relationship to the problem as 'definite', 'definite but secondary' or 'possible'; (c) respondents then rank all endorsed causes according to the time they first thought of them and according to their perceived importance at the time of the interview; (d) respondents identify the person(s) who first mentioned each endorsed cause and indicate whether the perceived importance of each cause changed after the respondent made contact with psychiatrists.

Relative importance of different causes

A simple measure of the importance of a specific causal explanation for schizophrenia (or any other illness) is the proportion of respondents who identify the cause or, if there is more than one respondent for a particular patient, the proportion of patients for whom at least one respondent identifies the cause. The problem with these proportional measures is that they do not take into consideration the relative importance of causes attributed by respondents (Matschinger & Angermeyer, 1996), the number of causes identified by each respondent or the number of respondents per patient.

To overcome this problem, we developed the following weighting algorithm to assess the relative importance of each endorsed cause: the weighted importance of a specific cause for a single respondent equals $200 \times (\text{number of causes reported by respondent} - \text{rank of cause} + 0.5)$ divided by the square of the number of causes reported by the respondent.

This algorithm generates weighted importance measures (range 0–100) for each endorsed cause; the total weighted importance for all causes for a single respondent

equals 100. If there are multiple respondents per patient, the weighted importance is the sum of the weighted importance of the cause for all respondents divided by the number of respondents. The weighted importance for a class of causes is the simple sum of the weighted importance of all specific causes included in the class. This weighted importance measure is more sensitive than proportional measures to differences between groups of respondents (or patients) and to changes in respondents' causal models over time. The test-retest and interrater reliabilities of the weighted importance measures are satisfactory: re-evaluation of 29 CMQS family member respondents by a different interviewer (who was blind to the original result) an average of 33 days (range 21–45) after a first evaluation resulted in a mean intraclass correlation coefficient of the weighted importance measure for the six classes of causes of 0.67 (range 0.30–1.00).

Sample characteristics

The CMQS was administered to 245 family members (who gave written consent) who were the principal caregivers of 135 consecutively admitted patients with DSM–III–R schizophrenia (American Psychiatric Association, 1987) at the time of admission to Guangji Hospital in Suzhou and Jilin Provincial Neuropsychiatric Hospital in Siping. The interviewers (Y.L. and L.X.) were attending psychiatrists who received 10 hours of training with the instrument.

The patients – 57 men (42%) and 78 women (58%) – had a mean age of 28.1 years (s.d.=6.5, range 16–42), a mean of 10.1 (s.d.=3.2) years of schooling (range 0–17), a mean duration of illness of 2.4 years (s.d.=1.6, range 0.5–6.3) and a mean of 1.6 (s.d.=0.8) admissions (range 1–5). This was the first admission for 81 (60%) of the patients.

Two family members were interviewed (independently) from 110 patients' families, and one family member was interviewed from 25 patients' families. The 245 respondents – 120 men (49%) and 125 women (51%) – had a mean age of 48.2 years (s.d.=12.4, range 20–75) and a mean of 7.4 (s.d.=4.0) years of schooling (range 0–17). Respondents included 94 mothers, 68 fathers, 54 spouses, 17 siblings and 12 other relatives. Of the respondents, 193 (78.8%) lived with the patient.

The following factors potentially relating to family members' causal models were also assessed.

Table 1 Chinese family members' beliefs about the causes of schizophrenia in 135 patients as assessed at admission using the Causal Model Questionnaire for Schizophrenia (CMQS)

| Class of cause Cause ² | Number of patients for whom respondents reported this cause | | | Weighted importance of this cause | |
|--|--|-------------|-------------------|--------------------------------------|------|
| | n | % | Rank ³ | Weight ⁴ | Rank |
| Social environment⁵ | 104 | 77.0 | – | 38.673 | – |
| Stress | 66 | 48.9 | 2 | 19.752 | 1 |
| Work pressure | 29 | 21.5 | 6 | 5.695 | 5 |
| Financial difficulties | 23 | 17.0 | 7 | 3.735 | 7 |
| Bad methods of upbringing | 15 | 11.1 | 10 | 2.342 | 11 |
| Problems in studies | 10 | 7.4 | 13 | 2.110 | 13 |
| Illness/death of family member | 8 | 5.9 | 14 | 2.438 | 9 |
| Conflicts among patients' relatives | 6 | 4.4 | 17 | 0.868 | 23 |
| Social environment (e.g. media) | 5 | 3.7 | 19 | 0.622 | 25 |
| Other social causes | 4 | 3.0 | 23 | 0.926 | 19 |
| Cultural influence | 2 | 1.5 | 27 | 0.185 | 31 |
| Personal characteristics of patient⁵ | 90 | 66.7 | – | 23.461 | – |
| Personality problems | 81 | 60.0 | 1 | 17.784 | 2 |
| Too much thinking | 34 | 25.2 | 4 | 5.203 | 6 |
| Alcohol or drug misuse | 2 | 1.5 | 27 | 0.370 | 28 |
| Low educational level | 1 | 0.7 | 31 | 0.104 | 34 |
| Patient's interpersonal relationships⁵ | 85 | 63.0 | – | 21.809 | – |
| Conflict in non-family relationships | 38 | 28.1 | 3 | 8.270 | 3 |
| Problems with marital engagement | 33 | 24.4 | 5 | 7.675 | 4 |
| Conflict with spouse | 17 | 12.6 | 9 | 3.452 | 8 |
| Conflicts with in-laws | 8 | 5.9 | 14 | 1.492 | 17 |
| Conflicts with other relatives | 5 | 3.7 | 19 | 0.920 | 20 |
| Physical/biological factors⁵ | 40 | 29.6 | – | 7.597 | – |
| Hereditary factors | 19 | 14.1 | 8 | 2.397 | 10 |
| Fatigue | 12 | 8.9 | 12 | 1.911 | 15 |
| Other physical illnesses | 5 | 3.7 | 19 | 1.271 | 18 |
| Head injury | 5 | 3.7 | 19 | 0.880 | 22 |
| Physical/biological deficiency | 2 | 1.5 | 27 | 0.203 | 30 |
| Other physical problems | 1 | 0.7 | 31 | 0.484 | 27 |
| Physical exhaustion | 1 | 0.7 | 31 | 0.278 | 29 |
| Menses | 1 | 0.7 | 31 | 0.173 | 32 |
| Spiritual/mystical factors⁵ | 21 | 15.6 | – | 3.799 | – |
| Spirit possession | 14 | 10.4 | 11 | 2.189 | 12 |
| Fate | 6 | 4.4 | 17 | 0.700 | 24 |
| Effect of previous lives | 3 | 2.2 | 25 | 0.619 | 26 |
| Religious reasons | 2 | 1.5 | 27 | 0.172 | 33 |
| Other spirit-related causes | 1 | 0.7 | 31 | 0.063 | 35 |
| Geomancy | 1 | 0.7 | 31 | 0.056 | 36 |
| Miscellaneous causes⁵ | 14 | 10.4 | – | 4.663 | – |
| Qigong (exercise regimen) | 7 | 5.2 | 16 | 2.076 | 14 |
| Other miscellaneous causes | 4 | 3.0 | 23 | 1.687 | 16 |
| Harmed by others | 3 | 2.2 | 25 | 0.900 | 21 |

1. Responses from 245 family members are considered; 110 patients had two family member respondents (assessed independently) and 25 patients had one family member respondent.

2. Nine causes considered by the CMQS were not reported by any of these respondents: brain disease; infection/germs; nutritional problems; retribution for evil deeds; political problems; masturbation; other psychological problems; climate; use of bad or incorrect medication.

3. Causes endorsed for the same number of patients are given the same (highest) rank.

4. See text for method of computing weights.

5. For the classes of causes, *n* represents the number of patients for whom at least one of the specific causes in the class is reported, and the 'weighted importance' is the combined weight of the specific causes in the class.

- (a) Patients' marital status: 59 (43.7%) were currently married and 76 (56.3%) were not.
- (b) Patients' work status: 98 (72.6%) were currently working and 37 (27.4%) were not.
- (c) Patients' health insurance status: 85 (63%) had insurance and 50 (37%) did not.
- (d) Patients' location of residence: 19 (14.1%) were from rural villages and 116 (85.9%) were from urban or suburban areas.
- (e) Overall severity of symptoms at the time of admission: the mean total score for the 21-item Brief Psychiatric Rating Scale (BPRS; Overall & Gorham, 1962) was 34.9 (s.d.=10.4, range 9–68).
- (f) Severity of negative symptoms at admission: the mean total score for the revised Chinese version of the Scale for the Assessment of Negative Symptoms (SANS–CV; Phillips *et al*, 1991) was 23.5 (s.d.=16.0, range 0–69).
- (g) Mean per capita monthly income of the patients' households: 265 yuan (s.d.=236, range 47–1500).
- (h) Family members' subjective reports of the overall effect of the patients' condition on the family in the previous three months, rated on a four-point scale (0–none; 1–mild; 2–moderate; 3–severe): the mean effect reported was 2.4 (s.d.=0.8, range 0–3).

Statistical methods

Several of the patient and respondent characteristics are related to each other, so multivariate analyses were employed in order to identify factors independently related to respondents' causal beliefs. Logistic regression was used to determine the predictors of the dichotomous outcomes (i.e. whether or not at least one family member reported a cause in each class of causes), and multiple linear regression was used to determine the predictors of the continuous outcomes (i.e. the weighted importance of each causal class). The following variables were considered: patients' gender, age, years of schooling, location of residence (rural *v.* urban), marital status (currently married *v.* not currently married), employment status (currently working *v.* not currently working), duration of illness, number of admissions to hospital (single *v.* multiple), health insurance status (insured *v.* uninsured), BPRS total score at

index admission, SANS–CV total score at admission, effect of the illness on the family over the previous three months, mean family per capita income, and the mean age and years of schooling of the family member(s) who completed the CMQS. All variables were present for all cases (i.e. $n=135$ for all analyses).

RESULTS

Endorsed causal models

The 245 respondents endorsed 36 of the 45 causes considered by the CMQS a total of 614 times. The mean number of causes endorsed per respondent was 2.5 (range 1–10, mode 2). As shown in Table 1, the ranked importance of the 36 causes based on the proportion of patients for whom at least one respondent reported each cause is different from the ranked importance based on the weighted importance that respondents attribute to each cause. The proportion and weighted importance methods of assessing the importance of the different classes of causes also generate different results.

Respondents attributed more than 84% of the 'cause' of schizophrenia (i.e. the proportion of the combined importance of all causes) to social, interpersonal and psychological problems; biological and spiritual causes accounted for less than 12% of the overall cause. The most important individual folk causes reported are 'stress', 'personality problems' and 'conflicts in non-family relationships'. None of the respondents endorsed 'brain disease' as a cause of their relative's illness, and alcohol or drug misuse was identified as a cause for only two of the 135 patients.

Respondents identified 275 'most important' causes; in 69% (189/275) of cases this was also the first cause considered at the onset of the illness. The relative ranking of the most important causes and of the first causes considered is similar to the ranking by weighted importance presented in Table 1. In 92% of cases (567/614), respondents identified themselves as the first person to consider the endorsed cause. Only four respondents reported changing their beliefs about the cause of schizophrenia after contact with psychiatrists.

Independence of the classes of causes

There were no significant positive correlations between the weighted importance of the six classes of causes; this indicates

that the classes of causes are independent constructs. There were, however, several significant negative correlations: respondents who endorsed social environmental causes were unlikely to concurrently endorse interpersonal relationship causes (Spearman's ranked correlation coefficient $r_s=-0.44$, $n=135$, two-tailed $P<0.001$), personal characteristic causes ($r_s=-0.41$, $P<0.001$), physical–biological causes ($r_s=-0.27$, $P=0.002$) or miscellaneous causes ($r_s=-0.23$, $P=0.008$); and respondents who endorsed personal characteristic causes were unlikely concurrently to endorse spiritual–mystical causes ($r_s=-0.27$, $P=0.001$).

Predictors of the use of different types of causal model

Table 2 presents the results of multivariate analyses of the relationship between patient and respondent characteristics and family members' causal beliefs. Logistic regression analyses and multiple regression analyses identified identical predictor analyses for the endorsement of social environment causal models (lack of health insurance), of causal models involving patients' personal characteristics (urban residence and a high level of education in the patient) and of spiritual or mystical causal models (rural residence). Both analyses identified a relatively low level of symptoms on admission as an independent predictor for belief in causal models involving a patient's interpersonal relationships, but the multiple regression analysis also identified another independent predictor: a relatively mild effect of the patient's illness on the family (as reported by respondents). The multiple regression analysis identifies a single important predictor of the use of physical and biological causal models (a short duration of illness), while the logistic regression analysis identified three independent predictors (few admissions to hospital, current marriage and current unemployment).

DISCUSSION

Causal models and explanatory models

Causal models of illness are an important component of what Kleinman (1980) has called 'explanatory models' – the notions that people have about the classification, causes, course and appropriate management of an episode of illness. These beliefs profoundly affect care-seeking behaviour

Table 2 Characteristics that remain significantly related to endorsement of different classes of cause by family members of 135 patients with schizophrenia after adjusting for other patient and respondent characteristics¹

| Class of cause | At least one family member reports this type of cause ² | | | Weighted importance of the type of cause ³ for the patient | | | | |
|---|--|---------------------|-------------|---|--|---------|-------|--------|
| | Predictive variable(s) | Adjusted odds ratio | (95% CI) | P | Predictive variable(s) | β | T | P |
| Social environment | Health insurance (0=no, 1=yes) | 0.57 | (0.35–0.93) | 0.0243 | Health insurance (0=no, 1=yes) | –0.2485 | –2.96 | 0.0037 |
| Personal characteristics of the patient | Rural resident (0=no, 1=yes) | 0.33 | (0.18–0.61) | 0.0004 | Patient's years of schooling | 0.3305 | 3.89 | 0.0002 |
| | Patient's educational level (0=low, 1=high) | 1.94 | (1.26–2.99) | 0.0027 | Rural resident (0=no, 1=yes) | –0.1685 | –1.98 | 0.0495 |
| Patient's interpersonal relationships | BPRS total score on admission (0=low, 1=high) | 0.63 | (0.44–0.90) | 0.0113 | BPRS total score on admission | –0.2260 | –2.69 | 0.0080 |
| | | | | | Effect of illness on family (0=none, 1=mild, 2=moderate, 3=severe) | –0.2225 | –2.65 | 0.0090 |
| Physical and biological factors | Number of psychiatric admissions (0=single, 1=multiple) | 0.50 | (0.32–0.78) | 0.0025 | Duration of illness (years) | –0.2202 | –2.60 | 0.0103 |
| | Currently married (0=no, 1=yes) | 1.64 | (1.09–2.46) | 0.0181 | | | | |
| | Currently working (0=no, 1=yes) | 0.62 | (0.40–0.97) | 0.0356 | | | | |
| Spiritual and mystical factors | Rural resident (0=no, 1=yes) | 2.40 | (1.40–4.12) | 0.0015 | Rural resident (0=no, 1=yes) | 0.2888 | 3.48 | 0.0007 |

BPRS, Brief Psychiatric Rating Scale.

1. The patient and respondent characteristics considered are described in the text.

2. Logistic regression models are used with a stepwise inclusion of variables. The dependent variable is whether or not at least one family respondent for the patient reported at least one of the specific causes included in each category (see Table 1). To simplify the interpretation of the odds ratios, patients' years of schooling and the BPRS total scores were dichotomised into high and low groups (with the median as the cut-off point).

3. Multiple regression models are used with a stepwise inclusion of variables. The dependent variable is the inverse transformation of the weighted importance of each class for each patient; the inverse transformation is used because this resulted in a normal distribution of errors.

and adherence to recommended interventions, so understanding sufferers' explanatory models is essential to improving the quality and appropriateness of clinical care. There have been several attempts to operationalise the explanatory model approach (Eisenbruch, 1990; Weiss, 1997; Lloyd *et al.*, 1998), but none of them has become widely used in clinical settings as yet.

Methodological issues in the assessment of causal models

Given large cultural differences in causal beliefs about mental illness (Patel, 1995), clinical application of the explanatory model approach requires the development of culture-sensitive measures of causal beliefs. The method of developing measures of causal beliefs and of coding and weighting the results can be the same cross-culturally, but the specific causes identified and the grouping of these causes into classes will be different in different settings.

Despite the complexity of causal beliefs, this study demonstrates that a quantitative measure of causal models of schizophrenia can be developed after preliminary qualitative research (using in-depth interviews) has

identified the causal explanations employed by members of the target community. The weighting algorithm employed by the CMQS makes it possible to adjust for a variety of common situations not addressed by other instruments, such as different numbers of causes reported by respondents, different levels of importance ascribed to reported causes by respondents and different numbers of respondents per patient.

The weighted importance measure of the different classes of cause provides a better reflection of the complexity of causal beliefs than dichotomous proportional measures. It is, therefore, a suitable parameter for comparisons across different groups of respondents, for comparison within a group of respondents over time, for identifying important predictors of different causal beliefs, and for assessing the relationship of causal beliefs to the level of expressed emotion, stigma, care-seeking behaviour and adherence.

Interpretation of the findings in China

These CMQS results indicate that Chinese family members' beliefs do not concur with

Chinese professionals' ideas about the biomedical causes of schizophrenia (Kleinman, 1986). The predominance seen in our respondents of psychosocial causal models of schizophrenia over physiological models has also been reported in the general public and among caregivers in both developed and developing countries (Furnham & Bower, 1992; Karanci, 1995; Jorm *et al.*, 1997). The infrequent identification of alcohol or drug misuse as a cause of schizophrenia is related to the low (though increasing) prevalence of these conditions in mainland China (Cooper & Sartorius, 1996).

The use of physical and biological causal models is predicted by a short duration of illness and a single admission to hospital. Early in the course of the illness, Chinese families of patients with schizophrenia often seek out multiple forms of treatment for the patient before coming to psychiatry (Phillips, 1993) because they hope to find a biological cause that can be 'cured'. These somatic causal models are reluctantly discarded as the illness progresses, but they are not replaced by the professional's biomedical model which considers schizophrenia a biological 'disease of the brain'.

Despite the apparent similarity of 'social environment' and 'interpersonal relationships', the strong negative correlation of the weighted importance of these two classes of cause ($r_s = -0.44$) indicates that they are independent classes of cause for Chinese caregivers. The different predictive factors identified in the multivariate analyses confirms this finding: lack of health insurance predicts belief in social environment causal models (e.g. stress, work pressure, financial difficulties, etc.), whereas a low severity of symptoms and a relatively mild effect of the illness on family members predict belief in causal models related to the patient's interpersonal relationships. In China the lack of health insurance (seen in 37% of our sample) is a marker for persons who do not have a stable job or access to social support services and are therefore susceptible to a variety of social stressors; it is understandable that family members would identify these stressors as the causes of a mental illness. We hypothesise that the association of social relationship causal models with mild forms of the illness occurs because the illness of patients with less florid psychotic symptoms who create less social disruption is more likely to be interpreted by family members as an exacerbation of 'normal' interpersonal conflicts than is the illness of patients with more bizarre symptoms and disruptive behaviour.

Family members of well-educated urban patients are more likely to employ 'internal' attributions which tend to blame the illness on some defect in the patient (such as 'personality problems'). Rural respondents are more likely to employ 'external attributions' which attribute the illness to factors outside the patient's control (such as spiritual and mystical forces). The relatively low importance ascribed to spiritual and mystical causes is probably related to the low proportion of respondents from rural areas (58 of 245), where such belief systems are still prevalent (Li & Phillips, 1990).

Changing family members' causal models

An important practical issue is the extent to which caregivers' beliefs and attributions are alterable. Our respondents reported that their ideas about the causes of illness changed little after contact with psychiatrists. This may be partly due to the high proportion of first-admission patients in the study (81 of 135) who had little prior contact with psychiatrists, and to the disinclination of

CLINICAL IMPLICATIONS

- Knowledge of patients' and family members' beliefs about the cause(s) of mental illnesses is an important step in the management of these illnesses.
- Qualitative and quantitative methods can be combined to develop easy-to-use instruments that accurately assess causal models of illness.
- Family members of patients with schizophrenia usually have different ideas about the causes of schizophrenia from the clinicians who treat them.

LIMITATIONS

- Causal explanations provided by family members of patients with schizophrenia in China are probably different from those of family members in other countries.
- Causal explanations provided by family members at the time of the patient's admission to hospital may differ from those provided during the remission phase of schizophrenia.
- The usefulness of the Causal Model Questionnaire for Schizophrenia (CMQS) in improving the quality of clinical care has not yet been assessed.

MICHAEL R. PHILLIPS, MD, Beijing Hui Long Guan Hospital, Beijing, China and Department of Social Medicine, Harvard Medical School, Cambridge, MA, USA; YONGYUN LI, MD, Guangji Hospital, Suzhou, China; T. SCOTT STROUP, MD, Department of Psychiatry, University of North Carolina at Chapel Hill, NC, USA; LIHUA XIN, MD, Jilin Provincial Neuropsychiatric Hospital, Siping, China

Correspondence: Dr R. Phillips, Research Center of Clinical Epidemiology, Beijing Hui Long Guan Hospital, Beijing 100096, People's Republic of China

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Chinese psychiatrists to educate family members about the illness (Phillips, 1993).

Interventions focused on changing family members' beliefs about the causes of schizophrenia ('attributional retraining') may result in beneficial decreases in the level of expressed emotion (particularly hostility) towards the patient (Brewin, 1994), but there is as yet no conclusive evidence to support this hypothesis. If true, the hypothesis would be of particular importance in China and in other developing countries where more than 90% of patients with schizophrenia live with family members, and where the family makes most of the health care decisions for the patient (Phillips, 1998).

Future work

There are a variety of uses for semi-quantitative causal model questionnaires such as the CMQS. Improved methods of assessing

patients' and family members' causal models will increase understanding of poor adherence and could be used to help improve health care services. Comparison of beliefs about the causes of an illness for different types of patients (e.g. male *v.* female, young *v.* old) helps to clarify the role that sociocultural factors play in the understanding and management of illness episodes. Comparison of causal models between different subgroups of respondents (e.g. spouses *v.* patients, fathers *v.* mothers) identifies discordant views within families that should be a focus for family interventions. Changes in the relative importance of attributed causes over time could measure the effectiveness of psycho-educational interventions. Furthermore, the specific causal explanations could be re-classified into different categories in order to address different theoretical issues, such as the relationship between internal *v.* external attribution of illness and outcome.

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