

Preliminary Findings for Two New Measures of Social and Role Functioning in the Prodromal Phase of Schizophrenia

Barbara A. Cornblatt^{1,2,3}, Andrea M. Auther², Tara Niendam⁴, Christopher W. Smith², Jamie Zinberg⁴, Carrie E. Bearden⁵, and Tyrone D. Cannon^{4,5}

²Recognition and Prevention Program, Department of Psychiatry Research, The Zucker Hillside Hospital, North Shore-Long Island Jewish Health System, 75-59 263rd Street, Glen Oaks, NY 11004; ³Department of Psychiatry, Albert Einstein College of Medicine, Bronx, NY; ⁴Department of Psychology, University of California, Los Angeles, CA; ⁵Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles, CA

Introduction: Research on prediction and prevention of schizophrenia has increasingly focused on prodromal (pre-psychosis) social and role dysfunction as developmentally early, stable, and treatment-resistant illness components. In this report, 2 new measures, Global Functioning: Social and Global Functioning: Role, are presented, along with preliminary findings about psychometric properties and course of social and role (academic/work) functioning in the prodromal phase of psychosis. **Methods:** Subjects included 69 participants from the Recognition and Prevention program and 52 from the Center for the Assessment and Prevention of Prodromal States. Ages ranged from 12 to 29 years, and all met criteria for Attenuated Positive Symptom syndrome. Retrospective (past year) and baseline data are reported for all 121 prodromal subjects and for 44 normal controls (NCs). Prospective follow-up data are reported for a subsample of patients reevaluated at both 6 and 12 months ($N = 44$). **Results:** For both scales, interrater reliability was high, and preliminary data supported construct validity. Relative to NCs, prodromal individuals displayed impaired social and role functioning at baseline. Analyses of change over time indicated that role functioning declined over the year before ascertainment and improved over 12-month follow-up, presumably with treatment. Social impairment, by contrast, was constant across time and predicted later psychosis ($P = .002$). **Discussion:** Using 2 new global measures, social functioning was found to be a stable trait, unchanged by treatment, with considerable potential to be a marker of schizophrenia. Role functioning, by contrast, may be a more direct barometer of

clinical change and may be responsive to treatment and environmental change.

Key words: RAP/CAPPS/functional predictors/prodromal schizophrenia/outcome/psychosis/scale validation/Global Functioning: Social/Global Functioning: Role

Introduction

Schizophrenia involves profound social and occupational deficits that substantially limit prognosis and long-term recovery. Social and occupational functional disabilities are widely reported to be rooted in early development, to be associated with neurocognitive deficits and negative symptoms, and to appear to be largely independent of positive (ie, psychotic) symptoms. Prospective high risk, birth cohort, and first-episode studies of schizophrenia^{1–6} have consistently reported preillness social and academic difficulties. For example, findings from the British birth cohort studies indicate a range of early social difficulties (eg, preference for solitary play, social anxiety, and lack of confidence) as well as low educational test scores in preschizophrenic individuals as young as 7 and 11 years of age.^{1,2} Prospective genetic high-risk projects have also consistently reported similar social and academic deficits in the adolescent offspring of parents with schizophrenia.^{3,4} More recently, a study of recent-onset schizophrenia patients reported that difficulties in maintaining social networks predated first hospitalization,⁶ further supporting functional deficits as long-standing traits.

In addition, findings from studies of adult schizophrenia patients indicate that functional outcome is more directly related to neurocognitive deficits and negative symptoms than to positive symptoms.^{7–11} In support of this view, a number of recent clinical trials have indicated that even with a major decrease in positive symptoms, antipsychotic medication often has little impact on the patient's ability to function independently in community, social, or occupational domains.^{12–14} The results of these treatment studies suggest that performance in the functional domains is independent of psychosis and tends to be medication resistant once illness has become chronic.

¹To whom correspondence should be addressed; tel: 718-470-8133, fax: 718-470-8131, e-mail: cornblat@lij.edu.

Such findings have converged to suggest that intervention should be initiated as early as possible, optimally prior to the onset of illness, at a point where social, academic, and occupational skills are acquired and solidified—typically considered to take place during adolescence and early adulthood.¹⁵ This has, in turn, highlighted the importance of the schizophrenia prodrome, a phase of rapid developmental change during which a range of early behavioral, cognitive, and clinical difficulties are hypothesized to emerge, many of which may still be remediable. Consistent with this view, Cornblatt et al¹⁶ have proposed a neurodevelopmental model in which impaired social and academic functioning during adolescence are considered to be core components of a biological susceptibility to schizophrenia and thus important targets of early intervention.

Although still a relatively new field, research has thus far demonstrated that the prodromal phase of illness is a clinical entity that is detected reliably¹⁷ and is associated with an elevated risk for subsequent schizophrenia (ranging from 20% to 40% within a 1- to 2-year follow-up period^{16,18–20}). Consistent with developments throughout the field of schizophrenia, prodromal researchers have only recently recognized the critical importance of the functional domains. As a result, there is a relative absence of functional measures specifically appropriate for the prodromal phase of illness. Research with chronic adult patients has tended to use a variety of measures that do not necessarily apply to the more subtle deficits characterizing prodromal youth. Of particular concern, the social functioning scales most commonly used in adult research tend not to address the unique social issues that occur in adolescence (eg, peer acceptance, dating, etc²¹). Alternatively, the Global Assessment of Functioning Scale (GAF)^{22,23}, a widely used global scale, has been shown to have a number of psychometric problems^{24–26} and may be too confounded with psychiatric symptom severity to shed light on developmentally specific functioning.

A major example of the need for prodromal functional measures was provided during the construction of the North American Prodromal Longitudinal Study (NAPLS)—federated database.²⁷ As part of the initial procedures followed to establish a common database across 8 prodromal studies, a survey (B.A.C. and A.A. data available on request) was made of functional measures used across participating sites. Major differences were found in virtually all aspects of the measures used. For example, type of instrument varied greatly, ranging from lengthy, detailed interviews^{28,29} and self-report measures^{30,31} to brief clinician-rated scales.³² In addition, these measures varied in targeted age range and domains covered, with measures developed for adults not typically appropriate for use with adolescents and vice versa. Measures developed for specific age ranges are particularly problematic for prodromal research, which covers a broad developmental period from early adolescence through young adulthood. As a result, to facilitate construction of the NAPLS database, 2 new functional measures

were designed to meet the 5 criteria, including the need to (1) incorporate detailed anchors appropriate for capturing subtle prodromal difficulties, (2) cover the age range typical of the prodromal phase (from mid-adolescence through young adulthood), (3) disentangle social from role functioning domains, (4) detect changes in functioning over time, and (5) provide brief and easy to use clinician ratings.

The new measures, referred to as the Global Functioning: Social (GF: Social³³) and the Global Functioning: Role (GF: Role³⁴) scales, provide clinician rated single overall scores designed along the lines of the GAF Scale and the Social and Occupational Functioning Assessment Scale (SOFAS²⁶). However, the new GF scales differ substantially from both the GAF and the SOFAS in that they represent parallel (one targeting social, the other role) well-anchored scales that take age and phase of illness into account. In addition, the GF scales prevent combining unequal levels of functioning and avoid confounding functioning with psychiatric symptoms. Both scales can be used to summarize already existing information or as stand-alone interviews. The aims of the current study are to introduce these new measures and to report early findings resulting from their use in 2 ongoing prodromal studies. In the sections to follow, the interrater reliability of both the GF: Social and Role scales will be presented, and baseline levels of functioning, changes over time, and association with subsequently emerging psychosis will be described.

Methods

The data presented in this report were collected at 2 different sites: (1) The Recognition and Prevention (RAP) program at The Zucker Hillside Hospital of the North Shore-Long Island Jewish Health System, New York, and (2) the Staglin Music Festival Center for the Assessment and Prevention of Prodromal States (CAPPS) at the Semel Institute for Neuroscience and Human Behavior at the University of California Los Angeles. Both the RAP and CAPPS programs are longitudinal studies focusing on the research and treatment of adolescents and young adults who are considered to be in the prodromal stages of psychosis. Both research groups are members of NAPLS,²⁷ and the samples included here partially overlap with those included in the NAPLS consortium—federated database. The current study is a direct outgrowth of a NAPLS survey indicating the need to develop prodromal appropriate measures for social and role functioning, as discussed previously. This task was undertaken by members of the RAP and CAPPS research teams working collaboratively with the RAP group responsible for development of the social functioning scale and CAPPS for developing the role functioning scale. Both scales underwent a complex process of development and refinement. First, within the global scale framework, anchors were developed based on clinical expertise and previous research

emphasizing that social isolation and poor academic achievement are widely observed early warning signs of later illness. The GF: Social scale was originated by A.M.A. (a senior clinician in the RAP program), and the GF: Role scale by T.D.C. (director of CAPPs). Second, each scale was then refined within each site (GF: Social by B.A.C. and C.W.S. and GF: Role by T.N. and C.E.B.). Third, the 2 scales were exchanged between the CAPPs and RAP programs, and anchors were further revised based on input from both sites. Fourth, the resulting GF scales were distributed to the other members of the NAPLS consortium, all highly experienced prodromal researchers, for consensus on content validity and other feedback, and additional content modifications were made. Fifth, both scales were then used to rate the data that had already been collected using more traditional measures in the RAP and CAPPs programs. It should be noted that the already existing data in the RAP and CAPPs studies did not enter into the initial scale development and that the current study represents the first step in validating these new GF scales. The analyses presented here therefore provide both functional data for the prodromal samples as well as a preliminary assessment of the psychometric properties of the 2 scales.

Subjects

The data included in this study were collected from 69 RAP and 52 CAPPs participants, all between the ages of 12 and 29 years. All participants were treatment seeking. Participants in both research projects were referred to the programs by affiliated outpatient and inpatient psychiatry departments, local mental health providers, school psychologists or counselors, or were self-referred. Written informed consent (or assent if under age 18 years) was obtained from participants and from parents (for subjects under age 18 years), and the Institutional Review Boards at the respective facilities approved all procedures.

Information from informants (parents or key family members) was obtained for all participants in the RAP program and for 86% of CAPPs participants (informants were not included if patients over age 18 years refused informant participation). Participants were excluded from the study if they met *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (1994) criteria for an Axis I schizophrenia-spectrum diagnosis, such as schizophrenia, schizoaffective disorder, schizophreniform disorder, or delusional disorder. Additional exclusion criteria include lack of reasonable fluency in English to allow valid, standardized application of the assessment instruments; the presence of a medical or neurological disorder that could affect brain functioning, drug or alcohol abuse (CAPPs only) or dependence (RAP and CAPPs) within the past 6 months; or an estimated IQ below 70. Axis I diagnoses (lifetime and current) were assessed via semi-structured interview using the Kiddie Schedule for Affective Disorders

and Schizophrenia^{35,36} or the Structured Clinical Interview for *DSM-IV* Axis I Disorders³⁷ for CAPPs participants aged 15 years or over. IQ was assessed with Vocabulary and Block Design subtests of the Wechsler Adult Intelligence Scale, Revised³⁸ and Wechsler Intelligence Scale for Children, 3rd Edition³⁹ in the RAP Program, and with the Wechsler Abbreviated Scale of Intelligence⁴⁰ in the CAPPs program.

All subjects included from both sites met criteria for Attenuated Positive Symptom (APS) prodromal syndrome, the syndrome most typically considered to reflect the prodromal or clinical at-risk state, according to the Scale of Prodromal Symptoms (SOPS^{41,42}). Meeting APS criteria requires that at least 1 of 5 attenuated positive symptoms (ie, unusual thoughts, suspiciousness, grandiosity, perceptual abnormalities, and conceptual disorganization) be rated in the moderate to severe range (ie, each positive symptom is scored 0–6, scores of 3–5 indicate a “prodromal” rating; a score of 6, psychosis). High interrater reliability both for individual SOPS items and prodromal diagnosis has been previously reported for both the RAP and CAPPs programs individually^{43,44} and across all 8 NAPLS sites.²⁷

In addition to 2 APS groups, 44 normal controls (NCs) (25 RAP, 19 CAPPs) were included as a reference point to evaluate the extent of the prodromal functional deficits at baseline. Demographic characteristics for both patient groups and the combined NC sample are presented in table 1. Both prodromal patients and NCs are generally in mid- to late adolescence, of average to somewhat above average intelligence, ethnically diverse, and tend to be male (except for the normal control group, which has more females). Parents of participants are well educated, and more than half of the parents of each sample are college graduates. As indicated in table 1, RAP subjects are significantly younger, have a lower mean IQ (although still within the average range), and have parents with a lower overall educational level than either CAPPs or the combined NC group. As will be discussed below, of these variables, only age is related to either social or role functioning for any of the subject groups.

Measures

In both the RAP and CAPPs programs, comprehensive clinical, neuropsychological, and biological measures are administered at baseline. The primary focus of this article is on 2 newly developed measures: the GF: Social and GF: Role scales. Four other traditional clinical assessments have also been included for comparison purposes: SOPS ratings on the Positive, Negative, Disorganized, and General Symptom Scales; the GAF included with the SOPS; the Premorbid Adjustment Scale (PAS); and the Strauss-Carpenter Outcome Scale (SCOS).

GF: Social and Role Scales. Each of the new GF scales is presented in full in Appendices 1 and 2, along with

Table 1. Demographics

		RAP APS (<i>n</i> = 69)	CAPPS APS (<i>n</i> = 52)	NC (Combined) (<i>n</i> = 44)	Test	<i>P</i>
Age	Mean (SD)	15.96 (1.98)	17.28 (3.80)	17.00 (2.63)	$F_{2,162} = 3.64$.03
Estimated IQ	Mean (SD)	100.75 (16.34)	107.02 (16.39)	109.63 (12.72)	$F_{2,149} = 4.68$.01
Sex						
Male	<i>N</i> (%)	45 (65.2)	34 (65.4)	17 (38.6)	$\chi^2 = 9.42$.01
Female		24 (34.8)	18 (34.6)	27 (61.4)		
Parental education						
≥College graduate	<i>N</i> (%)	35 (52.2)	41 (85.4)	32 (78.0)	$\chi^2 = 16.48$	<.001
<College graduate		32 (47.8)	7 (14.6)	9 (22.0)		
Race						
Caucasian	<i>N</i> (%)	48 (69.6)	29 (55.8)	21 (47.7)	$\chi^2 = 5.73$.06
African American		8 (11.6)	3 (5.8)	5 (11.4)		
Hispanic		10 (14.5)	11 (21.2)	4 (9.1)		
Asian American		2 (2.9)	4 (7.7)	11 (25.0)		
Other/mixed race		1 (1.4)	5 (9.6)	3 (6.8)		

Note: APS = Attenuated Positive Symptom diagnostic group. Age: Recognition and Prevention program (RAP) < Center for the Assessment and Prevention of Prodromal States (CAPPS), $P < .05$. IQ: RAP < CAPPS, $P < .05$ and RAP < normal control (NC), $P < .01$. Sex: RAP and CAPPS, greater % male than NC, both $P < .01$. Parental education: CAPPS and NC greater % college graduates than RAP, both $P < .01$. Race: Caucasian vs non-Caucasian, overall $P > .05$, no post hoc calculated.

optional probes for use during an interview. The scales were developed to be complementary to each other and thus adhere to the same metric, broadly derived from the traditional GAF format. For both scales, scores range from 1 to 10, with 10 indicating superior functioning and 1 representing extreme dysfunction. Both scales also include focused, detailed anchor points for each rating interval to increase reliability. Finally, both scales have been designed to be used by experienced clinicians, either to summarize other previously collected data or as a direct interview guided by the accompanying probes. Because the GF scales were developed well after preliminary data were collected in both projects, the data presented in this study were derived from previously conducted interviews and other available information. This rating strategy proved to be quite effective in that virtually no missing data were reported for either the RAP or CAPPS projects, or for any of the other NAPLS sites that used these measures to recode available baseline data²⁷. In addition, preliminary data collected from both the RAP and CAPPS sites indicate that both scales can be used effectively as brief direct interviews.

Each scale generates 3 scores: lowest level of functioning in the past month (referred to as “current functioning”) as well as lowest level and highest level of functioning reported over the past year.

GF: Social. The GF: Social scale assesses quantity and quality of peer relationships, level of peer conflict, age-appropriate intimate relationships, and involvement with family members. Emphasis is placed on age-appropriate social contacts and interactions outside of the family, with a particular focus on social withdrawal and isolation. Interactions limited only to family members automatically

restrict scores to the lower range from 1 to 3. To illustrate: an adolescent between 16 and 18 years of age with both casual and close friends, who is dating, but has difficulty resolving peer conflict would receive a GF: Social rating of 7, which represents mild problems in social functioning. By contrast, an adolescent of a similar age with no close friends, who is combative with peers and has infrequent contact with family members would receive a score of 4, reflecting a major impairment in social functioning. The scale is rated regardless of etiology of social dysfunction or level of clinical symptomatology.

GF: Role. The GF: Role scale anchor points refer to performance in school, work, or as a homemaker, depending on age. In addition to age appropriateness, ratings are based on demands of the role, level of independence or support provided to the individual (moving from fully independent to increasing need for monitoring and guidance), and the individual’s overall performance in the role given the level of support. For example, an adolescent in a regular public school setting with grades of D or higher or who maintains good performance (grades of C or higher) in regular classes with some minimal accommodations (eg, extra time on tests) would be rated as a score of 7 (mild problems in role functioning). A young adult who is failing all classes in mainstream school or functioning adequately with major support (eg, special education, therapeutic school) would be given a score of 4 (major impairment in role functioning).

Additional Measures

As indicated, 4 additional clinical assessments, routinely included in the RAP and/or CAPPS baseline clinical

batteries, were also included in this report for comparison purposes and to evaluate the association between functional domains and clinical symptoms. The full SOPS consists of 4 subscales (Positive, Negative, Disorganized, and General) and is accompanied by a revised GAF scale.²² The SOPS Positive scale is the basis for selection into the APS diagnostic group and was described above. The Negative SOPS scale consists of 6 items (social isolation, avolition, decreased expression of emotion, decreased experience of emotion, decreased ideational richness, and deterioration in role functioning); the Disorganized SOPS scale of 4 items (odd behavior, bizarre thoughts, trouble with focus/attention, and impaired hygiene); and the General SOPS scale of 4 items (sleep disturbance, dysphoric mood, motor disturbance, and impaired stress tolerance).

The GAF scale that accompanies the SOPS follows the established format of combining social, role, and clinical changes into one scale that generates a single global score based upon expanded anchors. One focus of the current article will be to determine if this combination of domains confounds the developmental picture, as has been suggested by several studies of the traditional GAF when used with affected patients.^{45, 46}

In addition, 2 measures that were site specific were selected to assess preliminary construct validity. As mentioned previously, there was little overlap among NAPLS sites in social/role measures used and no overlap between the RAP and CAPPs programs. The RAP program utilized the PAS⁴⁷ to evaluate social and academic functioning. The PAS queries level of sociability, peer relationships, school performance and adaptation to school for childhood (up to age 11 years), early adolescence (aged 12–15 years), and late adolescence (aged 16–18 years), with lower scores representing better functioning. This self-report measure was administered in the RAP program to both parent informants and adolescent participants. Social and role items were analyzed separately, and only the assessment period reflecting the participant's current level of functioning was used. The PAS has the advantage of providing informant corroboration of patient information and of covering a relatively broad age range. However, it is a self-report rather than a clinician rating and is based on recall and thus is not appropriate to prospectively measure change across time.

The CAPPs program utilized the clinician-rated SCOS³² to rate overall functioning. The SCOS consists of 3 items assessing duration and frequency of hospitalizations, social contacts with individuals outside of the family, and useful employment or participation in school. Because hospitalization information is not relevant to the current study, only the latter 2 items are included here. The SCOS is a brief clinician rating that can be administered prospectively across multiple time points. However, the SCOS was developed for chronically ill adults and therefore is not designed to measure many of the more subtle social and

role difficulties characterizing prodromal youth. Thus, while both established functional measures (PAS and SCOS) provide partial standards for comparison with the new GF scales, neither fulfills the broader needs of prodromal research.

Statistical Analysis

Demographic differences among APS participants for both sites and NCs were analyzed using chi-square tests and analysis of variance. Four of five demographic variables (age, IQ, sex, and parental education) differed among the groups (see table 1). Each of these 4 variables was further examined to determine relationships with social or role functioning within any of the 3 subject groups. The only demographic variable significantly related to functional level was age. As a result, all additional analyses were conducted controlling for age. In addition, for most analyses, the RAP and CAPPs samples were combined because no systematic differences were found between them in levels or pattern of social and role functioning. NCs were assessed only at baseline and were included here only in the mixed models analysis of covariance (RMANCOVA) to provide a reference for the functional deficits characterizing prodromal individuals. The RMANCOVA model contained 2 repeated (within subjects) factors, including functional level (ie, highest in past year, current, and lowest in past year) and functional domain (social vs role), and a between-subjects factor (prodromal vs NC), with age as the covariate. Interrater reliability both within and across sites was assessed with intraclass correlation coefficients (ICCs). Comparisons between baseline and follow-up evaluations at 6 and 12 months also used ICCs. All tests are 2 tailed and, to correct for multiple comparisons, only *P* levels less than .01 are considered significant.

Results

Interrater Reliability

To establish interrater reliability, intrasite reliabilities were first obtained with 3 experienced RAP raters (including A.M.A.) scoring 15 RAP cases and 2 experienced CAPPs raters (T.N. and J.Z.) scoring 15 CAPPs cases on both the GF: Social and GF: Role scales, based on written case reports. From these 15 cases, 10 from each site were selected, deidentified, and exchanged with the other site for cross-site reliability. In calculating the combined reliability, only the 20 cases scored at both sites were included (the 5 cases specific to each site, and not exchanged, were not included in the combined statistic). This generated a total number of 100 separate scores combined across the 2 sites, with 20 subjects (10 CAPPs and 10 RAP) each rated 5 times (3 RAP raters and 2 CAPPs raters).

As shown in table 2, intrasite reliabilities were somewhat higher than those that included cross-site ratings,

but in general, all the interrater reliabilities were consistently quite high and significant at $P < .001$. Interrater correlations were somewhat higher for the GF: Role than the GF: Social scale and for current functioning (ie, lowest score within the past month) than for retrospectively recalled levels (ie, lowest/highest levels within the past year).

Retrospective and Current Functioning

Baseline functioning and information regarding the highest and lowest levels of functioning in the year preceding study entry are presented in figure 1 for both prodromal subjects and NCs. In this analysis, CAPPs and RAP subjects are combined into an overall prodromal group ($n = 121$). Retrospective data consist of both the highest and lowest levels of functioning recalled compared with reported current levels. These analyses are of particular interest because an APS diagnosis requires evidence of clinical deterioration during the year preceding baseline, but the extent to which functioning declines during the same period is not yet established. Comparisons with NC changes and baseline levels are also of interest as indicators of the severity of prodromal deficits.

Results of the RMANCOVA analysis indicated that the age covariate was not significant. A significant main effect was found for subject group (prodromals vs NCs, $F_{1,162} = 204.05, P < .0001$), with NCs having higher functioning overall, and for recalled changes in functioning over time (highest-current-lowest; $F_{2,326} = 39.13, P < .0001$), with highest level recalled exceeding both others. No main effect differences were found for functional domain (social vs role). Of particular interest, significant 3-way interaction was observed for group \times domain \times functional change over previous year ($F_{2,326} = 4.81, P = .009$). These findings indicated that:

1. NCs show dramatically higher social and role functioning than prodromal individuals at all 3 time points and are no different at their highest level of functioning than their lowest for both role and social domains.
2. By contrast, prodromal subjects show significant deterioration from highest to current functioning and from current to lowest in both domains ($P < .001$ for all comparisons).
3. At highest level of functioning, both domains are equivalent in prodromal subjects (mean social = 6.3; role = 6.4). However, over the previous year, recalled role functioning indicates a relatively steep decline, whereas social skills show a comparatively reduced, shallow change. (Social, change from highest to current = 0.5; Role, change from highest to current = 1.2). In both cases, the report of current functioning is similar to the reported lowest level of functioning in the past year, indicating that subjects tend to be ascertained at a low point of functioning (Social, difference between current and lowest = 0.2; Role, difference between cur-

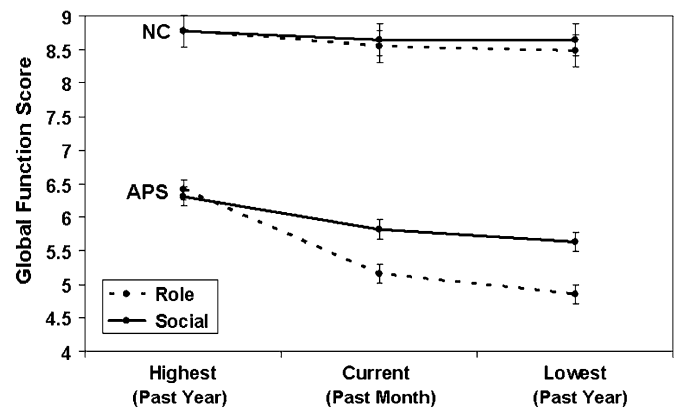


Fig. 1. Global Functioning: Social and Global Functioning: Role Scores for Normal Control ($n = 44$) and APS ($n = 121$) Groups.

rent and lowest = 0.3). Overall, these findings suggest that role functioning fluctuates substantially as reported over the previous year and that social functioning is the more stable of the 2 domains.

Preliminary Construct Validity

Comparisons between current levels of functioning (ie, those characterizing the month preceding study entry) and more traditional measures of the same functional domain were conducted as a preliminary evaluation of construct validity and are presented in table 3. RAP and CAPPs samples are presented separately because there was no overlap in established measures included in the original baseline batteries of the 2 studies. The GF scale scores were therefore compared with the SCOS in the CAPPs program and the PAS in the RAP program.

In the CAPPs sample, GF: Social was significantly correlated with the SCOS Social Contacts and GF: Role with the SCOS Work/School Functioning Subscales. Cross-correlations (ie, SCOS social vs GF: Role; SCOS work vs GF: Social) were low and nonsignificant. The same, highly consistent pattern was also found for the RAP sample, using the PAS, which has the added feature of providing ratings from both parent informants and prodromal subjects. GF: Social was significantly correlated with the PAS social scale, and the GF: Role was significantly correlated with the PAS role scale (for both parent informants and prodromal participants). Once again, the cross-correlations were low and nonsignificant.

Relationships between the 2 GF scales and ratings on the clinical scales included in the baseline batteries of both projects are presented in table 4. Specific symptom areas are represented by the 4 SOPS scales (ie, Positive, Negative, Disorganized, and General). GAF scores reflect global clinical psychopathology. Scores from both functional scales are independent of positive, disorganized, and general symptoms. The only significant relationships are with the SOPS negative symptom scale, and this is equivalent

Table 2. Interrater Reliability

Site	Intraclass Correlation Coefficients (ICC)					
	GF: Social			GF: Role		
	Highest	Current	Lowest	Highest	Current	Lowest
RAP	.86****	.93****	.91****	.87****	.95****	.96****
CAPPS	.88***	.94***	.95***	.85***	.94***	.95***
Combined	.78***	.85***	.84***	.84***	.93***	.92***

Note: Each site was responsible for generating data and rating 15 subjects. As a result, 30 ratings went into the Center for the Assessment and Prevention of Prodromal States (CAPPS) statistic (15 × 2 raters) and 45 ratings were included in the Recognition and Prevention program (RAP) ratings (15 × 3 raters). For the combined reliability, 10 of 15 case reports were cross-rated at the other site. The combined reliability therefore reflects a total of 100 scores (CAPPS program, 20 × 2 = 40; RAP program 20 × 3 raters = 60). ****P* < .001, *****P* < .0001.

and moderately high for both functional scales (*r* = −.51 for role, *r* = −.54 for social, both *P* < .001).

The GF scales are also moderately correlated with the GAF scores (*r* = .44 for social and .39 for role, both *P* < .001), as would be expected because the GAF also measures social and role functioning. However, it should be noted that GAF scores are moderately but significantly correlated with all the clinical scales as well, showing the highest associations with SOPS negative (*r* = −.44) and general (*r* = −.40) symptoms. Lastly, a modest correlation was observed between the 2 GF scales (role vs social, current) (*r* = .31, *P* < .001). Although significant, this relationship suggests that a level of general impairment in functioning underlies both measures to some extent but that the influence of general impairment is quite mod-

erate when compared with the unique variance contributed by the specific impairment within each particular domain. Common method variance is also likely to increase the correlation between GF scale scores.

Longitudinal Analyses Measured Prospectively

Changes Over Time and Test-Retest Stability. Forty-four subjects out of the combined baseline sample (*n* = 23 CAPPS, *n* = 21 RAP) have been retested twice since baseline, first at 6 months and then again at 12 months. Subjects with partial retest data (ie, at only one time point) were eliminated from this analysis to optimize the longitudinal cross-time comparisons. This enables assessment of change in functioning over time within the same subjects (by comparing differences in mean functional levels from baseline to later assessments) as well as an estimate of the test-retest reliability that emerges despite change in level of functioning (correlations between time points). Table 5 presents mean functional differences over time and stability correlations for baseline vs 6-month retest in the upper half of table 5 (section a) and vs 12 months in the lower half of table 5 (section b) for the combined prodromal follow-up sample of 44 subjects.

Subjects significantly improved in role functioning and on GAF scores at 6 months, an improvement that remains stable at 12 months. By comparison, social functioning shows little improvement with time. Short-term test-retest (baseline vs 6 months) correlations are significant for all 3 measures, though longer term stability (baseline vs 12 months) remains significant only for the 2 GF scales.

Prediction of Subsequent Psychosis. Table 6 presents preliminary comparisons of baseline functional scores between those individuals in the full combined baseline sample who did not convert to psychosis and the 23 subjects converting to psychosis over the 12-month follow-up

Table 3. Construct Validity—Correlations

	Strauss-Carpenter Outcome Scale		Premorbid Adjustment Scale Current Score			
	<i>N</i> = 50		Subject, <i>N</i> = 51		Parent, <i>N</i> = 46	
	Social Contacts	Work/School Functioning	Social	Role	Social	Role
RAP						
GF: Social			−.49***	.24	−.66***	−.13
GF: Role			−.07	−.68***	−.19	−.58***
CAPPS						
GF: Social	.70***	.14				
GF: Role	.23	.57***				

Note: *N*'s vary due to missing data for the Strauss-Carpenter Outcome Scale and Premorbid Adjustment Scale measures; RAP, Recognition and Prevention; GF, Global Functioning; CAPPS, Center for the Assessment and Prevention of Prodromal States. ****P* < .001.

Table 4. Correlations: Baseline Scale of Prodromal Symptoms Subscale Scores and Global Functioning (GF) Scales

	Positive, <i>N</i> = 121	Negative, <i>N</i> = 110	Disorganized, <i>N</i> = 108	General, <i>N</i> = 108	GF: Social, <i>N</i> = 121	GF: Role, <i>N</i> = 121
GF: Social	-.14	-.54***	-.15	-.19*		
GF: Role	-.15	-.51***	-.15	-.22*	.31***	
GAF	-.28**	-.44***	-.24**	-.40***	.44***	.39***

Note: For Global Assessment of Functioning Scale (GAF) comparisons: Positive/GF: Social/GF: Role (*n* = 120), Negative (*n* = 109), Disorganized and General (*n* = 107).

P* < .05, *P* < .01, ****P* < .001.

period (*n* = 9 CAPPS, *n* = 14 RAP). There were no differences between converters and nonconverters on either the GAF or GF: Role functioning scores at baseline. However, a significant difference was found on the GF: Social scale, with those individuals subsequently converting to psychosis displaying lower social scores at baseline than those individuals who did not convert over follow-up (see table 6).

Discussion

This report introduces 2 new measures—the GF: Social and GF: Role scales—and also presents data indicating that social and role functioning are impaired during the prodromal phase of schizophrenia, and, to differing extents, may serve as a predictive marker for psychosis. Of the 2 domains, social dysfunction appears to be a stable trait, which does not markedly improve after treatment. Role functioning, on the other hand, undergoes substantial decline in the year prior to study entry, improves upon acceptance and with treatment, and is not as clearly related to psychosis conversion. Ratings of social and role functioning also appear relatively independent of demographic variables, such as estimated IQ and parental education. For prodromal subjects, the only relationship with demographic variables was a moderate correlation between role functioning and age. This suggests that role functioning is

likely to reflect the changing environmental demands when moving to more structured schools or from school to work or homemaking roles. Overall, these findings indicate that evaluation of functional capacity, as measured by the new GF scales, is not greatly influenced by outside factors such as social class, or even IQ, a finding consistent with other global functional assessments.²⁴

Changes in Functioning Over Time

The present study provides 2 different ways of assessing functional changes over time. The first is built into the structure of the new GF measures and is based on recall of the changes in functioning in the year preceding ascertainment in comparison to the level of current functioning at baseline. The second is based on the prospective follow-up of a subgroup of participants who were reevaluated at 6 months and then again at 12 months. This combination of 1-year retrospective and an additional 1-year prospective data provides a very interesting picture of the changes in functioning that occur in tandem with changes in clinical status during the prodromal period. Although functional deterioration does not enter into the diagnosis of APS based upon SOPS criteria,⁴² results of this investigation reveal that retrospective reports indicate deterioration of role functioning in the year preceding ascertainment. After ascertainment,

Table 5. Change in Functioning Over Time

a	Mean Differences (SD)		<i>t</i>	<i>P</i>	Intraclass Correlations	
	Baseline	6 Months			<i>r</i>	<i>P</i>
GF: Social, <i>N</i> = 44	5.59 (1.73)	6.09 (1.67)	-1.95	.06	.50	<.001
GF: Role, <i>N</i> = 44	5.05 (1.98)	6.00 (2.01)	-3.28	.002	.53	<.001
GAF, <i>N</i> = 43 ^a	44.52 (9.92)	51.39 (9.19)	-4.39	<.001	.41	.002
b	Baseline	12 Months				
GF: Social, <i>N</i> = 44	5.59 (1.73)	5.66 (1.55)	-0.26	.80	.42	.002
GF: Role, <i>N</i> = 44	5.05 (1.98)	6.09 (1.76)	-4.26	<.001	.62	<.001
GAF, <i>N</i> = 43 ^a	43.93 (9.22)	51.67 (9.71)	-4.10	<.001	.14	.18

^aOne subject is missing baseline Global Assessment of Functioning Scale (GAF) score; GF, Global Functioning.

Table 6. Baseline Functioning and Conversion to Psychosis

	Combined APS Sample, <i>N</i> = 121		<i>t</i>	<i>P</i>
	Has Not Converted, <i>N</i> = 98	Converted to Psychosis, <i>N</i> = 23		
	Mean (SD)			
GF: Social	6.04 (1.57)	4.87 (1.58)	3.21	.002
GF: Role	5.28 (1.95)	4.65 (2.01)	1.37	.17
GAF	46.61 (9.35) ^a	43.17 (11.11)	1.53	.13

^aOne subject is missing baseline Global Assessment of Functioning Scale (GAF) score; APS, Attenuated Positive Symptom; GF, Global Functioning.

reports of role functioning in this sample demonstrate steady improvement in this domain over the year of follow-up, during which time treatment is administered (psychosocial and pharmacological in both programs; for RAP treatment data, see Cornblatt *et al.*⁴⁸ and for CAPPs treatment data, see Niendam *et al.*, this issue). Fluctuations in role functioning may also reflect changing environment. For example, many prodromal adolescents are reassigned to a more appropriate school setting, which may serve to improve their role functioning. This pattern quite clearly supports the value of early intervention because it is during this time that the skills essential to maintain independent employment as adults are acquired and solidified.^{48,49} By contrast, in the current study, social functioning shows a different developmental pattern. At the highest functioning point occurring prior to ascertainment, prodromal patients reported a moderate impairment in social skills and ability to interact with peers and others, a level significantly lower than that characterizing normal comparison subjects. Results of this analysis showed that already impaired social capacity essentially does not change over the year following ascertainment. There is some slight deterioration reported for the previous year, but the slope of the change is quite minimal. After treatment is initiated, there is also a very slight improvement over the first 6 months, but this is not maintained, and social functioning returns to baseline levels by the 12-month follow-up. Overall, when the pattern of functioning based upon retrospective and prospective data was examined, role functioning emerged as a possible mediating vulnerability indicator,⁴⁹ whereas social functioning appears to be a marker of stable underlying vulnerability.

Moreover, and of particular importance, when comparing baseline scores between those subjects who converted vs those who did not convert to psychosis, only social functioning showed a significant difference. Considered together, these findings support the notion that impaired social functioning may be an early marker of subsequent schizophrenia. It can be further speculated that standard treatment is not effective for improving

early social deficits, an important implication calling for new treatments. This is consistent with the relationship between social skills and cognitive deficits that has been reported in subjects at risk,⁵⁰ Niendam *et al.* (this issue), because such cognitive deficits are typically also treatment resistant.

GF: Social and GF: Role: Two New Measures

The data discussed above are consistent with much of the literature on functional impairment in genetically at-risk subjects and the follow-back studies of adult schizophrenics,^{1-5,50,51} indicating that the newly developed measures are targeting the appropriate functional domains. Measures used in these much earlier studies were typically based on the data available at that time and were restricted to whatever age range was being studied. Furthermore, as discussed earlier, established functional measures currently used throughout the field are not fully appropriate for following prodromal individuals prospectively, in that they either do not span the full prodromal age range, are overly complex, or focus on the types of severe deficits that are more characteristic of chronic patients than prodromal teenagers and young adults. In addition, while the GAF scale is widely used in prodromal studies, the current findings indicate that the GAF scores are quite nonspecific, showing correlations of about the same magnitude across all the SOPS subscales. Using traditional global scores such as the GAF is therefore likely to confound the ability to track the developmental patterns of the major functional domains. As a result, the newly developed GF scales appear to fill an essential assessment gap and to offer a set of unique advantages for the assessment of social and role functioning in prodromal and comparable domains of research.

In addition to reporting the preliminary data on social and role functioning, initial properties of the GF scales were also presented based on the data collected as part of the RAP and CAPPs ongoing prodromal programs. These findings, considered the first step to establishing the broad validity of both measures, include good interrater reliability and some support for construct validity.

Interrater Reliability. Interrater reliability on both functional scales was quite high. All interrater reliabilities for the 2 GF scales were above .75, thus falling into the excellent range.⁵² Of particular interest was the fact that cross-site correlations, although slightly lower than those within site, were nevertheless still very high. This suggests that intensive on-site training is not necessary to achieve high reliability, in turn, supporting the broad applicability of these functional measures to a range of clinical and research endeavors.⁴⁵ This is in contrast with the generally acknowledged modest reliability of earlier developed, more global, Axis V measures.^{26,53} Increased reliability is likely due to both the separation of domains and the inclusion of well-anchored descriptors.⁵³

Preliminary Construct Validity. Preliminary data also suggested acceptable construct validity (ie, that the scale is measuring what it is supposed to be measuring). Overlap with more established measures was demonstrated for each respective domain, while cross-association with other functional domains was not observed (ie, social relates to social, role to role, but not role with social). In terms of discriminant validity, there was no overlap between functional domains and positive symptoms. In addition, functional domains did not overlap with either disorganized or general symptoms but did show a significant association with negative symptoms. The relationship between negative symptoms and social/role functioning is both supported by the inclusion of role deterioration and social isolation in the negative symptoms scale and by the literature which shows a robust association between these domains in prodromal individuals¹⁶ as well as inpatients with established psychotic illness.^{7,9-11}

Interrelationships with the GAF provide further validation of the GF scales. Both scales were developed to enable assessment of social and role functioning separately from each other and from severity of symptoms, thus providing a substantial advantage over the traditional GAF format. At the same time, a global score for each domain was considered essential because these scales were also developed to track developmental change across multiple time points. A variety of clinical studies of the GAF in its various forms have indicated that the global nature of the measure, while effective for measuring a nonspecific pathology, is highly confounded by combining clinical and functional domains.^{22,23} This is especially problematic when attempting to study developmental mechanisms. The current data, indicating that GAF scores correlate significantly but at relatively modest levels with all the symptoms and functional domains, support this view. Moreover, the lack of long-term reliability and lack of predictive findings suggest that the GAF scores are not effective as illness markers. By contrast, the cross-sectional data reported here suggests that the functional scales, as tapping into stable traits, may be far more effective not only for predicting functional outcome but also as predictors of conversion.

A final note about the advantages of the new scales: In this report, the scales were used to rate baseline data that had already been collected using other instruments. However, both GF scales were also used as stand-alone instruments to collect 6- and 12-month data. The consistency of the retrospective vs prospective functioning in both cases suggest that these scales are appropriate for either summarizing existing information or collecting new interview data.

Limitations

Generating a single global score for each domain appears to be optimal for teasing apart the development of the overall social and role domains, where these 2 have previously been confounded with each other and with clin-

ical change in previous global assessments such as the GAF scale. The intention here is to understand the involvement of each overall domain in the mechanisms leading to illness, including the extent of deterioration prior to the onset of psychosis and response to treatment. Each of these domains, however, consists of multiple components that are of interest from other perspectives. This issue cannot be addressed by this study and, in the future, will be best evaluated by including other measures designed for the purpose of parsing each functional domain into basic components. One additional note: while the findings reported here of prodromal baseline functional deficits, in general, and the predictive potential of social functioning, in particular, are of considerable interest, it is important to keep in mind that it will be several years before outcome (ie, who will become psychotic) will be fully assessed. It is therefore important to replicate these findings, possibly on the larger NAPLS-federated database sample.

Appendix 1

*Global Functioning: Social Scale (GF: Social)*³³

Current _____	Lowest Past Year _____	Highest Past Year _____
---------------	---------------------------	----------------------------

Check here if this is a retrospective rating.

Please rate the patient's most impaired level of social functioning for the specified time period by selecting the "lowest" level which describes his/her functioning within that time frame. For "current," rate most impaired level of functioning in the "past month." Rate actual functioning regardless of etiology of social problems.

Note: The emphasis is on social contact/interactions with people other than family members, unless these are the only interpersonal contacts a person has (eg, the lower end of the scale). Also note that ratings of intimate relationships are secondary to the rating of primary friendships and should take into account the age of the individual. For example, older individuals may be expected to have intimate relationships involving steady dating, cohabitation, or marriage, whereas younger individuals may be expected to have only romantic interests (ie, flirtations or crushes) or close friendships.

GF: Social Scale Prompts

Specific questions to aid in rating the GF: Social scale are provided below. Be sure to assess for changes in social functioning over the previous year (to rate highest and lowest) as well as current functioning in the past month.

	Superior social/interpersonal functioning
10	Superior functioning in a wide range of social and interpersonal activities. Frequently seeks out others and has multiple satisfying interpersonal relationships, including multiple close and casual friends. Is sought out by others because of his or her many positive qualities. Age-appropriate involvement in intimate relationships.
	Above average social/interpersonal functioning
9	Good functioning in all social areas, and interpersonally effective. Interested and involved in a wide range of social and interpersonal activities, including both close and casual friends. Age-appropriate involvement in intimate relationships. No more than everyday interpersonal problems or concerns (eg, an occasional argument with spouse, girlfriend/boyfriend, friends, coworkers, or classmates). Able to resolve such conflicts appropriately.
	Good social/interpersonal functioning
8	Some transient mild impairment in social functioning. Mild social impairment is present, but transient and expectable reactions to psychosocial stressors (eg, after minor arguments with spouse, girlfriend/boyfriend, friends, coworkers, or classmates). Has some meaningful interpersonal relationships with peers (casual and close friends), and/or age-appropriate intimate relationships. Infrequent interpersonal conflict with peers.
	Mild problems in social/interpersonal functioning
7	Some persistent mild difficulty in social functioning. Mild impairment present that is NOT just expectable reaction to psychosocial stressors (eg, mild conflicts with peers, coworkers or classmates; difficulty resolving conflicts appropriately). Has some meaningful interpersonal relationships with peers (casual and/or close friends). Some difficulty developing or maintaining age-appropriate intimate relationships (eg, multiple short-term relationships).
	Moderate impairment in social/interpersonal functioning
6	Moderate impairment in social functioning. Moderate impairment present (eg, few close friends; significant but intermittent conflicts with peers, coworkers, or classmates). Moderate difficulty developing age-appropriate intimate relationships (eg, infrequent dating). Occasionally seeks out others but will respond if invited by others to participate in an activity.
	Serious impairment in social/interpersonal functioning
5	Serious impairment in social functioning. No close friends or intimate partner but has some casual social contacts (eg, acquaintances, school/work friends only). Rarely seeks out others. Occasional combative or verbally argumentative behavior with peers. Beginning to withdraw from family members (eg, does not initiate conversation with family, but will respond if addressed).
	Major impairment in social and interpersonal functioning
4	Major impairment in social functioning. Serious impairment in relationships with friends or peers (eg, very few or no friends, frequent conflicts with friends, or frequently avoids friends). Frequent combative or verbally argumentative behavior with peers. Infrequent contact with family members (eg, sometimes does not respond to family or avoids family members).
	Marginal ability to function socially
3	Marginal ability to function socially or maintain interpersonal relationships. Frequently alone and socially isolated. Serious impairment in relationships with all peers, including acquaintances. Few interactions with family members (eg, often alone in room). Serious impairment in communication with others (eg, avoids participating in most social activities).
	Inability to function socially
2	Unable to function socially or to maintain any interpersonal relationships. Typically alone and socially isolated. Rarely leaves home. Rarely answers the phone or the door. Rarely participates in interactions with others at home or in other settings (eg, work, school).
	Extreme social isolation
1	Extreme social isolation. No social or family member contact at all. Does not leave home. Refuses to answer the phone or door.

Note: This scale has been partially derived from the Social and Occupational Functioning Assessment Scale (SOFAS) from *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* and the GAF as it appears in the Scale of Prodromal Symptoms (SOPS). Item content has been changed to focus specifically on social and interpersonal functioning.

1. Tell me about your social life. Do you have friends?
2. Are they casual or close friends? If only casual—are they school or work friends only? If close—how long have you been close friends?
3. How often do you see friends? Do you see them outside of work/school? When was the “last time” you saw one of your friends outside of work/school? (Attempt to determine “actual” amount of social contact vs perceived amount of social contact.)
4. Do you usually initiate contact or activities with friends or do they typically call or invite you? Do you ever avoid contact with friends?
5. Do you ever have problems/falling outs with friends? Arguments or fights?
6. Are you dating or interested in dating? (Alter as needed to assess age-appropriate intimate relationships)
7. Do you spend time with family members (at home)? How often do you communicate with them? Do you ever avoid contact with family members?

Appendix 2

GF: Role Scale (GF: Role)³⁴

Current_____	Lowest Past Year_____	Highest Past Year_____
--------------	--------------------------	---------------------------

Check here if this is a retrospective rating.

Please rate the patient’s “lowest” level of functioning in occupational, educational, and/or homemaker roles, as appropriate, within specified time frame. For “current,” rate most impaired level of functioning for the “past month.” Rate actual functioning regardless of etiology of occupational/educational problems.

Note: This scale emphasizes the level of support provided within the individual’s environment and the individual’s performance given such support. The term “independently” as used throughout this instrument implies that an individual is functioning at an “age-appropriate level” without the assistance of external supports or accommodations. Examples of independent functioning include (1) age-appropriate functioning in a mainstream school without requiring extra help, special classes, or special accommodations for testing; (2) competitive full-time employment without additional guidance, support, job coaching, or other forms of special assistance; and (3) full-time homemaker responsible for generating, organizing, and pacing of household tasks and activities for a family without additional guidance, support, or supervision.

Prompts for GF: Role Scale

Specific questions to aid in rating the GF: Role scale are provided below. Be sure to assess for changes in role func-

tioning over the previous year (to rate highest and lowest) as well as current functioning within the past month. Determine and rate functioning for “primary role” setting (work, school, or home) based upon questions below. However, if the subject is engaged in multiple roles, consider total amount of time spent in role-related activities (ie, part-time school plus part-time work equals full-time role status).

1. How do you spend your time during the day?
2. If currently working:
 - a. Where do you work? What are your job responsibilities?
 - b. How many hours a week do you work?
 - c. How long have you been in your current job? Have you had any recent changes in your job status (eg, lost job, stopped working, changed position, or workload)?
 - d. Do you usually need assistance or regular supervision at work? How often do you need extra help? Are there any tasks that you are not able to do alone?
 - e. Do you ever have trouble keeping up? Are you able to catch up if you fall behind?
 - f. Have you received any comments (positive or negative) or formal reviews regarding your performance? Have others pointed out things that you have done well or poorly?
3. If currently attending school:
 - a. What type of school do you attend? (general education, nonpublic school, residential/hospital)
 - b. Have you ever been in special education classes or other nongeneral education classes?
 - c. How long have you been at this school? Have you had any recent changes in your school placement?
 - d. Do you receive any extra help or accommodations in your classes? Do you receive tutoring or extra help in school or after school? Do you receive extra time to take tests or are you able to leave the classroom to take tests in a quiet place?
 - e. Do you have trouble keeping up with your coursework? Are you able to catch up if you fall behind?
 - f. How are your grades? Are you failing any classes?
4. If a homemaker:
 - a. What are your responsibilities around the house or for the family?
 - b. How long have you been in charge of the home?
 - c. How many hours per week do you spend working on household tasks?
 - d. Are you able to keep up with the demands of your household? Do you ever fall behind? If so, are you able to catch up or do you need others’ help? Are

	Superior role functioning
10	Independently maintains superior functioning in demanding roles. Obtains only superior performance evaluations at competitive work placement. Obtains all A's in mainstream school. Generates, organizes, and completes all homemaking tasks with ease.
	Above average role functioning
9	Independently maintains very good functioning in demanding roles. Rarely absent or unable to perform. Obtains good to superior performance evaluations at competitive work placement. Obtains grades in A and B range in all courses in mainstream school. Generates, organizes, and completes all homemaking tasks.
	Good role functioning
8	Independently maintains good role functioning in demanding roles. Occasionally falls behind on tasks but always catches up; obtains satisfactory performance evaluations at competitive work placement; obtains grades of C and above in mainstream school; occasional difficulty generating or organizing homemaking tasks; or maintains above average performance with minimal support (eg, tutoring, reduced academic course load at 4-year university, attends community college, may receive additional guidance at work less than 1–2 times a week). Receives As and Bs, good work/school evaluations, and completes all tasks with this level of support.
	Mild impairment in role functioning
7	Mildly impaired functioning in demanding roles independently. Frequently behind on tasks or unable to perform; frequently obtains poor performance evaluations at competitive work placement or grades of Ds or better in mainstream school; frequent difficulty generating or organizing homemaking tasks; or maintains good performance with minimal support (eg, minimal accommodations in general education classroom, receives additional guidance/support at work 1–2 times a week). Receives Cs or higher, satisfactory work/school evaluations, and completes most homemaking tasks with this level of support.
	Moderate impairment in role functioning
6	Moderate impairment independently. May receive occasional F in mainstream courses, persistently poor performance evaluations at competitive work placement; may change jobs because of poor performance, persistent difficulty generating, or organizing homemaking tasks; or requires partial support (some resource or special education courses, receives guidance/support at work 2+ times per week). May require less demanding or part-time jobs and/or some supervision in home environment but functions well or adequately given these supports (may fall behind but eventually completes assigned tasks, obtains satisfactory evaluations at work or passing grades in school).
	Serious Impairment in Role Functioning
5	Serious impairment independently. Failing multiple courses in mainstream school, may lose job, or unable to complete most homemaking tasks independently; or in entirely special education classes, requires less demanding job/daily support or guidance, may require vocational rehabilitation, and/or some supervision in home environment but maintains “above average” performance—receives As and Bs, good evaluations at work/school, completes all tasks.
	Major impairment in role functioning
4	Very serious impairment independently. All Fs in mainstream school or failing out of school; cannot obtain or hold independent job or unable to complete virtually any homemaking tasks independently; or adequate to good functioning with major support. Requires assisted work environment, entirely special education classes, nonpublic or psychiatric school, home schooling for the purpose of a supportive school environment, and/or supported home environment but functions adequately given these supports (may fall behind but completes assigned tasks, obtains satisfactory performance evaluations at work or passing grades).
	Marginal ability to function
3	Impaired functioning with major support. Requires supported work environment, entirely special education classes, nonpublic or psychiatric school, home schooling for the purpose of a supportive school environment, and/or supported home environment but functions poorly despite these supports (persistently behind on tasks, frequently unable to perform, obtains poor performance evaluations at work or fails courses at school).
	Inability to function
2	Disabled but participates in structured activities. On disability or equivalent nonindependent status. Not working for pay, attending classes for grades, or living independently. Spends 5 or more hours a week in structured role-related activities (eg, residential treatment, volunteering, tutoring, sheltered work programs).
	Extreme role dysfunction
1	Severely disabled. On disability or equivalent nonindependent status. Not working for pay, attending classes for grades, or living independently. Spends fewer than 5 hours a week in structured role-related activities.

Note: This scale has been partially derived from the Social and Occupational Functioning Assessment Scale (SOFAS) from *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* and the GAF as it appears in the Scale of Prodromal Symptoms (SOPS). Item content has been changed to focus specifically on role functioning.

- you avoiding any tasks? Do you need regular assistance or supervision for any tasks within the home?
- e. Have you received any comments (positive or negative) regarding your performance? Have others pointed out things that you have done well or poorly?

Acknowledgments

The authors would like to thank Danielle McLaughlin, MA; Pradeep Nagachandran, MD; Emilie Nakayama, PhD; Barbara Napolitano, MA; Cindy Akin; Jacqueline Horwitz, MA; Sabrina Lux; Rachel Loewy, PhD; and Stephanie Meyer, PhD, for their assistance in carrying out this study. Grants: Supported by National Institute of Mental Health (NIMH) grants MH-61523 to Dr Cornblatt, and MH-60575 (Intervention Research Center grant, PI: John M. Kane, MD), NIMH MH65079 to Dr Cannon, P50 MH066286 (Translational Research Center grant, PI: Keith Nuechterlein, PhD), MH14584 (Ruth L. Kirschstein National Research Service Award Postdoctoral Fellowship to Dr Niendam), NARSAD Young Investigator Award (Maxine and Jack Zarrow Investigator Award to Dr Bearden), as well as donations from the Rutherford Charitable Foundation and Staglin Music Festival for Mental Health.

References

1. Done DJ, Crow TJ, Johnstone EC, Sacker A. Childhood antecedents of schizophrenia and affective illness: social adjustment at ages 7 and 11. *BMJ*. 1994;309:699–703.
2. Jones P, Rodgers B, Murray R, Marmot M. Child developmental risk factors for adult schizophrenia in the British 1946 birth cohort. *Lancet*. 1994;344:1398–1402.
3. Hans SL, Auerbach JG, Asarnow JR, Styr B, Marcus J. Social adjustment of adolescents at risk for schizophrenia: the Jerusalem Infant Development Study. *J Am Acad Child Adolesc Psychiatry*. 2000;39:1406–1414.
4. Dworkin RH, Lewis JA, Cornblatt BA, Erlenmeyer-Kimling L. Social competence deficits in adolescents at risk for schizophrenia. *J Nerv Ment Dis*. 1994;182:103–108.
5. Cannon M, Jones P, Huttunen MO, et al. School performance in Finnish children and later development of schizophrenia: a population-based longitudinal study. *Arch Gen Psychiatry*. 1999;56:457–463.
6. Horan WP, Subotnik KL, Snyder KS, Nuechterlein KH. Do recent-onset schizophrenia patients experience a “social network crisis”? *Psychiatry*. 2006;69:115–129.
7. Bellack AS, Gold JM, Buchanan RW. Cognitive rehabilitation for schizophrenia: problems, prospects, and strategies. *Schizophr Bull*. 1999;25:257–274.
8. Dworkin RH, Green SR, Small NE, Warner ML, Cornblatt BA, Erlenmeyer-Kimling L. Positive and negative symptoms and social competence in adolescents at risk for schizophrenia and affective disorder. *Am J Psychiatry*. 1990;147:1234–1236.
9. Green MF. What are the functional consequences of neurocognitive deficits in schizophrenia? *Am J Psychiatry*. 1996;153:321–330.
10. Green MF, Kern RS, Braff DL, Mintz J. Neurocognitive deficits and functional outcome in schizophrenia: are we measuring the “right stuff”? *Schizophr Bull*. 2000;26:119–136.
11. Green MF, Kern RS, Heaton RK. Longitudinal studies of cognition and functional outcome in schizophrenia: implications for MATRICS. *Schizophr Res*. 2004;72:41–51.
12. Hamilton SH, Edgell ET, Revicki DA, Breier A. Functional outcomes in schizophrenia: a comparison of olanzapine and haloperidol in a European sample. *Int Clin Psychopharmacol*. 2000;15:245–255.
13. Bond GR, Kim HW, Meyer PS, et al. Response to vocational rehabilitation during treatment with first- or second-generation antipsychotics. *Psychiatr Serv*. 2004;55:59–66.
14. Rosenheck RA, Leslie DL, Sindelar J, et al. Cost-effectiveness of second-generation antipsychotics and perphenazine in a randomized trial of treatment for chronic schizophrenia. *Am J Psychiatry*. 2006;163:2080–2089.
15. Neumann CS, Walker EF. Developmental origins of interpersonal deficits in schizophrenia. *Handbook of Social Functioning in Schizophrenia*. Boston: Allyn & Bacon, 1998;121–133.
16. Cornblatt BA, Lencz T, Smith CW, Correll CU, Auther AM, Nakayama E. The schizophrenia prodrome revisited: a neurodevelopmental perspective. *Schizophr Bull*. 2003;29:633–651.
17. Miller TJ, McGlashan TH, Rosen JL, et al. Prospective diagnosis of the initial prodrome for schizophrenia based on the structured interview for prodromal syndromes: preliminary evidence of interrater reliability and predictive validity. *Am J Psychiatry*. 2002;159:863.
18. Yung AR, Phillips LJ, McGorry PD, et al. Prediction of psychosis. A step towards indicated prevention of schizophrenia. *Br J Psychiatry Suppl*. 1998;172:14–20.
19. Yung AR, Phillips LJ, Yuen HP, et al. Psychosis prediction: 12-month follow up of a high-risk (“prodromal”) group. *Schizophr Res*. 2003;60:21–32.
20. Yung AR, Yuen HP, McGorry PD, et al. Mapping the onset of psychosis: the comprehensive assessment of at-risk mental states. *Aust N Z J Psychiatry*. 2005;39:964–971.
21. Yager JA, Ehmann TS. Untangling social function and social cognition: a review of concepts and measurement. *Psychiatry*. 2006;69:47–68.
22. Hall RC. Global assessment of functioning. A modified scale. *Psychosomatics*. 1995;36:267–275.
23. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Washington, DC: American Psychiatric Association; 1994.
24. Mellsop G, Peace K, Fernando T. Pre-admission adaptive functioning as a measure of prognosis in psychiatric inpatients. *Aust N Z J Psychiatry*. 1987;21:539–544.
25. Rey JM, Stewart GW, Plapp JM, Bashir MR, Richards IN. Sources of unreliability of DSM-III Axis IV. *Aust N Z J Psychiatry*. 1987;21:75–80.
26. Skodol AE, Link BG, Shrout PE, Horwath E. Toward construct validity for DSM-III Axis V. *Psychiatry Res*. 1988;24:13–23.
27. Addington J, Cadenhead K, Cannon T, et al. North American Prodrome Longitudinal Study (NAPLS). A multi-site, collaborative approach to prodromal schizophrenia research. *Schizophr Bull*. 2007;In press.
28. John K, Gammon GD, Prusoff BA, Warner V. The Social Adjustment Inventory for Children and Adolescents (SAICA): testing of a new semistructured interview. *J Am Acad Child Adolesc Psychiatry*. 1987;26:898–911.

29. Weissman MM, Klerman GL, Paykel ES, Prusoff B, Hanson B. Treatment effects on the social adjustment of depressed patients. *Arch Gen Psychiatry*. 1974;30:771–778.
30. Achenbach TM, Edelbrock C. *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Burlington, Vt: Queen City Printers; 1983.
31. Birchwood M, Smith J, Cochrane R, Wetton S, Copestake S. The Social Functioning Scale. The development and validation of a new scale of social adjustment for use in family intervention programmes with schizophrenic patients. *Br J Psychiatry*. 1990;157:853–859.
32. Strauss JS, Carpenter WT Jr. The prediction of outcome in schizophrenia. I. Characteristics of outcome. *Arch Gen Psychiatry*. 1972;27:739–746.
33. Auther AM, Smith CW, Cornblatt BA. *Global Functioning: Social Scale (GF: Social)*. Glen Oaks, NY: Zucker-Hillside Hospital; 2006.
34. Niendam TA, Bearden CE, Johnson JK, Cannon TD. *Global Functioning: Role Scale (GF: Role)*. Los Angeles, CA: University of California, Los Angeles; 2006.
35. Chambers WJ, Puig-Antich J, Hirsch M, et al. The assessment of affective disorders in children and adolescents by semistructured interview. Test-retest reliability of the schedule for affective disorders and schizophrenia for school-age children, present episode version. *Arch Gen Psychiatry*. 1985;42:696–702.
36. Orvaschel H, Puig-Antich J. *Schedule for Affective Disorders and Schizophrenia for School-Age Children—Epidemiologic Version*. Fort Lauderdale, FL: Nova Southeastern Univ; 1994.
37. First MB, Gibbon M, Spitzer RL, Williams JBW. User's guide for the Structured Clinical Interview for DSM-IV Axis I Disorders—Research Version (SCID-I). *Version 2.0*. 1996.
38. Wechsler D. *Manual for the Wechsler Adult Intelligence Scale, Revised (WAIS-r-R)*. San Antonio, Tex: The Psychological Corporation; 1981.
39. Wechsler D. *Manual for the Wechsler Intelligence Scale for Children, 3rd Edition. (WISC-III)*. San Antonio, Tex: The Psychological Corporation; 1991.
40. Wechsler D. *Manual for the Wechsler Abbreviated Intelligence Scale (WASI)*. San Antonio, Tex: The Psychological Corporation; 1999.
41. McGlashan TH, Miller TJ, Woods SW, Hoffman RE, Davidson L. Instrument for the Assessment of Prodromal Symptoms and States. In: Miller TJ, Mednick SA, McGlashan TH, Libiger J, Johannessen JO, eds. *Early Intervention in Psychotic Disorders*. New York: Springer-Verlag, 2001:135–149.
42. Miller TJ, McGlashan TH, Woods SW, et al. Symptom assessment in schizophrenic prodromal states. *Psychiatr Q*. 1999;70:273–287.
43. Lencz T, Smith CW, Auther A, Correll CU, Cornblatt B. Nonspecific and attenuated negative symptoms in patients at clinical high-risk for schizophrenia. *Schizophr Res*. 2004;68:37–48.
44. Meyer SE, Bearden CE, Lux SR, et al. The psychosis prodrome in adolescent patients viewed through the lens of DSM-IV. *J Child Adolesc Psychopharmacol*. 2005;15:434–451.
45. Hilsenroth MJ, Ackerman SJ, Blagys MD, et al. Reliability and validity of DSM-IV axis V. *Am J Psychiatry*. 2000;157:1858–1863.
46. Moos RH, Mccoy L, Moos BS. Global assessment of functioning (GAF) ratings: determinants and role as predictors of one-year treatment outcomes. *J Clin Psychol*. 2000;56:449–461.
47. Cannon-Spoor HE, Potkin SG, Wyatt RJ. Measurement of premorbid adjustment in chronic schizophrenia. *Schizophr Bull*. 1982;8:470–484.
48. Cornblatt BA, Lencz T, Smith CW, et al. Can antidepressants be used to treat the schizophrenia prodrome? Results of a prospective, naturalistic treatment study. *J Clin Psychiatry*. 2007; In press.
49. Nuechterlein KH, Dawson ME. A heuristic vulnerability/stress model of schizophrenic episodes. *Schizophr Bull*. 1984;102:300–312.
50. Cornblatt BA, Lenzenweger MF, Dworkin RH, Erlenmeyer-Kimling L. Childhood attentional dysfunctions predict social deficits in unaffected adults at risk for schizophrenia. *Br J Psychiatry Suppl*. 1992;18:59–64.
51. Cannon TD, Mednick SA. The schizophrenia high-risk project in Copenhagen: three decades of progress. *Acta Psychiatr Scand Suppl*. 1993;370:33–47.
52. Cicchetti D Guidelines Criteria. Rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychol Assess*. 1994;6:284–290.
53. Goldman HH, Skodol AE, Lave TR. Revising axis V for DSM-IV: a review of measures of social functioning. *Am J Psychiatry*. 1992;149:1148–1156.