

The Structured Interview for Schizotypy (SIS): A Preliminary Report

by Kenneth S. Kendler,
Jeffrey A. Lieberman, and
Dermot Walsh

Abstract

This article presents a new interview-based research instrument for assessing schizotypal symptoms and signs. The Structured Interview for Schizotypy (SIS), which was developed from experience gained in a large, controlled family study of schizophrenia in the west of Ireland and has been field-tested in three other locations, differs from previously available interviews in that it includes: (1) built-in contextual assessments of the pathological nature of certain symptoms (e.g., suspiciousness or ideas of reference); (2) multiple independently scored items, most with closed response options, per symptom scale; (3) extensive assessment of schizotypal signs; (4) symptom probes designed to make responding positively appear nondeviant; and (5) coverage of potentially relevant symptoms and signs not required in current criteria for schizotypal personality disorder. Schizotypal symptoms can be assessed with high reliability by the SIS. When sufficient variability is present, schizotypal signs are also reliably assessed by the SIS, although the reliability is generally lower than that found for symptoms. In three independent pilot studies, schizotypal symptoms and signs assessed by the SIS appear to discriminate significantly the relatives of schizophrenic patients from relatives of controls.

The belief that schizophrenia-like personality disorders aggregate in relatives of schizophrenic patients can be traced back to Kraepelin and Bleuler (Kendler 1985). During the last two decades, a number of controlled family and adoption studies

have documented an increased risk for these disorders in biological relatives of schizophrenic patients (e.g., Kety et al. 1968, 1975; Stephens et al. 1975; Kendler and Gruenberg 1984; Baron et al. 1985). Recent evidence for linkage of schizophrenia to markers on chromosome 5 was based, in large measure, on the classification of relatives using phenotypes in the schizophrenia spectrum (Sherington et al. 1988).

As measurement is often a rate-limiting step in research on psychopathology, a number of investigators in the last 15 years have attempted to develop instruments to measure "schizotypy," which we define, after Rado (1953), as "the hypothesized personality-like expression of a schizophrenia genotype." These instruments have usually taken the form of either self-report (paper-and-pencil) inventories (Grove 1982) or interview-based assessments. Many self-report instruments for schizotypy have been proposed, most notably by Chapman and colleagues (e.g., Chapman et al. 1976, 1980, 1982; Eckblad and Chapman 1983; Chapman and Chapman 1987), but also by others (e.g., Goldin and Meehl 1979; Launey and Slade 1981; Claridge and Broks 1984; Rust 1987).

Although the empirical evidence linking schizotypy to schizophrenia comes entirely from face-to-face interviews of relatives of schizophrenic patients, less effort has been expended on the development of interview-based assessments of schizotypy. To our knowledge, there are only three published interview-

Reprint requests should be sent to Dr. K.S. Kendler, Dept. of Psychiatry, Medical College of Virginia, P.O. Box 710, Richmond, VA 23298.

based instruments that focus specifically on the assessment of schizotypy. Brief sections on schizotypal personality disorder are present in several recent instruments developed for the assessment of all *DSM-III* (American Psychiatric Association 1980) personality disorders (Pfohl et al. 1983; Spitzer et al. 1986; Loranger 1988).

Meehl, in 1964, proposed his "Checklist of Schizotypic Signs," which listed, often with a detailed description, 25 symptoms and 20 signs considered to be indicative of schizotypy. No structured questions were provided, and many of the symptoms required very high degrees of inference (e.g., hatred of mother, narcissism, and counter-transference strain).

Khoury et al., in 1980, proposed the Symptom Schedule for the Diagnosis of Borderline Schizophrenia (SSDBS), based on the symptoms of borderline schizophrenia as proposed by Kety et al. (1968), which were in turn heavily influenced by the writings of Hoch and others in the psychoanalytic tradition (Kendler 1985). The scale contained eight symptoms and no signs, including "intense preoccupation with perverse sexuality," "altered perception of body image," and "self-inflicted injuries." On a review of interviews from the Danish Adoption Study of Schizophrenia, Khoury et al. (1980) showed that the total scale score (although apparently not scores on individual items) was relatively reliable and replicated, with reasonable accuracy, the clinician's diagnosis of borderline schizophrenia.

Finally, in 1981, Baron et al. proposed the Schedule for Schizotypal Personalities (SSP), based on the eight items that constitute the criteria for *DSM-III* schizotypal per-

sonality disorder. These criteria had been proposed in 1979 by Spitzer et al. based on a review of interviews from the Danish Adoption Studies of schizophrenia (Kety et al. 1975) and were adopted into *DSM-III*. The SSP provides a series of structured probes for "groups of items" in each of nine scales (with schizotypal item No. 4 being divided into illusions and derealization-depersonalization). For example, scale 1 ("Illusions") consists of four groups of questions on visual illusions, auditory illusions, tactile illusions, and other illusions, each with several structured probes. The answers to the individual probes are not recorded. Rather, the interview provides a global score for each group of items on a 4-point intensity scale. An unusual feature of this scale is the conversion of what are usually considered "signs" into symptoms. Thus, to assess "facial" flat affect, the SSP has the interviewer ask the respondent:

Do people often say that your face looks like a blank screen? Or that you have a "poker face"? That it is impossible to know what you are feeling because you show little or no facial expression?

Baron et al. (1985) report good interrater and test-retest reliability for most of their scales. The mean (\pm SD) intraclass correlation on 25 joint interviews with relatives of schizophrenic patients for the nine scales was 0.86 ± 0.07 . The validity of this instrument was subsequently demonstrated in a large family study where it successfully identified much higher rates of schizotypal personality disorder in relatives of schizophrenic patients than in relatives of matched normal controls (Baron et al. 1985). In addition, the reliability of the SSP and its ability

to predict clinician's diagnosis was tested by Perry et al. (1984), who found interrater reliability based on videotaped interviews of patients and symptomatic volunteers for the nine scales to be very similar to that of Baron et al. (1985) (0.85 ± 0.12).

Limitations of Available Interview-Based Assessments

In our review of the available instruments, and in our extensive experience with the problems of measuring schizotypy in a large controlled family study of schizophrenia, a number of potentially important limitations of the available interview-based assessments of schizotypy became evident.

First, the two instruments that propose specific questions for assessing schizotypy, the SSDBS and the SSP, both throw away information by coding only a "global" score on the individual symptom dimensions rather than the responses to individual questions. This approach might be appropriate if the main goal were only to determine the presence or absence of a given a priori list of global schizotypal symptoms. However, given the shaky empirical basis of our current knowledge of the optimal set of schizotypal symptoms/signs (Spitzer et al. 1979), it seems unwise to restrict the information unnecessarily to a priori global items.

Second, the SSP, *DSM-III*, and *DSM-III-R* (American Psychiatric Association 1987) confound schizotypal symptoms and signs. For example, we found a number of individuals who responded positively to many "suspiciousness" questions, but who were extremely friendly and helpful during our home visit to them. We also found individuals

who denied the "symptom" of suspiciousness, but were quite guarded and suspicious during our contact with them. In addition, preliminary analysis of results from the Roscommon Family Study (Kendler et al., unpublished data) indicates that the sign of suspiciousness is much more accurate at detecting relatives of schizophrenic patients than is the symptom.

Third, none of the previous instruments adequately dealt with the problem that contextual judgment is sometimes needed to score schizotypal symptoms properly. For example, we met an individual who had a very disfiguring facial injury. He responded positively to many of the probes for ideas and reference, such as feeling looked at and talked about in public. We felt quite sure that he was accurate in his perceptions. Similarly, we met an elderly widow who responded positively to many of the probes for suspiciousness but told us that there had been two robberies, one with a brutal beating, in her housing estate in the last 2 months. Again, the interviewer assessed her "suspicious" symptoms as being perfectly understandable. Similar problems arose in the interpretation of magical thinking and social isolation.

Fourth, some of the probes designed to elicit schizotypal symptoms inevitably sound "strange" or "odd" to nonpatient populations. None of the previous interview instruments for schizotypy satisfactorily addressed this problem. To increase the general acceptability of the interview and to minimize the suppression of symptoms by respondents who do not wish to appear "odd," we felt it was important that key symptom probes be carefully drafted so as to seem as inoffensive as possible.

Fifth, none of the available interview-based instruments for schizotypy use some important principles of survey research. Compared to the open-ended questions used exclusively in previous interviews for schizotypy, closed-option items have two important advantages: (1) they are more time efficient (i.e., one can ask more of them in the same time period), and (2) they make it easier for respondents to admit to deviant symptoms. In addition, since survey researchers have developed questions for such variables as social isolation/integration, it makes little sense for psychiatrists to "reinvent the wheel" for such well-established dimensions by devising their own questions.

Sixth, until now, little or no cross-fertilization has occurred between self-report and interview-based assessments of schizotypy. In view of the effort that has gone into the construction of the numerous self-report measures, it made sense that some of that work could be successfully adapted to an interview-based format.

Finally, the subject domain was somewhat restricted in previous interview-based assessments of schizotypy. The scale of Khouri et al. (1980) was heavily weighted toward symptoms of pseudoneurotic schizophrenia, while the SSP was tied to *DSM-III* criteria for schizotypal personality disorder. Clinical experience and previous research have suggested several other dimensions that might be relevant to schizotypy, including social withdrawal in childhood and adolescence (Kendler et al. 1982), antisocial behavior and impulsivity (Heston 1966; Silverton 1988), oddness-eccentricity (Kendler 1985), psychotic-like symptoms, and restricted emotional range. In fact, the *DSM-III-R* added to the *DSM-III*

criteria for schizotypal personality disorder the item "odd or eccentric behavior or appearance."

Development of the Structured Interview for Schizotypy (SIS)

The SIS (Kendler 1988, unpublished scale), which was developed from experience gained in a large-sample, controlled family study of schizophrenia based in County Roscommon in the west of Ireland, grew out of limitations that were perceived with the available assessment measures for schizotypy reviewed above. In all versions, the SIS was designed to be given along with an instrument that assesses "Axis I" psychopathology, such as the Schedule for Affective Disorders and Schizophrenia—Lifetime Version (SADS-L; Spitzer and Endicott 1978) or the Structured Clinical Interview for *DSM-III-R* (SCID; Spitzer et al. 1986). The final section of the SIS, in which signs are recorded, is designed to be based on observations made during both the Axis I and SIS interview.

The SIS has gone through five versions since 1984. The first version was based in part on the SSP, with extensive modifications and additions that resulted in greater emphasis on the measurement of specific schizotypal signs (e.g., guardedness, odd behavior, and odd speech). Subsequent versions required coding of responses to all individual questions; converted most symptom probes from an open- to a closed-option format; expanded the number of symptom scales and signs with items created de novo or adapted from several other instruments (Chapman et al. 1980; Pfohl et al. 1983; Claridge and Broks 1984; Eckblad and Chapman 1983;

Spitzer et al. 1986; Cloninger 1987; Loranger 1988); and added standard questions for quantity of social contacts. To maximize the validity of assessment of key symptom dimensions, multiple items of slightly differing content were used.

The instrument at various stages has been field-tested at four sites: (1) versions 1.0 and 1.1 have now been given to over 1,800 relatives and probands in the Roscommon Family Study, and version 1.4 has been given to 34 schizophrenic and control probands and their relatives in a pilot followup study in County Roscommon; (2) versions 1.3 and 1.4 have been given to over 70 relatives of schizophrenic and control probands ascertained from Hillside Hospital, New York; (3) version 1.4 has been given to 59 unselected twins from the population-based twin registry at the Medical College of Virginia; and (4) version 1.4, translated both into Finnish and Swedish, is currently being used in followups of biological and adoptive relatives in a large ongoing adoption study of schizophrenia in Finland (Tienari et al. 1987).

Description of the SIS, Version 1.4

Version 1.4 contains five kinds of items. In closed-option items, the respondent is asked to choose from a list of potential responses (i.e., "often," "sometimes," "rarely," or "never"). With field-coded items, the respondent is asked an open-ended question (i.e., Why do you think you are being looked at?), and, on the basis of the response, the interviewer must code one of a number of answers (e.g., "no realistic reason" to "strong realistic reasons, describing normal reaction"). Global

symptom scores come at the end of most symptom scales and require the interviewer to rate the degree of pathology present in that symptom dimension on a 1- to 7-point scale (from marked to absent). Specific signs require the interviewer to rate the respondent on a particular category of behavior (e.g., eye contact, appropriateness of affect, and oddness of dress). Global signs require the interviewer to rate the respondent on overall performance in a broad category of behavior (e.g., global rapport and global oddness).

Symptoms of Schizotypy. The instrument consists of 19 sections, 18 of which assess individual symptom "dimensions" and one of which contains 36 individual signs.¹ In the current version, a global symptom item is provided for the following symptom scales: social isolation, sensitivity, social anxiety, ideas of reference, suspiciousness, restricted emotion, magical thinking, illusions, psychotic-like phenomena, derealization-depersonalization, irritability, and impulsivity.

A. Childhood personality features. This section, which covers up to age 13, contains eight closed-option questions that examine four dimensions: (1) shyness, (2) social isolation-withdrawal, (3) anxiety, and (4) the sense of "oddness" or "not fitting in." Question 9 is about the number of close friends in childhood.

B. Adolescent personality. This section, which covers the ages of 13 to 19, has 12 closed-option questions that examine: (1) shyness, (2) social isolation-withdrawal, (3) "oddness," (4) anti-social features, and (5) age at which dating began. Question 13 is

about the number of close friends in adolescence.

C. Social isolation. The main part of this section consists of nine closed-option questions that cover frequency of contact with friends and family, frequency of attendance at clubs, organizations and religious services, number of "friends," number of "confidants," and the respondent's self-concept as being "outgoing," a "loner," etc. All but the last two of these are adapted from standard survey questions used by the Institute for Social Research. All items in the section are asked in the timeframe of the last 3 years. Next, a field-coded item records possible objective reasons for social isolation. In our work in Ireland, we met with individuals who were socially isolated because they lived in a remote area and did not own a car, had a disabling medical condition that prevented them from socializing, or were old enough that nearly all of their friends had died. The final questions in this section ask whether the last 3 years have been typical for the respondent in regard to social activities and, if not, whether they have been characterized by more or less social activity than usual.

D. Interpersonal sensitivity. This scale contains eight closed-option questions including items that address respondents' self-concepts about being "sensitive," "touchy," and "emotionally thin-skinned"; their responses to critical comments; and their fear of being considered foolish.

E. Social anxiety. This scale contains six closed-option questions about anxiety and self-consciousness in social situations.

F-H. Ideas of reference. The SIS devotes considerable space to ideas of reference, in part because this is a

¹Copies of the SIS are available at cost from K. Kendler, M.D.

particularly difficult area of psychopathology to assess and in part because preliminary results from the Roscommon Family Study outlined below indicate that this symptom is one of the best at discriminating nonschizophrenic relatives of schizophrenic versus control probands. As in the SSP, ideas of reference are divided into three domains: being watched, seeing meanings, and being talked about.

F. Being watched. This item has a single probe question that attempts to make a positive response appear as nondeviant as possible:

F.1. At one time or another, when in public, many people have had the feeling they are being watched. How often have you had such an experience? Would you say often, sometimes, rarely, or never?

Respondents who answer "never" to this question skip to section G. Otherwise, they are asked several additional questions about their feelings of being watched and are then asked to give a description of one or more recent events in which they clearly remember the feeling of being looked at. This is recorded verbatim. Next, they are asked why they feel they are being looked at. This is a key field-coded item, because in our experience a substantial subset of individuals who respond to standard questions on ideas of reference are describing nonpathological experiences (e.g., an attractive woman feeling that she is being appraised). If this item is scored as "normal reaction," the interviewer skips to section G. If it is scored otherwise, several additional questions are asked about the experience of being watched.

G. Seeing meanings. This section, with eight items, can be divided into two subsections. The first addresses

the question of interpreting neutral environmental events as having "special significance." This is a difficult item because of its abstractness. Uneducated respondents do not always understand this question. As with being watched, if respondents answer positively to this question, we ask how frequently this "watching" occurs, obtain a verbatim description of a recent time when they had such an experience, and ask the interviewer to field-code the degree to which the experience appears to be pathologic. As with being watched, we have been impressed that a number of individuals who respond positively to "seeing meanings" are describing nonpathological experiences. The last four items in this section, which are asked of everyone, inquire as to "seeing special meanings or messages" on TV or the radio or in the newspaper.

H. "Remarks" or "being talked about." The structure of this section is somewhat complex. It has two "introductory" items:

H.1. When in public places, people sometimes have the feeling that the people around are talking about them. Have you ever had a feeling like that?

H.3. How about the feeling of being laughed at when you are in public? Does this happen to you often, sometimes, rarely, or never?

If the answers to both these questions are no, then the interviewer skips to H.6. Otherwise, several additional questions are asked about the experience of being talked about and/or laughed at. Again, the interviewer asks the respondent why this is happening and must field-code a judgment as to how realistic the response appears to be. All respondents are asked two questions about people "dropping hints"

(H.6.) and using "doubletalk" around them (H.7). This section concludes with eight closed-option items (with possible responses of often, sometimes, rarely, or never) that recapitulate the entire section. Two example items are:

H.9c. When I'm in public, I feel that people are watching me.

H.9g. When I'm in public, I feel that people make fun of me.

I. Suspiciousness. It is unlikely that suspiciousness is a single dimension. This section attempts to tap several potentially important domains including: (1) conceiving of oneself as trusting versus suspicious, (2) considering mankind to be basically selfish versus altruistic, (3) distrusting others, (4) feeling inappropriately blamed and criticized, and (5) needing to be "on-guard" around others. Two lists of closed-option responses are provided. The first has a "frequency" response set (often, sometimes, rarely, or never). Two examples are:

I.3b. I feel that people criticize me more than I deserve.

I.3d. I feel that I need to be on my guard around other people.

The second list has a response set of "definitely agree," "probably agree," "probably disagree," and "definitely disagree." Two examples are:

I.4a. All in all, it is probably safer never to trust anyone.

I.4e. If you confide in people, sooner or later they will use the information you gave them to hurt you.

The section then concludes with three field-coded items that ask whether "people have gone out of their way to deliberately hold you back in life," whether the respondent needs to go out of his or her

way to take precautions, and how the respondent gets along with neighbors. If the respondent answers positively to any of these questions, the interviewer must field-code how realistic the respondent is being. After giving the global suspiciousness score, the interviewer also globally scores the degree to which the respondent has realistic reasons for suspiciousness.

J. Restricted emotion. This short section contains nine items that address the intensity and frequency with which the respondent feels strong emotions.

K. Magical thinking. This relatively long section can be divided into two parts. The first part contains two lists of closed-option questions that tap various aspects of magical thinking. Response categories for the first list are based on endorsement (e.g., definitely true to definitely not true), while for the second category they are based on frequency (e.g., often to never). We list two items from these two scales:

- K.1e.** Good luck charms keep evil away.
- K.1i.** Accidents can be caused by mysterious forces.
- K.2a.** I communicate with other people using only my mind.
- K.2c.** I sense when bad things are going to happen to people close to me.

The second section of magical thinking assesses superstitious beliefs and actions (e.g., performed to "keep evil away"). These beliefs and actions are recorded, and the interviewer field-codes their deviance from subcultural norms. As might be expected in traditional societies, in the west of Ireland, many older individuals have a large number of superstitious beliefs and actions, most of which would not be

considered deviant in that subculture.

L. Illusions. This section is divided into items that address visual and auditory illusions, and items related to the concept of perceptual aberration.

M. Psychotic-like phenomena. This section contains 11 items that ask for psychotic-like experiences in as nonthreatening a manner as possible. For example:

M.1. Sometimes people feel that their thoughts are so real that it seems as if they are spoken out loud so that other people could hear them. Have you ever experienced that?

M.9. People sometimes have the feeling that their thoughts can influence things going on around them. Have you ever had any feelings like this?

In each case, positive responses are followed up with further questions about the frequency and the probable deviance of the experience. For example, for those who have experienced a "thought-insertion"-like experience, we inquire whether the outside agencies that placed the thoughts in their minds were limited to God or the devil.

N. Derealization/depersonalization. This section contains nine items and includes a specific item for the less pathological déjà vu experience.

O. Antisocial, irritable behavior. This section contains items for antisocial and criminal behavior, and irritability. Irritability was one of the signs most commonly noted by early clinicians in deviant, nonpsychotic relatives of schizophrenic patients (Kendler 1985).

P.-R. These include three short scales that measure "borderline-like" experiences of self-destructive behavior (section P), affective in-

stability (section Q) and boredom (section R).

S. Impulsivity. This final symptom scale consists of 11 items that assess impulsivity and nonconformity with closed-option items such as:

S.5c. People who go by the rules are boring.

S.5f. I like to break rules, just for the hell of it.

By design, two other important personality "dimensions" of possible relevance to schizotypy, introversion-social anhedonia and neuroticism, are not assessed by the interview-based part of the SIS. Introversion (and the related construct of social anhedonia) has face validity for the clinical and historical concept of schizoid-schizotypal personality; and neuroticism has been shown by Claridge and Hewitt (1987) to correlate + 0.69 with self-report schizotypy scores. Well-developed "paper and pencil" instruments are available for these dimensions (Eysenck et al. 1985; Mishlove and Chapman 1985). From these previously published scales, we have assembled two short self-report questionnaires, which are to be given to the respondent upon completion of the SIS. The questionnaires contain a total of 59 items, including a shortened (20-item) version of their social anhedonia scale (Chapman et al. 1976) which Drs. Chapman and Chapman were kind enough to prepare for this purpose, as well as the short version of Eysenck's psychoticism scale (Eysenck et al. 1985), which actually taps a personality dimension more closely related to nonconformity and antisocial traits. In their family study of self-report questionnaires, Claridge et al. (1983) found that only this scale significantly discriminated relatives of schizophrenic probands

from relatives of matched neurotic controls.

Signs of Schizotypy. As noted above, the "observed during interview" section of the SIS is designed to be completed based on observation of the respondent during the entire interview process, which should include an Axis I diagnostic interview. Five major and several "minor" dimensions are assessed.

Major signs.

A. Rapport. This is divided into eye contact, body language, and emotional and "global" rapport.

B. Affect. Items here include fullness, appropriateness, lability, and warmth of affect.

C. Organization of speech. Items include goal-directedness of speech, organization of associations, and rate and amount of speech.

D. Odd/eccentric behavior. This important dimension is divided into motor behavior (posture, gait, body movements), social behavior (invading body space, staring, inappropriate intimacy or hostility), odd dress, and global oddness.

E. Suspiciousness. This dimension is divided into nonverbal aspects (hypervigilance, scanning of the environment, etc.) and verbal aspects (asking repetitive questions about the object of the study, searching for hidden meanings in questions, etc.).

Minor signs. These include assessment of the respondent's irritability, mood, anxiety level, occupational and social functioning, and standard questions about the degree to which the respondent understood the questions, the presence or absence of others during the interview (and any interference caused thereby), etc.

Interrater Reliability

Two studies of interrater reliability have been conducted with the SIS at different stages of development. The reliability of version 1.0 was tested in 33 joint interviews in the field in the west of Ireland with blind assessment by two raters: K.S.K. and Ms. Gillian Robinson, an Irish social scientist who was personally trained on the interview instrument by K.S.K. for over 60 hours. The presence of prominent schizotypal features in many of the relatives in this sample provided more than adequate variance for the accurate assessment of reliability in the various scales of the SIS. The results are seen in table 1.

The mean intraclass correlation coefficient (ICC) (\pm SD) for the seven key global symptom scales was 0.87 ± 0.12 , with only magical thinking having a value below 0.75.

Only four key signs of schizotypy were assessed in SIS version 1.0. These results are seen in table 2. As expected, reliability in assessment of signs was somewhat lower than that of symptoms (ICC of 0.69 ± 10). However, the ICC for all signs except guardedness exceeded 0.65.

The second interrater reliability study, which was conducted at Hillside Hospital in New York, involved 25 blindly assessed relatives of schizophrenic and matched surgical patients. Three Master's level (M.S.W.) clinical interviewers with extensive experience with structured psychiatric interviews (S. Insall, D. Engel, and M. Smith) participated in this study, each taking turns interviewing the patient with the SIS while the other two observed. These interviewers were trained on the SIS for only around 15 hours. Ten of the reliability interviews used SIS version 1.3, and 15 used version 1.4.

Table 1. Global Symptom Scales

| | Intraclass correlation | |
|---------------------------------------|-----------------------------|------------------------------|
| | Hillside sample (n = 25) | Roscommon sample (n = 33) |
| Social isolation | 0.86 | 0.92 |
| Interpersonal sensitivity | 0.73 | 0.78 |
| Social anxiety | 0.80 | 0.95 |
| Ideas of reference | 0.81 | 0.99 |
| Suspiciousness | 0.71 | 0.99 |
| Restricted emotions | 0.66 | — |
| Magical thinking | 0.79 | 0.67 |
| Illusions ¹ | 0.75 | 0.79 |
| Psychotic-like phenomena ¹ | 0.78 | — |
| Derealization ¹ | 0.78 | — |
| Irritability ¹ | 0.78 | — |
| Impulsivity ¹ | 0.37 ² | — |

¹Sample size varies from 15 to 23.

² Between-subject variance < 1.00.

Table 2. Major signs of schizotypy

| | Intraclass correlation | |
|------------------------------|------------------------|------------------|
| | Hillside sample | Roscommon sample |
| Global rapport | 0.11 ¹ | 0.80 |
| Fullness of affect | 0.27 ² | |
| Appropriateness of affect | 0.15 ¹ | |
| Lability of affect | 0.57 ² | |
| Global odd speech | — | 0.73 |
| Goal-directedness of speech | 0.62 | |
| Organization of associations | 0.55 | |
| Rate of speech | 0.65 ² | |
| Global oddness | 0.64 | 0.68 |
| Odd motor behavior | 0.19 ² | |
| Odd dress | 0.56 ² | |
| Global suspiciousness | — | 0.56 |
| Suspiciousness, nonverbal | 0.00 ¹ | |
| Suspiciousness, verbal | 0.26 ¹ | |

¹Between-subject variance < 0.50.²Between-subject variance < 1.00.

Among the relatives in this small reliability study, there was considerable variation in schizotypal symptoms. However, for many of the schizotypal signs, little variation was present. The interpretation of reliability in the presence of minimal intersubject variance is problematic. Low observed reliability can result from poor instrument performance or low population variability. We present all the ICCs, but note those where the low reliability is probably more a reflection of the population variance than the instrument performance (e.g., where variance is ≤ 0.5 or ≤ 1.0 on a 7-point scale). The ICCs were calculated assuming a fixed set of raters, each rating all subjects, as specified by Shrout and Fleiss (1979).

Versions 1.3 and 1.4 of the SIS contain three kinds of symptom items: closed-option, field-coded, and global scores. For 18 randomly

selected closed-option items, the mean ICC was 0.97 ± 0.07 . For half of these items, interrater agreement was perfect. The ICC was less than 0.95 for only two items: "I wonder whether the people I know can really be trusted" (0.92), and "How often do thoughts come into your mind that feel as if they don't belong?" (0.69).

Field-coded items require interviewers to code a response to a single item based on their assessment of the respondent's answers. There are only four obligatory field-coded items in the SIS. Most of the field-coded items depend on positive responses to earlier items. For these four, all in the suspiciousness section, the mean ICC was 0.76 ± 0.32 . The ICC was below 0.75 for only one of the items: "Are there people who have gone out of their way to hold you back in life and to make things difficult for you?"

Global symptom scales require the interviewers to integrate responses for all items in a given scale to provide a single "best estimate" assessment of the degree of pathology. As seen in table 1, for the 11 global symptom scores with adequate between-subject variance, the mean ICC was 0.77 ± 0.05 , falling below 0.70 on only one scale (restricted emotion). However, the global impulsivity item, which had a between-subject variance of 0.99, had a low ICC (0.37). The mean ICC for these 12 global scales, including impulsivity, was 0.74 ± 0.13 .

Only three signs had substantial between-subject variance (e.g., ≥ 1.0) and, for these, the ICC was only slightly less than that found in Ireland (0.60 ± 0.47) (see table 2). For all of the 12 major signs listed in table 2, the ICC was only 0.38 ± 0.24 . In both samples, two signs that require a relatively high degree of inference ("odd speech" and "odd" behavior) were rated with reasonable reliability. For the two major signs (rapport and suspiciousness) where the variance and ICC were low in the Hillside sample, the ICC was considerably higher in the Irish sample.

Validity

Since our interest in schizotypy stems from its probable genetic/familial relationship with classic schizophrenia, the most useful method of validation for the SIS is the comparison of its individual symptoms and signs in the nonpsychotic relatives of schizophrenic and control probands. Three small-sample validation studies have been conducted on various versions of the SIS. The first of these, using version 1.0, was based on blind

face-to-face interviews with 210 relatives of schizophrenic and matched control probands from the Roscommon Family Study. We indicate statistical significance by * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$ (one-tailed). After schizophrenic relatives were excluded, the following symptoms as assessed by the SIS were significantly more common in relatives of schizophrenic patients versus controls: social isolation***, sensitivity**, ideas of reference***, suspiciousness*, and magical thinking**. The following signs, as assessed by the SIS version 1.0, were significantly more common in the relatives of schizophrenic patients in this sample: poor rapport***, odd speech***, odd behavior***, and suspiciousness***.

The second sample, which used SIS versions 1.3 and 1.4, was based on a smaller sample ($n = 60$) of relatives of schizophrenic and surgical control probands from Hillside Hospital. After eliminating schizophrenic relatives and controlling for demographic factors, more pathological ratings in relatives of schizophrenic patients versus controls were found for the following three symptoms and two signs: global social anxiety*, global magical thinking**, global interpersonal sensitivity*, fullness of affect*, and nonverbal suspiciousness*. It is of interest to note that two of the signs that had low reliability in the small interrater reliability study (fullness of affect and nonverbal suspiciousness) in the larger pilot sample significantly discriminated relatives of schizophrenic patients from relatives of matched controls.

The third sample, which used SIS version 1.4, was composed of 24 relatives of schizophrenic and control probands from the Roscommon

Family Study. In this small sample, we found more deviant scores in relatives of schizophrenic patients versus controls on childhood social isolation*, adult social isolation*, global rapport**, fullness of affect**, appropriateness of affect***, and global oddness***.

In only one of these validation studies was the sample size large enough to justify evaluating the SIS as a method of making schizophrenia spectrum personality diagnoses. In a slightly larger sample from the pilot phase of the Roscommon Family Study ($n = 272$), one of us (K.S.K.) blindly reviewed the SIS to make *DSM-III* diagnoses of schizotypal and paranoid personality disorder, finding a risk of 16.1 ± 2.9 and 2.7 ± 1.5 percent, respectively, in first-degree relatives of schizophrenic and matched control probands, respectively (χ^2 test of independence = 12.47, $df = 1$, $p = 0.0004$).

Interview Duration and Training

We have detailed information about the length of SIS version 1.4 in two samples: relatives of schizophrenic and control probands from Hillside Hospital ($n = 49$) (mean \pm SD), 47.4 ± 11.0 minutes, and unselected twins from the population-based Virginia Twin Registry ($n = 55$), 39.6 ± 8.8 minutes. We were particularly concerned about the acceptability of the SIS in the nonclinical twin population, but a series of formal debriefings with the twins did not reveal any significant problems. While many of the twins were aware that the questions were probing for relatively "odd" symptoms, they consistently stated that they found the interview inoffensive.

From our experience, optimal training for the SIS would last about

40 hours. Training should focus on three areas: (1) the field-coded items, particularly those dealing with the interpretation of deviance in ideas of reference, suspiciousness, and magical thinking; (2) global symptom items; and (3) schizotypal signs. To date, individuals have been trained on the SIS who both have had and have not had extensive clinical experience with schizophrenic patients. While training was easier and more efficient with experienced clinicians, individuals without clinical experience with schizophrenia could also be trained to use the SIS reliably. A question-by-question manual to accompany the SIS, which should assist in training, is in preparation. Training videotapes are not currently available.

Discussion

In this report, we have described the limitations of currently available instruments for the interview-based assessment of schizotypy, outlined the development of a new instrument—SIS—and presented preliminary data on its reliability and validity. The SIS was developed from experience gained in a large-sample family study of schizophrenia in the west of Ireland and is, by design, a research, and not a clinical, instrument. The guiding principle in its development was that, since we do not yet know the ideal combination of symptoms and signs required to detect the deviant but nonpsychotic relatives of schizophrenic patients, and since these features may not be constant across populations, it is important to gather a wide base of potentially relevant information.

Data on interrater reliability of the various versions of the SIS have shown that, when there is substantial variation, reliability is good to excellent. As expected, closed-option items are rated with near perfect reliability. The few field-coded items in the latest versions of the SIS also have at least good reliability, as do global ratings for symptom scales. Not unexpectedly, schizotypal signs are somewhat less reliably assessed than are symptoms. In general, the assessment of signs requires a higher degree of inference than the ratings of symptoms. This is particularly true for several schizotypal signs (e.g., rapport, suspiciousness, and odd behavior). In the Irish reliability sample, where considerable intersubject variance was found for these signs, reliability was good to excellent. Results in the Hillside Hospital sample were more problematic. In general, when adequate variance was present, the items were rated reliably. Further work may be needed either to specify clear "anchor" points for the signs with variable reliability or to develop more systematic training (e.g., videotapes, that contain "reference" examples of various degrees of pathology for the individual signs).

Preliminary validity data for the SIS indicate that certain individual schizotypal symptoms and signs, as assessed by the SIS in three samples, successfully discriminated the non-schizophrenic relatives of schizophrenic probands from relatives of matched normal controls. Not surprisingly, all of the symptoms and signs on the SIS did not perform equally well in this regard. The diagnosis of schizotypal personality disorder made on the basis of an early version of the SIS also discriminated to a high degree of significance relatives of schizo-

phrenic versus control probands.

Finally, information on the duration and acceptability of the instrument is favorable. In general, the interview averages 40-50 minutes and is well accepted by respondents.

Potential Limitations. As the SIS is a research and not a clinical instrument, its format differs from that of the SSP or the recently developed "general" personality disorder interviews such as the Structured Interview for *DSM-III* Personality Disorder (SIDP) (Pfohl et al. 1983), the SCID-II (Spitzer et al. 1986), or the Personality Disorder Examination (PDE) (Loranger 1988) where the goal is chiefly to score as present or absent the individual *DSM-III* or *DSM-III-R* criteria for schizotypal personality disorder. Information is present in the SIS to score all these individual symptoms and signs. However, we have not specified a scoring scheme whereby responses for individual symptoms and signs could be converted into a dichotomous outcome (presence/absence) from which a diagnosis could be generated. We have not done this because, at our current stage of knowledge, such a scoring scheme would be arbitrary and would suggest, incorrectly, that we know the true boundaries of the schizophrenia spectrum.

The absence of a scoring algorithm for the SIS might be seen, by different investigators, as an advantage or a disadvantage. Investigators who wish to obtain categorical data on schizotypy from the SIS will either have to choose their own scoring rules, or, preferably, will need to try out a variety of approaches. For example, in some of our preliminary analyses, we have relied only on the global symptom scores and have analyzed the data using either

"narrow" criteria (requiring a score of marked or moderate) or "broad" criteria (requiring a score of marked, moderate, or mild). Clearly, however, the SIS has the potential for far richer analyses than this.

Another approach, which has much to commend it, is to maintain the quantitative nature of the results from the SIS. For example, in the pilot study with the SIS conducted in Ireland, we have seen quite significant correlations in relatives of schizophrenic patients and controls between individual scores on symptoms and signs from the SIS and measures of attention. Reducing the individual symptoms and signs to dichotomies would considerably attenuate these relationships.

Another potential limitation is the relatively narrow coverage of the SIS. Compared to other interview-based assessments of schizotypy, the SIS covers a relatively broad range of symptoms and signs. However, compared to the recent "general" personality disorder instruments (SIDP, SCID-II, and PDE), it assesses a relatively narrow range of phenomena. In constructing the SIS, we chose domains where the clinical and research literature had suggested that we might find a difference in relatives of schizophrenic and control probands. This excluded a number of areas of personality functioning (e.g., dependent or compulsive personality traits) that might be of interest in their own right. We felt, however, that the inclusion of such areas of personality function would, because of time constraints, inevitably diminish the number of items left to assess the key schizotypal traits. From our perspective, the major problem with the use of the general personality disorder instruments for family/genetic research in schizophrenia is

that because they cover the entire domain of personality disorders, schizotypy may receive insufficient attention. For example, in assessing ideas of reference, the SIDP has three questions and the SCID-II and PDE have only two questions. We would argue that it is very difficult to assess this complex phenomenon with so few items.

Our concerns about the assessment of schizotypy by the new general personality disorder instruments are supported by the results of two recent family studies using the SIDP (Pfohl et al. 1983), both of which found quite low rates of schizotypal personality disorder in relatives of schizophrenic patients that differed marginally or not at all from rates found in relatives of controls (Coryell and Zimmerman 1988; Gershon et al. 1988). These findings differ markedly from those reported from studies that used instruments specifically designed to assess schizotypy (e.g., Baron et al. 1985; preliminary results noted above from the Roscommon Family Study).

Finally, the SIS does not currently have an informant version, that could be used with a relative or friend to inquire about schizotypal symptoms and signs in the respondent. We have not prepared such a version for two reasons. First, in the Roscommon Family Study, we have systematically obtained, from each individual, family history information on relatives including simple criteria for schizophrenia-related personality disorder (Kendler et al. 1984). We have been impressed how often relatives do not report schizotypy in a relative that is obvious at direct interview. It is not clear whether this is due to their hesitancy to report deviancy in a relative, or their inability to see the behavior

as deviant (Oh, that's just the way he is!). Second, we have been recently examining the validity of such indirect information using a twin-family paradigm in which family members report on themselves and on their relatives. For both straightforward variables (e.g., weight and years of education) and psychiatric variables (e.g., lifetime history of depression), the report on a relative is substantially biased by the respondent's own characteristics (unpublished data). While certainly of potential value, the interpretation of informant information on schizotypy is, in our opinion, not without problems.

Conclusions

Our results suggest that the SIS may hold promise as a detailed interview-based research instrument for the assessment of schizotypy in clinical and genetic-epidemiologic investigations. While not free of limitations, some of which we hope to address in future revisions, this interview may prove useful to researchers interested in collecting systematic data on schizotypal signs and symptoms in relatives of schizophrenic patients.

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The Authors

Kenneth S. Kendler, M.D., is Professor, Departments of Psychiatry and Human Genetics, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA. Jeffrey A. Lieberman, M.D., is Assistant Director of Research, Hillside Hospital, Division of Long Island Jewish Medical Center; and Research Associate Professor of Psychiatry, State University of New York School of Medicine at Stony Brook, NY. Dermot Walsh, M.B., is Chief, Mental Health Section, The Health Research Board, Dublin, Ireland; Clinical Director, St. Loman's Psychiatric Service, Dublin, Ireland; and Inspector of Mental Hospitals (Chief Psychiatrist), Department of Health, Dublin, Ireland.