



Published in final edited form as:

J Am Acad Child Adolesc Psychiatry. 2008 October ; 47(10): 1197–1204. doi:10.1097/CHI.0b013e3181825a7b.

The Selective Mutism Questionnaire: Measurement Structure and Validity

Andrea M. Letamendi, MS, Denise A. Chavira, PhD, Carla A. Hitchcock, Scott C. Roesch, PhD, Elisa Shipon-Blum, DO, Murray B. Stein, MD, MPH, and Scott C. Roesch, PhD

Ms. Letamendi, Dr. Chavira, Ms. Hitchcock, and Dr. Stein are with the Anxiety and Traumatic Stress Disorders Research Program in the Department of Psychiatry, University of California San Diego; Dr. Roesch is Associate Professor in the Department of Psychology, San Diego State University; Dr. Shipon-Blum is Director of the Selective Mutism Group Childhood Anxiety Network.

Abstract

Objective—To evaluate the factor structure, reliability, and validity of the 17-item Selective Mutism Questionnaire.

Method—Diagnostic interviews were administered via telephone to 102 parents of children identified with selective mutism (SM) and 43 parents of children without SM from varying U.S. geographic regions. Children were between the ages of 3 and 11 inclusive and comprised 58% girls and 42% boys. SM diagnoses were determined using the Anxiety Disorders Interview Schedule for Children - Parent Version (ADIS-C/P); SM severity was assessed using the 17-item Selective Mutism Questionnaire (SMQ); and behavioral and affective symptoms were assessed using the Child Behavior Checklist (CBCL). An exploratory factor analysis (EFA) was conducted to investigate the dimensionality of the SMQ and a modified parallel analysis procedure was used to confirm EFA results. Internal consistency, construct validity, and incremental validity were also examined.

Results—The EFA yielded a 13-item solution consisting of three factors: a) Social Situations Outside of School, b) School Situations, and c) Home and Family Situations. Internal consistency of SMQ factors and total scale ranged from moderate to high. Convergent and incremental validity were also well supported.

Conclusions—Measure structure findings are consistent with the 3-factor solution found in a previous psychometric evaluation of the SMQ. Results also suggest that the SMQ provides useful and unique information in the prediction of SM phenomenon beyond other child anxiety measures.

Keywords

Selective mutism; child anxiety; psychometric properties; parent-report

Introduction

Selective Mutism (SM) is a childhood psychiatric disorder characterized in the DSM IV-TR as a persistent failure to speak in social situations in which there is an expectation for speaking, despite speaking in other situations.¹ As the DSM indicates, failure to speak is not

Correspondence and reprint requests to: Andrea M. Letamendi, MS, Anxiety and Traumatic Stress Disorders Research Program, University of California San Diego 8950 Villa La Jolla Drive, Suite B-218 La Jolla, CA 92037 Phone: 858-534-6438; fax: 858-534-6460 aletamen@ucsd.edu.

due to the child's lack of knowledge or comfort with the language required in the context of the social situation.¹ For example, a typical child with SM may speak at developmentally appropriate rates at home with parents and siblings, but not speak in school settings.² The DSM-IV-TR states that the lack of communication in SM must be verbal; gesturing, pushing, pulling, or grunting are often forms of communication displayed by children with SM.^{1,2} Typically a child with the disorder will show signs of mutism between the ages of 2 and 5^{3,4} however, restricted and selective speech often does not become identifiable as a condition until a child enters the school system.² Few studies have established the population prevalence rate of SM, though school-based samples yield rates between 0.71%⁵ and 1.9%⁶ when using DSM-IV criteria. Girls tend to outnumber boys with ratios at 1.5:1⁷ and 1.6:1.⁴

Selective mutism commonly co-occurs with social phobia, with comorbidity rates as high as 97%.^{3,8,9} In clinical samples of children with social phobia, a subgroup meets criteria for concurrent diagnosis of selective mutism.¹⁰ However, the notion that these are “comorbid” anxiety disorders has been challenged; selective mutism may instead be considered a severe, early-onset form of social phobia.¹¹⁻¹⁴ Alternatively, conceptualizing selective mutism as a severe social phobia may neglect a fuller characterization of SM.⁹ These mixed impressions suggest a need for a specialized assessment that might help to reconcile the phenomenological questions about selective mutism and its clinical distinctions from social phobia. An assessment tool validated for children with selective mutism is therefore an essential feature in the armamentarium available to practitioners and researchers in child psychiatry.

At present, children with selective mutism and related disorders (e.g., social anxiety) frequently are under-recognized and undertreated, and disproportionately so when compared to children with externalizing disorders.^{15,16} Indeed, because children with SM are not likely to be aggressive or unruly in classroom settings, they are often not referred for mental health services.² Such under-recognition underscores the need for more standardized and sound assessment methods to facilitate the detection and, ultimately, the treatment of children with selective mutism. Previous studies of selective mutism have used parent- or teacher-rated instruments validated to measure anxiety symptomatology in children either across several broad domains (e.g. comprehensive syndrome scales), or for a single child anxiety disorder (e.g., social phobia). These assessments often supplemented DSM criteria in order to inform the impairment level, severity, or scope of a child's selective mutism. Dummit and colleagues,⁸ for example, utilized the Social Behavior Scale¹⁷ for parent-ratings of anxiety and avoidance of social situations in children with SM, and added questions about the child's speech behavior because “no scale to quantify speech across different social settings could be found” (p.655). Similarly, to supplement standardized psychiatric ratings of child behavior, Black and Uhde³ generated a “parent screening questionnaire” with ratings on the severity of the child's reluctance to speak in a variety of circumstances. Yeganeh, Beidel, Turner, Pina & Silverman⁹ examined the emotional and behavioral functioning of children with SM using the Child Behavior Checklist (CBCL)¹⁸ Externalizing, Internalizing, Anxious/Depressed, Withdrawn, Aggressiveness, and Delinquency subscales. In another study, Yeganeh, Beidel, & Turner¹⁹ included self-report measures such as the Social Phobia and Anxiety Inventory for Children (SPAI-C)²⁰ to measure child anxiety symptoms and inhibited behaviors often concurrent with SM. While these instruments capture SM characteristics among several other childhood behaviors and anxiety symptoms, they do not capture a unique characteristic of SM, i.e. the degree of failure to speak in selective social situations.

The Selective Mutism Questionnaire (SMQ)²¹ is the only available instrument developed to measure a child's frequency of non-speaking behavior across situations in which children are

expected to speak. This parent-report measure consists of 17 items that allow the clinician to quantify the degree of mutism in various social and interpersonal contexts, and to assess the severity and interference associated with the child's non-speaking behavior. Psychometric properties of the SMQ, including factor structure, have recently been evaluated by developers of the measure.²¹ Their findings demonstrate a meaningful factor structure consisting of 3 components describing mutism: 1) at school; 2) at home/with family; and 3) in public/social settings. Furthermore, their findings support both the convergent and discriminant validity of the measure, as well as its treatment sensitivity.

The current study represents an independent, exploratory assessment of the psychometric properties of the SMQ using a clinical sample of children diagnosed with SM. Objectives of this study include evaluating estimates of reliability, convergent validity, incremental validity and factor structure of the SMQ. The process of methodized evaluation of a measure's competency is a critical endeavor for both researchers and clinicians alike. By establishing that a measure performs with good precision, such that it measures the construct it is intended to measure in a consistent way, we better approximate that construct and realize more accurate recognition of the disorder. This process is especially crucial in the advancement of improving recognition of internalizing disorders in children. Sound assessments specific to selective mutism, therefore, have the potential to inform prevalence, facilitate the diagnosis, and assist in monitoring treatment change among children with this psychiatric disorder.

Method

Participants

188 biological parents of target children participated in the screening phase of a national project investigating genetic markers of SM and the psychopathology of parents of children with selective mutism.²² Control families were recruited through community advertisements and a university website advertising participation in research studies. Children with language disorders (n=1), speech problems (n=1), developmental delays (n=3), and outside the age range of 3-11 years (n=3) were excluded from the present analysis. In addition, 5 families terminated contact with investigators after completing the screen and were dropped from study. Of the remaining family sets, 102 cases included children who met diagnostic criteria for current selective mutism, 30 cases included those with lifetime selective mutism, and 43 cases were controls.

Measures

Selective Mutism Questionnaire—The SMQ²¹ assesses the degree of a child's speech inhibition in various situations. The SMQ includes 17 statements describing typical situations in which children are expected to speak (e.g., “When called on by his/her teacher, my child would answer”) spanning three domains: “at school” (five items), “with family” (five items), and “in social situations” (seven items). Three overall interference and distress questions supplement the situational statements (e.g., “Overall, how much did not talking interfere with daily living for your child?”). Parents are asked to rate the frequency of each item, using a 4-point scale (1=Always; 2= Often; 3=Seldom; and 4=Never for speaking situations). A separate scale is used for the interference/distress items (1=Not at all, 2=Slightly, 3=Moderately, 4=Extremely). Global scores range from 17-68, with higher scores representing greater SM severity (i.e., not talking behaviors) and SM-related impairment.

Anxiety Disorders Interview Schedule for Children for DSM-IV-Parent Version (ADIS-C/P)—The ADIS-C/P²³ is a semi-structured diagnostic interview designed to assess

DSM-IV anxiety disorders in children and adolescents. DSM-IV symptoms are judged by the parent as present or absent (“yes” or “no”), although the interviewer (i.e. clinician) is prompted to elicit elaborated responses when needed.²⁴ Total numbers of “yes” responses are calculated to determine whether diagnoses are met, with follow-up questions aimed at ascertaining distress and interference. Finally, each module includes a Clinician Severity Rating (CSR), a global rating which allows the assessor to assign a severity index for each diagnosis using a 0(absent) to 8(very disabling) scale. CSR's should consider intensity of symptoms, behavioral avoidance associated with the symptoms, and the interference in social and occupational functioning of the symptoms endorsed.²⁵ The CSR cutoff of 4 was used to determine diagnosis for each disorder. Previous research has demonstrated good to excellent reliability of the ADIS-C/P among disorders ($\kappa = 0.65$ to 0.88).²⁴ The selective mutism module ADIS-C/P CSR served to determine diagnostic status of children in the SM sample. Diagnosticians included advanced doctoral students, post-doctoral fellows, and psychologists who received 8 weeks of training on clinical instruments followed by certification based on at least 80% agreement on mock cases. Final impairment scores were determined based on clinical judgment and consensus meetings.

Child Behavior Checklist/1.5 – 5 and /6-18 -Parent Report Form—Revised and re-normed in 2001,²⁶ the Child Behavior Checklist/1.5 – 5 and 6-18 (hereafter referred to as CBCL Preschool-age form and CBCL School-age form, respectively) obtain reports from parents or guardians regarding a child's competencies, behavioral and emotional problems. Parents are asked to rate the extent to which each statement describes the youth within the past 6 months using the following rating scale: 0 = not true (as far as you know); 1 = somewhat or sometimes true; 2 = very true or often true. Using the CBCL Preschool-age form, parents rate 99 problem items used to derive scores on 7 syndrome scales, 5 DSM-oriented scales, and an externalizing, internalizing, and total problems scale. Using the CBCL School-age form, 118 items describe specific behavioral and emotional problems used to derive 8 syndrome scales, 6 DSM-oriented scales, and an externalizing, internalizing, and total problems scale. Scales are based on factor analyses of nearly 5,000 children and normative data of over 1,700 children representative of region, SES, ethnicity, and rural-suburban-urban residence across 48 states.²⁶

Data Collection Procedures

Study procedures followed review and approval by the Institutional Review Board at the University of California, San Diego. Families of children with SM were recruited through two primary sources: 1) A web-based site sponsored by the Selective Mutism Group-Child Anxiety Network, a non-profit organization focused on increasing SM awareness; and 2) Nationwide Selective Mutism conferences for parents offered by the same group. Control families were recruited through the following two sources: 1) Advertisements posted in San Diego county and 2) A University of California at San Diego website advertising participation in research studies. Parents interested in the project were mailed consents and child assents or were given these materials in person. SM and control families that returned consent forms were thereafter screened via telephone during which either parent reported on the child's behavior, speech productivity, and psychological functioning. The parent was administered the Anxiety Disorders Interview Schedule for Children–Parent Report (ADIS-P/C),²³ the SMQ,²¹ and the CBCL School-age or PreSchool-age form.¹⁸ A subsample of parents were also administered self-report anxiety questionnaires and diagnostic interviews for adults, not used in the present study. Complete SM interview data were obtained for 102 children with current SM, 30 with lifetime SM, and 43 control children. The control group consisted of children with no current or lifetime SM but with varying levels of anxiety and other Axis I disorders. To optimize the precision of our analytic model, only those children

meeting criteria for current SM were included in the factor analysis and subsequent reliability and validity analyses.

Data Analysis

Data Reduction

Exploratory Factor Analysis (EFA) using principal axis factoring with direct oblimin rotation was conducted to explore the dimensionality of the 17-item Selective Mutism Questionnaire. Oblimin rotation was chosen over Varimax and Promax rotations because correlations were expected among the factors created. The variance accounted for by the solution, the variance accounted for by each individual factor, and the interpretability of the factors were all evaluated to determine the initial plausibility of the factor structure. The commonly used rules to determine the correct number of factors in EFA, including the Guttman-Kaiser (GK) eigenvalue greater than one rule,^{27,28} have been shown to perform poorly in factor number estimation.²⁹ When compared to GK, Barlett's test, and Cattell's scree test, Horn's parallel analysis was the most accurate factor estimation procedure.³⁰ Per these findings, we used a modified parallel analysis procedure (PA)³¹ to confirm the factor structure of the SMQ, a method that determines the number of factors by comparing eigenvalues from our target exploratory factor analysis to those generated from a large number of random correlation matrices based on the same number of items and sample size. Essentially, null distributions of eigenvalues from very large random correlation matrices were used in determining which actual eigenvalues were larger than those expected by chance. We set α to .05 to determine eigenvalue significance. Each extracted factor from our analysis with an eigenvalue that exceeds its corresponding eigenvalue generated from random data was deemed a statistically plausible factor. This statistical approach is considered theoretically similar to a standard hypothesis testing situation in that a test statistic is compared to a critical value; if the actual eigenvalue exceeds the null value, then the actual is considered to be a real effect that is not likely due to chance sampling variability. This modified PA has been demonstrated to perform better than Horn's PA in pulling the correct number of factors from an EFA in that it reduces the tendency to overextract.³¹

Internal Consistency

To obtain a reliability rating of the SMQ, we obtained coefficient alpha estimates³² for the total scale as well as each factor. Mean inter-item correlations were also derived for the total scale and each factor.

Convergent Validity

To establish convergent validity of the SMQ, the selective mutism Clinician Severity Scale (CSR) on the ADIS-C/P was correlated with the SMQ Global Score and to the SMQ overall interference score. While the SMQ was not developed for diagnostic purposes, a child's total score on the parent-report measure should bear a strong relationship to the ADIS-C/P clinician-report severity rating in that they are purported to assess the same theoretical diagnostic construct. Furthermore, establishing convergent validity by maximally different means (in this case, varying rater-types) is preferred over using similar instrument types.³³

Incremental Validity

To supplement traditional psychometric dimensions of convergent and structural validity, the incremental validity of the SMQ was considered. Infrequently addressed despite advocacy by psychometricians,³⁴ incremental validity assesses the performance of a measure relative to others. Because no other standardized assessments that address the core features of SM are available, we deemed the SMQ a measure that, qualitatively, contributes

meaningfully to the prediction of selective mutism. To statistically demonstrate relative efficacy against other measures used to assess SM-related symptoms (e.g., internalizing problems including anxiety, withdrawal, and fear), we conducted hierarchical regression analyses using a larger sample which included the SM group and the control group. Eighty parents from this combined sample completed the CBCL (55 children identified with current SM and 25 controls) and were included in the incremental analysis. The Anxious/Depressed Syndrome Scale from both the Preschool and School CBCL versions was used as a comparison predictor variable, with SM diagnosis from the ADIS-C/P as the criterion variable. Two sets of hierarchical multiple regression analyses were conducted, one for preschool age and another for school-age subsets of children ($n = 36$ and $n = 44$, respectively). First, demographic variables were controlled for and entered as an initial block: Child's age, sex, ethnicity, and the average of the mother and father's education levels. Second, the CBCL Parent-Report Form Syndrome Scale Anxious/Depressed T-score was entered. Third, the three domain scores from the SMQ (School, Family, and Social Situations) were entered simultaneously as a block. Incremental validity tests were based on the differences in variance accounted for by the model(s).

Results

Parent and Child Demographics

A majority of the parent participants were mothers (96.6%). Among the children who participated in the current study ($n = 102$), 58% were female and 42% were male. The age of the children ranged from 3 to 11 years, with a mean age of 6.14 ($SD = 2.04$). Families were geographically distributed as follows: 35.4% were U.S. Northeast residents, 26.3% from the West, 25.3% from the South, 11.1% from Midwestern states, and 2% of the sample had residency in Canada. Caucasian children comprised the majority of the sample (74.5%), with smaller percentages of other ethnicities: Latino/Hispanic American (5.9%), Asian American (2.9%), Native American (1%), and Other (3.9%). Respondents who did not report ethnicity made up 11.8% of the sample.

SMQ

The overall sample mean on the 17-Item SMQ total score was 51.89 ($SD = 7.53$) with a median of 52.0. Domain mean scores were 17.58 ($SD = 3.37$) for School, 10.95 ($SD = 3.11$) for Family, and 23.17 ($SD = 3.77$) for Social Situations. SMQ item means ranged from 1.60 to 3.64 for this clinical sample.

A between-subjects one-way analysis of variance (ANOVA) showed no differences between girls and boys [$F(1, 101) = 2.15, p = .146$] on the SMQ global score. Age groups, defined as preschool age (2-5) and school age (6-12), also showed no differences [$F(1, 101) = 2.76, p = .100$] on the SMQ global score.

Exploratory Factor Analyses

An initial EFA using principal axis factoring with direct oblimin rotation was conducted to explore the dimensionality of the Selective Mutism Questionnaire. The EFA suggested that a 4-factor solution best explained the data. The variance explained by the solution was 53.14% and the four factors individually accounted for 26.23%, 17.47%, 5.18%, and 4.25%, respectively. A parallel analysis, however, suggested that a 3-factor-solution best explained the variance when eigenvalues from the target data set were compared to the 95th percentile of the sampling distribution representing the random data set: (a) Component 1: 4.47 vs. 1.20; (b) Component 2: 2.97 vs. .96; (c) Component 3: 0.85 vs. 0.81. In addition, one item loaded on one factor (Item 9: "Willing to speak on the phone to parents and siblings."). While it is not clear what accounted for this unique association, we considered age a

plausible factor: Some younger children may not have as many opportunities to speak on the phone as their older counterparts. Given the univocal loading of the item and weak interpretability of its factor, the item was dropped from the analysis. A subsequent EFA, therefore, was conducted to explore the dimensionality of the 16 remaining SMQ items.

The 16-item EFA suggested that a 3-factor solution best explained the data with 50.66% variance explained by the solution. The three factors individually accounted for 27.37%, 18.23%, and 5.06%, respectively. Examination of the pattern matrix revealed relatively high secondary cross-loadings, i.e., above .30 or within .10 the value of the primary loading, for three items. These items were subsequently dropped (Item 10: “My child would speak to at least one babysitter.”; Item 13: “My child would speak with family friends who he/she didn't know.”; and Item 14: “My child would speak with his or her doctor and/or dentist.”). A final exploratory factor analysis was conducted to explore the dimensionality of the 13 remaining SMQ items.

The 13-Item EFA suggested that a 3-factor solution best explained the data. The variance explained by the solution was 51.34% and the three factors individually accounted for 29.27%, 16.36%, and 5.70%, respectively. A parallel analysis confirmed the 3-factor-solution when eigenvalues from the target data set were compared to random-data eigenvalues: (a) Component 1: 3.77 vs. 0.80; (b) Component 2: 2.09 vs. 0.61; (c) Component 3: 0.70 vs. 0.47. The pattern matrix was used to interpret these factors. Formal items and factor loadings from the final factor analysis are presented in Table 1. Five items composed Factor 1, with large positive pattern coefficients (value loadings of .624 to .886). Four items composed Factor 2, with moderate positive pattern coefficients (value loadings of .448 to .652). Factor 3 comprised four items, with moderate-to-large negative pattern coefficients (value loadings of -.541 to -.713). Secondary cross-loadings were minimal in value (absolute values between .257 and .001). Inter-factor correlations were weak to moderate ($r = -.06$ between Factor 1 and 2; $r = -.25$ between Factor 1 and 3, and $r = -.34$ between Factor 2 and 3). Factors 1, 2, and 3 were conceptualized and labeled School Situations, Home and Family Situations, and Social Situations Outside of School. The 13 items derived by this factor reduction were used in subsequent psychometric analyses.

Internal Consistency

Table 2 shows the Cronbach's α reliability coefficients and mean inter-item correlation for each factor (subscale) and total score of the SMQ. Factor internal reliability estimates indicated acceptable to good reliability (Cronbach's α between .654 and .913; mean inter-item r between .32 and .68). Additionally, the total scale reliability coefficient indicated strong internal consistency ($\alpha = .783$, mean inter-item $r = .22$).

Convergent Validity

The clinician-rated ADIS SM CSR correlated moderately with the SMQ Global Score ($r = .42$) and with the SMQ overall interference rating ($r = .48$). The correlations between the parent-reported SMQ scores and a clinician-rated measure of selective mutism phenomenology support the convergent validity of the measure.

Incremental Validity

As shown in Table 3, the Preschool CBCL Anxious/Depressed Subscale significantly predicted SM diagnosis. The SMQ added significant variance in the prediction of SM diagnosis over the CBCL Syndrome Scale. Specifically, this relationship was driven by the Social Situations ($\beta = .06$, $p = .001$) and the School Situations ($\beta = .03$, $p = .006$) domains.

The School CBCL Anxious/Depressed Subscale also significantly predicted SM diagnosis for school-aged children (Table 3). The 13-Item SMQ predicted variance in SM diagnosis over and above the CBCL Syndrome Scale. Specifically, this relationship was driven by the School Situations domain ($\beta = .06$, $p < .001$). The magnitude of additional variance explained by the SMQ global and domain scores strongly supports the incremental validation of the measure in both preschool and school-aged children.

Discussion

The purpose of this study was to evaluate the psychometric properties of the SMQ using a clinical sample of children with selective mutism. With respect to the dimensionality of the measure, our results replicated the three-factor solution found in an initial psychometric study.²¹ These three factors represent the type of situations where non-speaking behaviors occur; in school, in social settings outside of school, and in home and family settings. In addition, our findings support the internal consistency of the measure with Cronbach's alpha estimates (.65 to .91.) slightly less robust than previous internal consistency estimates (.88 to .97).²¹ Our findings also support the convergent validity of the measure. Specifically, the SMQ was correlated with a clinician severity rating index derived from a semi-structured clinical interview.

The current study found strong support for the incremental validity of the SMQ. Our findings demonstrated that the SMQ provided additional, unique diagnostic prediction beyond the CBCL Syndrome Scale of Anxiety/Depression for both preschool and school-aged children. The SMQ can therefore be advantageous to clinicians and researchers when selecting among assessment strategies for SM. Examination of SMQ subscales points to the school domain and social situations domain as the best predictors of SM diagnosis for preschool-aged children, whereas the school domain best predicted SM diagnosis for school-aged children. Certainly, social, developmental and language expectations of children differ for these age groups in that they become increasingly complex when a child enters the school system. Our results are consistent with reports demonstrating that although SM behavior is evident prior to school entry, SM impairment emerges once the child enters a school setting.^{34,36} Our findings further suggest that speech inhibition in school settings may therefore be the best predictor of selective mutism among older youth enrolled in school.

The SMQ is a relatively brief measure that allows for basic detection of speech inhibition. While it was not intended as a diagnostic measure, it can be useful for determining severity of a child's non-speaking behaviors, the scope of which they occur, as well as the need for follow-up assessment. Future research will inform the utility of the instrument as a screening instrument in diverse settings including mental health clinics, primary care, and school settings. For children already diagnosed with SM, the SMQ can serve to monitor severity and impairment related to mutism. Long-term stability (i.e. test-retest reliability) of the SMQ has yet to be examined. However, existing data support the treatment sensitivity of the SMQ following behavioral therapy.²¹

Criteria not addressed by the SMQ should be considered when assessing a child with selective mutism, including the rule-out of pervasive developmental disorders, neurological insults, neuropsychological deficits, auditory problems, and atypical speech and language difficulties.¹³ Thus, complete assessment of the child's academic abilities, medical history including orofacial abnormalities, and formal language testing should supplement measurement of speech inhibition using the SMQ when possible. Finally, direct or videotaped observation of a child speaking at home is useful in evaluating verbalization abnormalities. In sum, standardized academic testing, neurodevelopmental examination,

parent-report (e.g., SMQ), and direct observation or audiotape of the child speaking constitute a multi-method approach to obtaining a comprehensive evaluation of a child with selective mutism.¹³

There are several limitations of this study that are important. First, only 10% of the study sample represented non-Caucasian participants. A more ethnically diverse and representative sample is needed to generalize the study's findings to U.S. non-Caucasian populations. Second, additional factor analytic studies are warranted in order to replicate the three dimensional structure in other samples. That is, the 3-factor structure of the SMQ should be established using confirmatory factor analysis with a larger, separate sample of children with SM diagnosis. To further establish convergent validity, future psychometric studies on the SMQ should consider other methodological approaches such as direct observation.³³ Furthermore, it is plausible that statistical convergence between the SMQ and the ADIS-IV CSR is attenuated by the differences in their scope of measurement. That is, the SMQ queries the non-speaking behavior across domains of interpersonal and social situations whereas the ADIS-IV CSR relies on DSM criteria without eliciting reports on child non-speaking frequency across domains. Thus, a child who presents with severe SM in one particular domain (e.g., impaired by mutism primarily in school contexts) may generate a moderate score on the SMQ global rating but a severe score on the ADIS CSR. Finally, given the frequently cited overlap between selective mutism and social phobia^{1,9} and the validated childhood social phobia measures available (e.g. SPAI-C),²⁰ it would have been optimal to demonstrate the incremental validity of the SMQ compared to social phobia instruments in order to more convincingly demonstrate a need for a self-report measure specific to SM. Because such instruments were not included in this project, we used a CBCL subscale frequently used to measure symptoms in anxiety-disordered youth.³⁷⁻³⁹ Other dimensions of incremental validity may be considered in addition to predictive power, including, for example, the degree to which the measure contributes to the design of more effective treatments, or to which the measure is more sensitive to changes in symptoms.³⁴

In light of the present limitations associated with SM assessment, the current findings represent a relevant contribution to the availability of psychometrically sound measures of SM. The reliability and validity data from this study, in combination with previous findings,²¹ suggest that the SMQ is a promising measure of SM severity that has applications in both clinical and research settings. The current study evidenced a 13-item, three dimensional factor structure yielding good to excellent internal consistency, convergent validity, and incremental validity. Thus, these findings offer preliminary support for a truncated version of the SMQ; however, they require replication prior to any formal modifications of the existing 17-Item version of the SMQ.²¹ As a valid parent-report form of the core features of selective mutism, the SMQ can be considered a fundamental assessment tool in the comprehensive evaluation of SM in children.

Acknowledgments

We thank Lindsey Bergman, Ph.D. for her advice and assistance in the usage of the Selective Mutism Questionnaire.

Funding for the current study was provided in part by a grant to the Selective Mutism Group-Child Anxiety Network from GlaxoSmithKline.

Reference List

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th Edition, Text Revision (DSM-IV-TR). American Psychiatric Association; Washington, DC: 2000.

2. Sharp WG, Sherman C, Gross AM. Selective mutism and anxiety: A review of current conceptualization of the disorder. *J Anxiety Disord* 2007;21:568–79. [PubMed: 16949249]
3. Black B, Uhde TW. Psychiatric characteristics of children with selective mutism: A pilot study. *J Am Acad Child Adolesc Psychiatry* 1995;34:847–56. [PubMed: 7649954]
4. Steinhausen HC, Juzi C. Elective mutism: An analysis of 100 cases. *J Am Acad Child Adolesc Psychiatry* 1996;35:606–14. [PubMed: 8935207]
5. Bergman RL, Piacentini J, McCracken J. Prevalence and description of selective mutism in a school-based sample. *J Am Acad Child Adolesc Psychiatry* 2002;41:938–46.
6. Kumpulainen K, Rasanen E, Raaska H, Somppi V. Selective mutism among second graders in elementary school. *Eur Child Adolesc Psychiatry* 1998;11:71–8.
7. Kopp S, Gillberg C. Selective mutism: A population-based study: A research note. *J Child Psychol Psychiatry* 1997;38:257–62. [PubMed: 9232472]
8. Dummit ES, Klein RG, Tancer NK, Asche B, Martin J, Fairbanks JA. Systematic assessment of 50 children with selective mutism. *J Am Acad Child Adolesc Psychiatry* 1997;36:653–60. [PubMed: 9136500]
9. Yeganeh R, Beidel D, Turner S, Pina A, Silverman W. Clinical distinctions between selective mutism and social phobia: An investigation of childhood psychopathology. *J Am Acad Child Adolesc Psychiatry* 2003;42:1069–79. [PubMed: 12960706]
10. Beidel D, Turner S, Morris T. Psychopathology of childhood social phobia. *J Am Acad Child Adolesc Psychiatry* 1999;38:643–50. [PubMed: 10361781]
11. Anstendig KD. Is selective mutism an anxiety disorder? Rethinking its DSM-IV classification. *J Anxiety Disord* 1999;13:417–34. [PubMed: 10504110]
12. Chavira DA, Stein MB. Recent developments in child and adolescent social phobia. *Curr Psychiatry Rep* 2000;2:347–52. [PubMed: 11122980]
13. Dow SP, Sonies BC, Scheib D, Moss SE, Leonard HL. Practical guidelines for the assessment and treatment of selective mutism. *J Am Acad Child Adolesc Psychiatry* 1995;34:836–46. [PubMed: 7649953]
14. Stein MB, Chavira DA, Jang KL. Familial aggregation of anxiety-related quantitative traits in generalized social phobia: Clues to understanding “disorder” heritability? *Am J of Med Genet* 2001;105:79–83. [PubMed: 11425006]
15. Chavira DA, Stein MB, Bailey K, Stein M. Child anxiety in primary care: Prevalent but untreated. *Depress Anxiety* 2004;20:155–64. [PubMed: 15643639]
16. Wren FJ, Scholle SH, Heo J, Comer DM. Pediatric mood and anxiety syndromes in primary care: Who gets identified. *Int J Psychiatry Med* 2003;33:1–16. [PubMed: 12906340]
17. Watson D, Friend R. Measure of social-evaluative anxiety. *J Consult Clin Psychol* 1969;33:448–57. [PubMed: 5810590]
18. Achenbach, TM.; Edelbrock, C. *Manual for the Child Behavior Checklist*. University of Vermont; Burlington: 1991.
19. Yeganeh R, Beidel D, Turner S. Selective mutism: More than social anxiety? *Depress Anxiety* 2006;23:117–23. [PubMed: 16421889]
20. Beidel DC, Turner SM, Morris TL. A new inventory to assess childhood anxiety and social phobia: The Social Phobia and Anxiety Inventory for Children. *Psychol Assess* 1995;7:73–9.
21. Bergman RL, Keller ML, Piacentini J, Bergman AJ. The development and psychometric properties of the Selective Mutism Questionnaire. *J Clin Child Adolesc Psychol*. in press.
22. Chavira DA, Shipon-Blum E, Hitchcock C, Cohan S, Stein MB. Selective mutism and social anxiety disorder: All in the family? *J Am Acad Child Adolesc Psychiatry*. in press.
23. Silverman, WK.; Albano, AM. *Anxiety Disorders Interview Schedule for Children Using DSM-IV (Child and Parent Versions)*. Psychological Corporation; San Antonio, TX: 1996.
24. Silverman WK, Saavedra ML, Pina AA. Test-retest reliability of anxiety symptoms and diagnoses with the anxiety disorders interview schedule for DSM-IV: Child and parent versions. *J Am Acad Child Adolesc Psychiatry* 2001;40:937–44. [PubMed: 11501694]

25. Hope DA, Laguna LB, Heimberg RG, Barlow DH. The relationship between ADIS Clinician's Severity Rating and self-report measures among social phobics. *Depress Anxiety* 1997;4:120–5. [PubMed: 9166640]
26. Achenbach TM, Demenci L, Rescorla LA. DSM-oriented and empirically based approaches to constructing scales from the same item pools. *J Clin Child Adolesc Psychol* 2003;32:328–40. [PubMed: 12881022]
27. Guttman L. Some necessary conditions for common factor analysis. *Psychometrika* 1954;19:149–62.
28. Kaiser HF. The application of electronic computers to factor analysis. *Educ Psychol Meas* 1960;20:141–51.
29. Linn RL. A Monte Carlo approach to the number of factors problem. *Psychometrika* 1968;33:37–71. [PubMed: 5239570]
30. Zwick WR, Velicer WF. Comparison of five rules for determining the number of components to retain. *Psychol Bul* 1986;99:432–42.
31. Glorfeld LW. An improvement on Horn's parallel analysis methodology for selecting the correct number of factors to retain. *Educ Psychol Meas* 1995;55:377–93.
32. Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika* 1951;16:297–334.
33. Foster SL, Cone JD. Validity issues in clinical assessment. *Psychol Assess* 1995;7:248–60.
34. Haynes SN, Lench HC. Incremental validity of new clinical assessment measures. *Psychol Assess* 2003;15:456–66. [PubMed: 14692842]
35. Giddan JL, Ross GJ, Sechler LL, Becker BR. Selective mutism in elementary school: Multidisciplinary interventions. *Lang Speech Hear Serv Sch* 1997;28:127–33.
36. Standart S, Le Couteur A. The quiet child: A literature review of selective mutism. *Child Adolesc Ment Health* 2003;8:154–60.
37. Aschenbrand SG, Angelosante AG, Kendall PC. Discriminant validity and clinical utility of the CBCL with anxiety-disordered youth. *J Clin Child Adolesc Psychol* 2005;34:735–46. [PubMed: 16232070]
38. Seligman LD, Ollendick TH, Langley AK, Baldacci HB. The utility of measures of child and adolescent anxiety: A meta-analytic review of the Revised Children's Manifest Anxiety Scale, the State-Trait Anxiety Inventory for Children, and the Child Behavior Checklist. *J Clin Child Adolesc Psychol* 2004;33:557–65. [PubMed: 15271613]
39. Higa CK, Fernandez SN, Nakamura BJ, Chorpita BF, Daleiden EL. Parental assessment of childhood social phobia: Psychometric properties of the Social Phobia and Anxiety Inventory for Children—Parent Report. *J Clin Child Adolesc Psychol* 2006;35:590–7. [PubMed: 17007605]

Table 1

Items and Standardized Factor Loadings for the Selective Mutism Questionnaire

| Item | Factor Loading | | |
|--|-------------------|----------------------------|-------------------------------------|
| | School Situations | Home and Family Situations | Social Situations Outside of School |
| 1. My child would speak in groups or in front of the class. | .886 | .051 | -.045 |
| 2. When called on by his/her teacher, my child would answer. | .874 | -.059 | -.057 |
| 3. My child would speak to most teachers or staff at school. | .865 | .162 | .079 |
| 4. My child would ask his/her teachers questions. | .851 | -.001 | .060 |
| 5. My child would talk to most peers at school. | .624 | -.170 | -.115 |
| 6. My child would talk to family members living at home when other people were present. | -.048 | .652 | .101 |
| 7. My child would talk to family members that didn't live with him/her. | -.113 | .533 | -.257 |
| 8. My child would talk to family members when in unfamiliar places. | .053 | .532 | .023 |
| 9. My child would speak with family friends who were well-known to him/her. | .061 | .448 | -.188 |
| 10. My child would talk when in clubs, teams, or organized activities outside of school. | .156 | -.035 | -.713 |
| 11. My child would speak to store clerks and/or waiters. | .104 | .200 | -.610 |
| 12. My child would speak with children who he/she didn't know. | -.117 | .066 | -.602 |
| 13. My child would speak on the phone with non-family members. | .015 | -.059 | -.541 |

Table 2

Chronbach's α reliability coefficients and mean inter-item correlations for SMQ factors and total score.

| Scale/Subscale | Number of items | Cronbach's α | Mean inter-item r |
|-------------------------------------|-----------------|---------------------|-------------------|
| School Situations | 5 | .913 | .68 |
| Home and Family Situations | 4 | .654 | .32 |
| Social Situations Outside of School | 4 | .734 | .41 |
| Total Scale | 13 | .783 | .22 |

Table 3

Hierarchical Regression Analysis for SMQ Scores as a Predictor of Selective Mutism in PreSchool and School-Aged Children ($N = 80$)

| Criterion Variable | Predictor Variable | ΔR^2 | ΔF | β |
|---------------------------------------|-----------------------------------|--------------|------------|---------|
| Selective Mutism Diagnosis, PreSchool | Preschool demographics | .03 | 1.23 | |
| | CBCL SS Anxious/Depressed T-Score | .27 | 12.61* | |
| | SMQ global score | .62 | 67.02** | |
| | SMQ school factor score | | | .03* |
| | SMQ family factor score | | | .004 |
| | SMQ social situations score | | | .06* |
| Selective Mutism Diagnosis, School | School demographics | .04 | 1.44 | |
| | CBCL SS Anxious/Depressed T-Score | .38 | 26.12** | |
| | SMQ global score | .48 | 57.86** | |
| | SMQ school factor score | | | .06** |
| | SMQ family factor score | | | .01 |
| | SMQ social situations score | | | .01 |

Note: SMQ = Selective Mutism Questionnaire; CBCL SS = Child Behavior Checklist Syndrome Scale. Selective mutism diagnosis was determined via the Anxiety Disorders Interview Schedule for Children for DSM-IV-Parent Version. R^2 indices are adjusted.

* $p < .01$.

** $p < .001$.