A Comparison of Psychiatric Symptom Severity in Individuals Assessed in Their Mother Tongue Versus an Acquired Language: A Two-Sample Study of Individuals With Schizophrenia and a Normative Population

Caitlin A. Brown and Amy Weisman de Mamani
University of Miami

Case studies published over 40 years ago suggest that seriously mentally ill patients appear to report more severe psychotic symptoms when assessed in their mother tongue as opposed to a later acquired language. We aimed to test this hypothesis empirically in both a clinical sample of 222 patients with schizophrenia/ schizoaffective disorder (Study 1) and a nonclinical sample of 414 undergraduates (Study 2), focusing on positive and disorganized symptoms (clinical and subclinical, respectively), which have been indicated as most influenced by sociocultural factors. In Study 1, participants interviewed in their mother tongue endorsed significantly greater symptom severity than those interviewed in a later-acquired language on the Thought Disturbance subscale of the Brief Psychiatric Rating Scale, but no differences on the Disorganization subscale. In Study 2, participants who were assessed in their mother tongue reported significantly greater Unusual Experiences and Cognitive Disorganization on the Oxford-Liverpool Inventory of Feelings and Experiences than those responding in an acquired language. Results supported the hypothesis that evaluations conducted in an individual's mother tongue reveal greater psychopathology than those conducted in a later acquired language. Clinical implications regarding language use in assessment are discussed.

Keywords: schizophrenia, psychosis, language, hallucinations, schizotypy

Currently, 18% of the U.S. population identifies as multilingual (Shin & Kominski, 2010). Among Hispanics, the largest and fastest-growing minority group in the United States, this rate rises to 59% (Pew Hispanic Center, 2013). The increasing use of languages other than English in the United States, and of multilingualism globally, yields a need to understand the impact of assessment language on psychiatric symptom reporting. Although researchers have long recognized that sociocultural and ethnic factors influence diagnosis and treatment (Chu, Leino, Pflum, & Sue, 2016), little research has examined interactions between language and symptom severity. A better understanding of how language relates to psychiatric symptoms may improve diagnosis and case conceptualization in a multilingual world.

Although a bilingual individual's mother tongue may be defined in various ways, the term *mother tongue* is used here to describe the language learned first, typically in early childhood and at home (Ouane & Glanz, 2011). It will be especially important to examine how the use of the mother tongue versus an acquired language manifests in the expression of severe psychopathology, such as schizophrenia, one of the most debilitating psychiatric illnesses (Minzenberg & Carter, 2012). The symptoms of schizophrenia are characterized as *positive*, a category that includes delusions and hallucinations, or *negative*, which refers to deficits such as flattened affect, apathy, and anhedonia (American Psychiatric Association [APA], 2013). Disorganized speech and behavior are additional hallmarks of the illness, and thought disorder, which may result in language that takes on a confusing or even incomprehensible form and is characterized by derailment, tangentiality, and abnormalities at the single word level (Andreasen, 1979). Also related to language, positive symptoms such as auditory hallucinations have been attributed to disturbances of inwardly directed speech (Hoffman, 1986). Thus, abnormalities in positive and disorganized symptoms of schizophrenia seem to be closely tied to linguistic deficits (Paradis, 2008; Strik, Dierks, Hubl, & Horn, 2008). Not surprisingly, then, symptoms such as hallucinations and disorganized speech were the focus of early research (Del Castillo, 1970; Hemphill, 1971) that examined the influence of language on psy-

CAITLIN A. BROWN received her MS in clinical health psychology from the Autonomous University of Barcelona and her BA in psychology from Columbia University. She is currently a doctoral-level student in clinical psychology at the University of Miami. Under the mentorship of Dr. Amy Weisman de Mamani, she conducts research on bilingualism and schizophrenia, culturally informed treatments for serious mental illness, and individuals at high risk for psychosis.

AMY WEISMAN DE MAMANI received her PhD in clinical psychology from the University of Southern California. She is currently an Associate Professor and the Associate Director of the Adult Division of the Department of Psychology at the University of Miami. Her areas of research interest include free will perceptions, attributions of control, religious beliefs and values, and other sociocultural factors (e.g., self-construal and acculturation) that may be associated with patients' and relatives' emotional reactions to schizophrenia; developing a culturally informed treatment for schizophrenia; and how psychopathology manifests in bilinguals (English-Spanish) with schizophrenia.

CORRESPONDENCE CONCERNING THIS ARTICLE should be addressed to Caitlin A. Brown, Department of Psychology, University of Miami, 5665 Ponce de Leon Boulevard, Coral Gables, FL 33146. E-mail: cabrown@miami .edu

chiatric symptom severity. More recent research has also looked at language effects on other symptom dimensions.

Early Research

A small number of studies, mostly based on clinical observation, suggest that patients with severe mental illness may endorse greater symptoms of positive psychosis when interviewed in their mother tongue compared to later-acquired language. For instance, Del Castillo (1970) presented a series of case studies of patients who reported more positive symptoms of schizophrenia and greater anxiety in their mother tongue than in an acquired language. Hemphill (1971) examined a similar question but focused primarily on language of hallucination content. In a qualitative study of 30 patients with schizophrenia, he found that auditory hallucinations occurred only in the first acquired language, even if the subject reported using his or her second language on a more regular basis at the time of testing. Hemphill also offered observations as to language effects on the reporting of clinical symptoms, noting that many patients appeared logical and grounded in their acquired language, but highly psychotic when interviewed in their native language.

In another early case study on the same topic, Marcos, Alpert, Urcuyo, and Kesselman (1973) reported that symptomatology was rated as more severe in the acquired language compared to the mother tongue. The authors conducted interviews with a small sample of Puerto Rican patients ($N = 10$) whose mother tongue was Spanish, but who spoke sufficient English to participate in English psychiatric interviews, with the conclusion that certain individual negative and affective schizophrenia symptoms were reported as more severe in the acquired language. However, in this observational study, language effects were confounded with clinician ethnicity and language: the individuals rating the symptom severity were not bilingual/bicultural but rather Spanish-speaking for the Spanish interviews and English-speaking for the English interviews. In addition, unlike Del Castillo (1970) and Hemphill (1971), Marcos et al. (1973) based their claims of differences according to language not on positive symptoms such as hallucinations, but rather on negative and affective symptoms. Specifically, patient symptom severity was rated higher in English than in Spanish, with observed differences for the somatic concern, anxiety, emotional withdrawal, tension, mannerisms and posturing, depressive mood, and hostility subscales of the Brief Psychiatric Rating Scale (BPRS; Lukoff, Liberman, & Nuechterlein, 1986).

Since the publication of these case studies, several researchers have examined differences in schizophrenia symptoms according to interview languages using small to medium samples of individuals with schizophrenia and quasi-experimental designs. In a medium sample of Mexican American patients with schizophrenia, Price and Cuellar (1981) found that patients with schizophrenia endorsed significantly more psychopathology when interviewed in their native language. Even more recently, Malgady and Costantino (1998) found that Hispanic individuals interviewed in both their mother tongue and acquired language (Spanish and English, respectively) were rated has having greater schizophrenia symptoms, followed by those only interviewed in Spanish, with those only interviewed in their acquired language rated as having the lowest symptom severity. The authors ventured that the use of the nondominant language may cause more cognitive strain, whereas the use of the native language may cause more emotional difficulties, which would explain the hierarchy of symptom severity according to language that they found in a Hispanic sample.

The authors of the early case studies also speculated as to clinical implications and mechanisms that might explain this differential symptom severity according to language. Hemphill (1971) argued that the patient's "language environment" (Hemphill, 1971, p. 1394) may have key clinical consequences. Specifically, he suggested that the use of a less-developed language might allow clinicians to treat highly psychotic patients, as they may be more capable of rational thought in their nonnative tongue. Del Castillo (1970) took this a step further, attempting to explain the processes at work behind this discrepancy in symptom severity in the mother tongue and acquired language. He posited that the effortful control involved in the production of an acquired language helps to "ground" individuals in reality, such that patients who are psychotic in their mother tongue may be more lucid when speaking a second language. This dovetails with evidence from cognitive load theory, in that speaking a second language could be conceptualized as a distractor task from the primary task of symptom reporting (Henik, Nissimov, Priel, & Umansky, 1995), and from cognitive remediation theory, which suggests cognitive benefits afforded by learning a second language (Medalia & Choi, 2009). In Del Castillo's terms (1970), although the experience of schizophrenia is present regardless of the language of reporting, it is possible that the greater cognitive load involved in speaking an acquired language may be associated with a perceived reduction in symptom severity, compared to the emotional arousal experienced when the symptoms are described in the individual's mother tongue.

Recent Findings in Neuroscience

More recently, research from linguistics and neuroscience has helped to further elucidate potential mechanisms for observed differences in symptom severity according to language. Approaching this research question through an analysis of linguistic features in schizophrenia patients, Smirnova et al. (2015) found that the clinical markers of disorganized speech in schizophrenia are similar in both of a bilingual patient's languages. However, they reported an interaction between language spoken and schizophrenia symptoms, such that certain lexical indicators of schizophrenia were exhibited with a greater degree of impairment in an individual's second language (L2). Although these authors considered the possibility that this difference could be due to limited proficiency in the acquired language, they noted that the greater L2 lexical impairment occurred largely with syntax or semantic components of language, suggestive of an impairment in processes associated with declarative memory rather than a proficiency issue. This research has direct implications for the impact of assessment language on the severity of disorganized symptoms: Because certain language processes appeared more impaired when participants spoke their acquired language, the severity of disorganized speech may be compounded by reduced fluency when an individual is speaking in his or her second language (Smirnova et al., 2015).

Imaging studies on language use and schizophrenia may also inform research into mechanisms at work behind this observed difference. The structural and functional abnormalities that appear to be involved in schizophrenia symptoms, such as auditory hal-

lucinations, suggest potential dysfunction in the speech areas of the left temporal lobe (Hugdahl, Løberg, & Nygård, 2009), which is activated during the use of the mother tongue. For individuals with low proficiency in and/or late acquisition of a nonnative language, research indicates that the production of the acquired language is correlated with a more diffuse network of activation in the brain (Perani & Abutalebi, 2005). Thus, highly overlapping brain regions may be involved in L1 usage and schizophrenia symptoms, whereas L2 language production may involve prefrontal activity and a more diffuse network beyond the language areas in the temporal lobe, depending on factors such as fluency and age of acquisition. Although L1 production may activate psychogenic regions in the left temporal lobe, symptoms could present as less severe in an acquired language if a more diffuse network, extending beyond the brain areas associated with positive symptoms, is involved in L2 usage. At the same time, some evidence suggests that for highly proficient bilinguals, the neural representation of L2 may be reduced to that of L1 (Perani & Abutalebi, 2005). If this overlap between brain regions related to psychosis and language production does influence reported symptom severity in bilinguals, individuals who are highly proficient in both languages would then be expected to endorse similar levels of psychotic symptoms in both of their languages. Imaging studies of bilinguals with schizophrenia may further elucidate this question.

The Present Study

In the 40+ years that have elapsed since these original observational studies were published, only a handful of studies—most of which are limited by small samples and/or observational designs—have been conducted on the topic in spite of the increasing presence of bilingualism in the United States. Additional research is needed to clarify the role of language use in the manifestation of psychopathology. Specifically, it is important to assess whether the effort associated with speaking a second language also protects against subclinical or prodromal psychotic symptoms in a normative population or whether this pattern only emerges once one has crossed a certain psychopathology threshold. In other words, the extension of this research idea to normative populations, using a similar design, will help clarify whether the finding that psychiatric symptoms appear more severe in the mother tongue compared to an acquired language is generalizable or specific to severe psychopathology.

Thus, the goal of the present project was to test Del Castillo and Hemphill's hypothesis empirically, examining the severity of psychotic symptoms in a clinical sample and the severity of attenuated psychotic symptoms a nonclinical sample, using a between-groups design to compare symptom severity in the mother tongue versus a later acquired language. In Study 1, we aimed to determine whether patients with schizophrenia report more severe psychotic symptoms when interviewed in their mother tongue compared to a later acquired language. In Study 2, we extended this concept to a nonclinical sample, examining the severity of attenuated or subclinical symptoms of psychosis in participants interviewed in their mother tongue versus a later acquired language. In both instances, we examined positive and disorganized symptoms (or subclinical features resembling positive and disorganized symptoms), because they have been the focus of previous studies. We also assessed group differences in negative symptoms, some of which Marcos et

al. (1973) found to be elevated in the nondominant language, but which empirical evidence indicates are not as affected by language or culture (Weisman de Mamani & Caldas, 2013). Finally, we explored whether the reported intensity of affective symptoms differs in the mother tongue versus a later acquired language.

Study 1

Consistent with Hemphill's (1971) observations, we hypothesized that patients with schizophrenia assessed in their mother tongue (English or Spanish), defined by the language acquired first and/or used most frequently in the first four years of life, would report greater psychotic symptoms on the Thought Disturbance and Disorganization subscales of the BPRS (Lukoff, Liberman, & Nuechterlein, 1986) compared to patients assessed in an acquired language (English or Spanish). In addition, we predicted that, consistent with findings by Weisman de Mamani and Caldas (2013), there would be no clinician-rated differences for negative symptoms (measured by the Anergia subscale) across the language groups. Affect, the fourth dimension of the BPRS, was also examined on an exploratory basis.

Method

Participants. Participants were 222 patients (30.8% female) who met criteria for schizophrenia (37.4%; 23.8% female), schizoaffective disorder (46.3%; 38.4% female), or another psychotic disorder (16.4%; 25.7% female). The mean age of participants was 41.05 (SD = 11.5) years. Levels of education varied (below Grade 8, 2.8%; Grade 8 completed, 2.8%, part high school beyond Grade 8, 20.3%, high school graduate, 28.1%, part college, 35.9%, college degree, 8.8%, advanced degree, 1.4%). Participants identified as Caucasian (17.2%), African American (42.8%), Hispanic/Latino (37.7%), or Other (2.3%). Of those whose mother tongue was English (73.5%), 22.2% identified as Caucasian, 57.6% as African American, 19.0% as Hispanic, and 1.2% as Other. Of those whose mother tongue was Spanish (24.2%), 96.2% identified as Hispanic, 1.9% as African American, 1.9% as Other, and none as Caucasian. Of those whose mother tongue was a language other than English or Spanish (2.3%), 40.0% identified as Caucasian, 20.0% as Hispanic, 40.0% as Other, and none as African American. The interview was conducted in the participants' mother tongue (English or Spanish) in 78% of cases.

Procedures. Participants were recruited as part of a larger study on culturally informed therapy for schizophrenia (Weisman de Mamani & Suro, 2016; Weisman de Mamani, Weintraub, Gurak, & Maura, 2014). They were obtained through referrals from hospitals and community mental health centers, as well as through advertisements in newspapers and on Miami's aboveground rail system. Those interested in participating were administered an eligibility screener by phone, and those meeting criteria were invited to complete a baseline assessment. All data analyzed in the current study was collected in person at baseline, prior to any intervention. Trained graduate students who were fully proficient in both English and Spanish (some native speakers and others learned proficient bilinguals) conducted the clinical interviews. Because assessments were conducted as part of a treatment study, assessment language was not randomized but rather conducted in each participant's preferred language (English or Spanish).

Patients reported family language, other language(s) spoken, and primary language of use. *Mother tongue* was defined as the language spoken most frequently during the first 4 years of life, in accordance with prior definitions of early language acquisition in linguistics literature (e.g., Garbin et al., 2011; Sebastián-Gallés & Soto-Faraco, 1999). Mother tongue was determined according to family language, birth place, and number of years before coming to the United States. If family language was a language other than English, and the participant lived in a non-English speaking place during the first 4 years of life, the mother tongue was recorded as the family language.

Measures.

Patient diagnosis. The Structured Clinical Interview for *DSM–IV* Axis I Disorders, Version 2.0, patient edition (SCID-I/P; First, Spitzer, Gibbon, & Williams, 2002) was used to confirm patient diagnosis of schizophrenia or schizoaffective disorder. Interrater reliability for the current study was determined by having all interviewers watch six videotapes of SCID-I/P interviews and independently rate each video to determine an overall diagnosis (in four of the training tapes a diagnosis was present; in two it was absent). Interrater agreement for the current study using Cohen's kappa was found to be 1.0, indicating perfect agreement in determining whether a diagnosis of schizophrenia or schizoaffective disorder was present or absent. For the findings to be as generalizable as possible, patients with comorbid diagnoses were not excluded, as the majority of patients with schizophrenia have a comorbid diagnosis of a substance use, mood, or anxiety disorder (Tsai & Rosenheck, 2013).

Symptom severity. The BPRS (Lukoff, Liberman, & Nuechterlein, 1986) was used to determine positive, negative, disorganized, and affective symptom severity. The BPRS is a 24-item measure, with each item assessed on a 7-point Likert scale. Some items are based on patient self-report, and others are coded according to clinician-observed behavior and speech. The Principal Investigator of this study completed a University of California at Los Angeles (UCLA) BPRS training and quality assurance program and trained graduate student interviewers. Interviewers coded six training videotapes provided by the UCLA assurance program's creator (Ventura). Intraclass correlations between interviewers and consensus ratings from the quality assurance program ranged from .79 to .98 for all items.

For the current study, Mueser, Curran, and McHugo's (1997) four-factor model of the BPRS was used. Positive symptoms were assessed using the Thought Disturbance factor, which includes items measuring grandiosity and suspiciousness, as well as questions about hallucinations and delusions, which have been the focus of prior research on this topic. Although hallucinations may occur across sensory modalities, auditory hallucinations—hearing voices—are most common and experienced in up to 74% of patients (Badcock, Waters, Maybery, & Michie, 2005). Delusions involve breakdowns in the normal cognitive belief system, with themes of persecution and control (e.g., someone is controlling my thoughts) most commonly presented (Langdon, Ward, & Coltheart, 2010). The Disorganization factor was used to measure cognitive disorganization, and includes items about conceptual disorganization, tension, and mannerisms and posturing. The Anergia factor was used to measure negative symptoms, and includes items about motivation, withdrawal, and motor retardation. The Affect factor, which assesses symptoms of depression and anxiety,

was also included on an exploratory basis. The four subscale scores were computed by adding the scores for the items included in a given subscale, then dividing by the number of items in that factor.

Statistical analyses. Analyses were conducted using SPSS version 22. Potential covariates of age, gender, ethnicity, and education were examined in relation to thought disturbance, disorganization, anergia, and affect, the four dependent variables. Pearson correlation coefficients were used for continuous variables (e.g., age), *t* tests were used to assess gender, and analyses of variance were used to assess ethnicity and education. Finally, analyses of covariance (ANCOVAs) were conducted to examine differences across the four factors for those interviewed in the mother tongue compared to acquired language, in each case controlling for any other covariate found to be associated with that dependent variable.

Results

Preliminary analyses.

Missing data. Missing data were present for all study variables but appeared to be missing at random with no indication of systematic response biases. Little's missing completely at random (MCAR) test was nonsignificant and supports the presence of MCAR data, $\chi^2(9) = 9.881$, $p = .360$. A listwise deletion approach was used for all analyses.

Study variables. All variables were assessed for normality and outliers. Nonnormality issues arise when univariate values are 2.0 or larger for skewness and 7.0 or larger for kurtosis (Curran, West, & Finch, 1996). All variables' skewness and kurtosis values were within normal limits, and no transformations were required. Most values were within the range of -1 and $+1$.

Table 1 provides results from analyses testing whether the following potential covariates were related to our primary dependent variables: age, gender, ethnicity, and education. Education was significantly related to thought disturbance, $F(7, 213) = 2.543$, $p = .016$, and age was significantly related to both anergia, $r = -.181$, $p = .007$, and affect $r = .194$, $p = .004$. Demographic covariates were only included in analyses when they were found to be significantly related to the dependent variable being evaluated; as such, education was included in the model testing group difference in thought disturbance, and age was included in the models testing group differences in anergia and affect. It should be noted that ethnicity was not found to be significantly related to any of the dependent variables and was therefore not included in the models.

Primary analyses. Figure 1 depicts means, 95% confidence intervals, and significance for group differences in BPRS factors according to language, as well as the same statistics for individual items of the thought disturbance factor (hallucinations and suspiciousness) tested using Bonferroni-corrected post hoc contrasts. As predicted, participants interviewed in their mother tongue (78%) endorsed greater symptoms ($M = 3.23$; $SD = 1.18$) than those interviewed in an acquired language ($M = 2.79$; $SD = 1.14$) on the Thought Disturbance scale of the BPRS, $F(1, 216) = 4.436$, $p = .036$, partial $\eta^2 = .03$, 90% confidence interval (CI) 0.001–0.061, indicating a modest effect size. The overall model including education as a covariate was significant, $F(2, 216) = 5.884$, $p = .003$, $\eta^2 = .05$, 90% CI .011–.101. Follow-up tests using Bonferroni-corrected contrasts revealed that the items driving this difference

Table 1
Relationships Among Potential Covariates and Primary Outcome Variables

Variable	Gender	Age	Ethnicity	Education
Thought disturbance	$t(219) = -.178$	$r = .113$	$F(3, 210) = 1.794$	$F(7, 213) = 2.543^*$
Disorganization	$t(220) = 1.77$	$r = -.012$	$F(3, 211) = 1.822$	$F(7, 214) = 1.387$
Anergia	$t(218) = .121$	$r = -.181^{**}$	$F(3, 209) = .076$	$F(7, 212) = 1.417$
Affect	$t(217) = -1.90$	$r = .194^{**}$	$F(3, 208) = 1.275$	$F(7, 211) = 1.813$

Note. Age ranged from 18 to 75 years old, with a mean of 41.05 ($SD = 11.5$) years old. Ethnicity was defined by the following categories: Caucasian, African American, Hispanic, and other. Education was classified as below Grade 8, Grade 8 completed, some high school beyond Grade 8, high school graduate, some college, college degree, or advanced degree.
$^* p < .05.$ $^{**} p < .01.$

in thought disturbance were greater reports of hallucinations in the mother tongue ($M = 3.70$, $SD = 1.55$) compared to the acquired language ($M = 2.90$, $SD = 1.89$), $F(1, 217) = 7.234$, $p = .008$, partial $\eta^2 = .032$, 90% CI 0.005–0.079, and greater reports of suspiciousness in the mother tongue ($M = 3.70$, $SD = 1.55$) compared to the acquired language ($M = 2.90$, $SD = 1.89$), $F(1, 218) = 4.777$, $p = .030$, partial $\eta^2 = .021$, 90% CI 0.001–0.063. There was no difference on the disorganization, anergia, or affect factors of the BPRS for those interviewed in their mother tongue compared to those interviewed in an acquired language.

Discussion

The results of Study 1 indicate that individuals with schizophrenia interviewed in their mother tongue reported more severe symptoms of positive psychosis than those interviewed in an acquired language. Specifically, a significant difference in severity ratings on the thought disturbance factor of the BPRS was driven by differences in hallucinations and suspiciousness, which were rated as more severe when described in the mother tongue. These results support similar qualitative observations drawn from previous case studies and observational designs (Del Castillo, 1970; Hemphill, 1971), as well as experiments using small samples (Malgady & Costantino, 1998; Price & Cuellar, 1981). However, the results did not support our hypothesis that individuals interviewed in their mother tongue would also display greater disorganized symptoms. These findings dovetail with research suggesting that similar lexical markers are impaired in schizophrenia symptoms across L1 and L2 (Smirnova et al., 2015), which would result in similar levels of disorganized speech across languages. It is possible that although participants chose their preferred assessment language, some individuals were assessed in their nondominant language, and that reduced fluency in an acquired language may be conflated with disorganized speech. This point merits further attention in future research.

Study 2

The aim of the second study was to investigate whether the hypothesis that greater symptom severity is present in the mother tongue would similarly be supported in a nonclinical sample, or whether this pattern may not emerge until one crosses a certain psychotic threshold. That is, the second study provides evidence as to the relative ability to generalize the findings from Study 1, helping to determine whether the observed phenomenon is specific to clinical levels of psychosis or may also apply to other psychiatric symptoms in normative populations. Because schizotypal symptoms, such as magical thinking, suspiciousness, and interpersonal difficulties (APA, 2013), may be a precursor to psychosis (Johnstone, Ebmeier, Miller, Owens, & Lawrie, 2005), we chose to assess symptoms of schizotypy as reported by the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; Mason, Claridge, & Jackson, 1995) in a nonclinical sample of college students. Again, we focused specifically on subclinical or prodromal positive and disorganized symptoms because of parallels to work in clinical samples. In line with Study 1, we hypothesized that individuals responding in the mother tongue would convey greater symptom severity on the unusual experiences and cognitive disorganization factors of the O-LIFE, compared to individuals assessed in an acquired language. We hypothesized that there would be no difference for negative subclincial symptoms (the Introvertive Anhedonia subscale), and the Impulsive Nonconformity subscale was included as an exploratory measure.
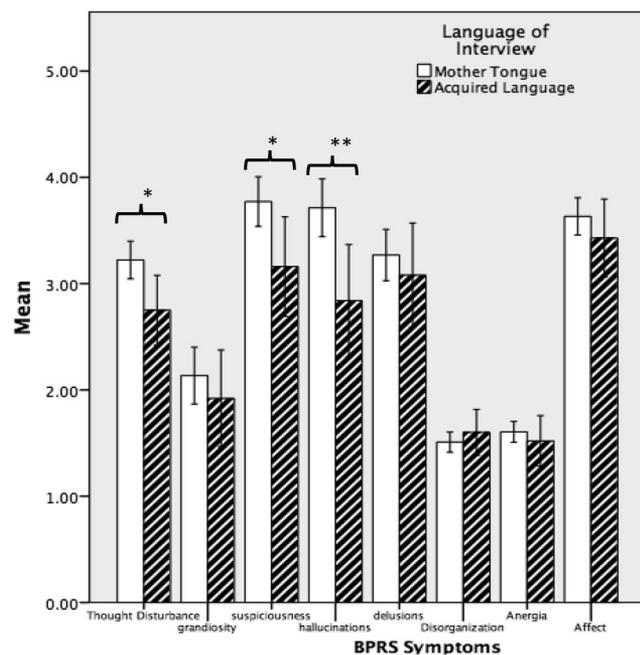

Figure 1. Results of analyses of covariance. BPRS = Brief Psychiatric Rating Scale. $^* p < .05.$ $^{**} p < .01.$

Method

Participants. The sample included 414 undergraduate students (62.7% female) who consented to participate in partial fulfillment of course requirements at the authors' home institution. Those who chose not to participate had other options to participate in research studies for credit. Participants were from diverse backgrounds (45.4% Caucasian, 22.6% Hispanic, 11.2% Asian American, 4.5% African American, 1.9% Native American, 14.3% other). The average age was 19.19 (SD = 2.72) years. Of those reporting English as their mother tongue (70.8%), 59.2% identified as Caucasian, 15.0% as Hispanic, 5.4% as African American, 9.2% as Asian American, 1.0% as Native American, and 10.2% as Other. Of those reporting a language other than English as their mother tongue, 12.4% identified as Caucasian, 40.5% as Hispanic, 1.7% as African American, 16.5% as Asian American, 4.1% as Native American, and 24.8% as Other. The assessment was conducted in the participants' mother tongue (English) in 70.8% of cases.

Procedures. The study was approved by the Internal Review Board of the university, and participants provided informed consent before participation. Research assistants supervised the completion of self-report measures in small groups. Participants reported family language, acquired language(s), and primary language of use. *Mother tongue*, defined as the language spoken most frequently during the first four years of life, was coded in the same manner as in Study 1. Subclinical symptoms were measured using the four factors of the O-LIFE (Mason et al., 1995). Because participants were participating for course credit, all questionnaires were completed in English, and assessment language was therefore not randomized. Given that individuals in Study 2 were all assessed in English, those with a mother tongue other than English were necessarily assessed in their acquired language (English), whereas native English speakers were all assessed in their mother tongue.

Measures.

Psychiatric symptoms. O-LIFE, which includes 104 true/false self-report questions (Mason et al., 1995), was used to measure psychiatric symptoms. The Unusual Experiences subscale captures experiences of subclinical positive psychosis, including perceptual aberrations, magical thinking, and hallucinations. The Cognitive Disorganization subscale measures disorganized thoughts, as well as deficits in attention, concentration, and decision-making. The Introvertive Anhedonia subscale asks questions about negative symptoms of psychosis such as blunted affect and lack of ability to feel pleasure from contact with others, and the Impulsive Nonconformity subscale assesses impulsive, antisocial, and eccentric behaviors. Internal consistency for all four subscales was adequate in the current study (Unusual Experiences, α = .87; Cognitive Disorganization, α = .86; Introvertive Anhedonia, α = .80, Impulsive Nonconformity, α = .70).

Statistical analyses. Analyses were conducted in the same manner as in Study 1. Potential covariates of age, gender, and ethnicity were examined in relation to unusual experiences, cognitive disorganization, introvertive anhedonia, and impulsive nonconformity, the four dependent variables. ANCOVAs were conducted to examine differences across the four factors, according to mother tongue versus acquired language.

Results

Preliminary analyses.

Missing data. As in Study 1, Little's MCAR test was nonsignificant and supports the presence of MCAR data, $\chi^2(8)$ = .922, p = .999.

Study variables. Normality was assessed using the procedures outlined in Study 1. All study variables' skewness and kurtosis values were within normal limits and no transformations were required, with most values falling in the range of −1 and +1. Table 2 provides results from analyses testing whether the following potential covariates were related to our primary dependent variables: age, gender, and ethnicity. Gender and ethnicity were found to be significantly related to introvertive anhedonia (gender, $t(262.61)$ = 3.08, p = .002; ethnicity, $F(5, 399)$ = 2.85, p = .015). Gender and age were significantly related to impulsive nonconformity (gender, $t(412)$ = 3.08, p = .002; age, r = −.116, p = .018). For this reason, the covariates of gender and ethnicity were included in the model testing group differences in introvertive anhedonia, and the covariates of gender and age were included in the model testing group differences in impulsive nonconformity.

Primary analyses. Figure 2 depicts means, 95% confidence intervals, and significance levels for group differences in O-LIFE symptom severity according to assessment language. As predicted, participants who responded in their mother tongue endorsed significantly greater unusual experiences (M = 9.14; SD = 6.28) than those responding in their acquired language (M = 7.91; SD = 5.06), $F(1, 401)$ = 6.54, p = .01, partial η^2 = .02, 90% CI 0.002–0.04, indicating a modest effect. Participants who completed the questionnaire in their mother tongue also endorsed significantly greater cognitive disorganization (M = 9.95; SD = 5.66) than those responding in their acquired language (M = 8.25; SD = 5.07), $F(1, 401)$ = 11.45, p = .001, partial η^2 = .03, 90%CI 0.01–0.06, indicating a modest effect. There were no significant

Table 2

Relationships Among Potential Covariates and Primary Study Variables

Variable	Gender	Age	Ethnicity
Unusual experiences	$t(407)$ = −.96	r = .00	$F(5, 403)$ = 1.51
Cognitive disorganization	$t(406)$ = −1.64	r = −.04	$F(5, 402)$ = .74
Introvertive anhedonia	$t(262.61)$ = 3.08**	r = .03	$F(5, 399)$ = 2.85*
Impulsive nonconformity	$t(412)$ = 3.08**	r = −.116*	$F(5, 408)$ = .590

Note. Age ranged from 17 to 53 years old, with a mean of 19.19 (SD = 2.72) years. Ethnicity was defined by the following categories: Caucasian, Hispanic, African American, Asian American, and Native American.
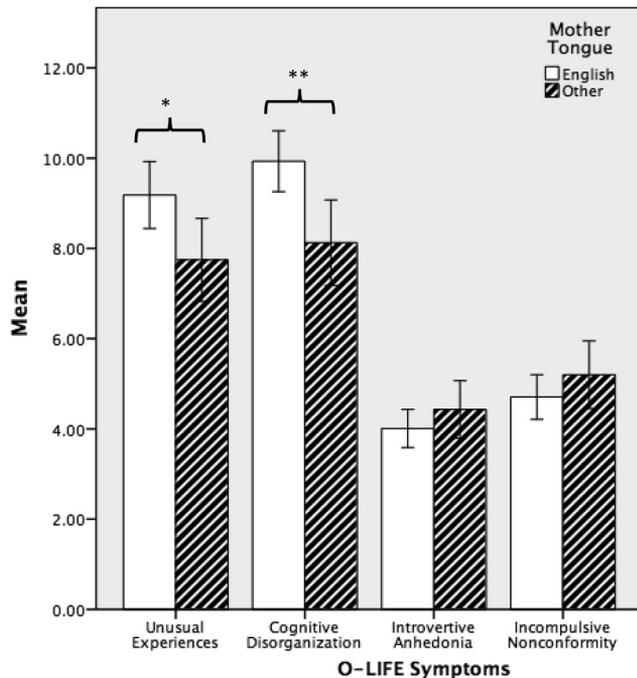* p < .05. ** p < .01.

Figure 2. Results of analyses of covariance. O-LIFE = Oxford-Liverpool Inventory of Feelings and Experiences. $^*p < .05$. $^{**}p < .01$.

differences on the Introvertive Anhedonia or Impulsive Nonconformity scales for those completing the questionnaire in their mother tongue compared to those completing the questionnaire in an acquired language, controlling for the aforementioned demographic variables.

Discussion

Results suggest that previous findings regarding the greater intensity of psychotic symptoms in the mother tongue can be extended to schizotypal symptoms in a nonclinical population. Similar to the results of Study 1, the results of Study 2 suggest that individuals assessed in their mother tongue report greater symptoms of unusual experiences, a measure of subclinical symptoms of positive psychosis, than those assessed in an acquired language. As predicted, individuals responding in their mother tongue also endorsed greater levels of cognitive disorganization compared to those assessed in an acquired language. In conjunction with the nonsignificant results for disorganization in Study 1, this suggests a need for future research into the impact of language on disorganized speech and behavior in particular.

General Discussion

This two-part study was aimed at testing Del Castillo's (1970) hypothesis that individuals with severe mental illness report a greater severity of psychotic symptoms in their mother tongue compared to an acquired language, as well as whether this finding would extend to subclinical symptoms in a nonclinical population. As predicted, patients with schizophrenia reported greater symptom severity on the Thought Disturbance scale of the BPRS when

interviewed in their mother tongue, consistent with evidence that positive symptoms of schizophrenia are more severe in the native language (Del Castillo, 1970; Hemphill, 1971; Malgady & Costantino, 1998; Price & Cuellar, 1981). Relatedly, nonclinical participants endorsed greater schizotypal symptom severity on the Unusual Experiences and Cognitive Disorganization subscales of the O-LIFE.

Across both studies on schizophrenia spectrum symptoms in clinical and normative populations, there was support for greater positive symptom severity or corresponding unusual thoughts and experiences in the mother tongue, compared to an acquired language. In the first study, patients with schizophrenia interviewed in their mother tongue endorsed significantly higher levels of thought disturbance, driven by reports of more severe hallucinations and suspiciousness, than those interviewed in an acquired language. However, greater symptom severity for cognitive disorganization was not observed when comparing patients interviewed in the mother tongue versus an acquired language. In the second study, participants responding in their native language reported greater symptoms of unusual experiences and cognitive disorganization compared to those responding in their acquired language.

Explanatory Mechanisms

These findings dovetail with previous evidence of a connection between psychosis and the mother tongue that seems to be reduced or absent in the acquired language (Malgady & Costantino, 1998; Price & Cuellar, 1981), and that may have affective, cognitive, and neural bases (Paradis, 2008). In individuals with clear language dominance, the seemingly reduced psychotic symptoms when interviewed in the acquired language may have to do with the fact that using a second language involves the activation of different brain regions, as well as the use of different cognitive processes. Instead of the automatic processes associated with production of the mother tongue, an individual speaking an acquired language invokes effortful control and declarative memory. As consequence of this differential activation and greater working memory load, the individual may be disengaged from the affective component that is central to psychosis (Paradis, 2008). Of note is the fact that Marcos et al. (1973), who claimed stronger symptom severity in the acquired language, found effects largely for negative and disorganized symptoms, with no differences for positive symptoms. These results may reflect what Malgady and Costantino (1998) described as perceived cognitive difficulties ascribed to speaking a second language, in contrast to the emotional component attached to the mother tongue.

At the same time, effortful control is but one of several factors that may explain the results obtained across the present studies. Because the designs used here did not assess the relative fluency of individuals assessed in their acquired language, it is possible that the observed pattern of results for disorganized symptoms was due to an issue of fluency. That is to say, individuals who are conversational but are not fully proficient in an acquired language may have simply struggled to express their symptoms comprehensively in their second language in Study 1, although it is likely that most participants chose to be interviewed in the language they felt more comfortable speaking (English or Spanish). From a sociocultural standpoint, much research supports the importance of therapeutic alliance in making a patient feel comfortable enough to disclose

information about his or her symptoms (Karlsson, 2005). To that end, a patient might feel more comfortable being honest and forthcoming about his or her symptoms with a therapist who speaks his or her native language (Ibaraki & Hall, 2014), which could help explain the pattern of results obtained for positive symptoms in Study 1. Relatedly, it is possible that non-native English speakers tend to have stronger cultural identities, which could serve as a protective factor and partially account for the difference in perceived symptom severity.

The divergent results for disorganized symptoms in Study 1, which did not differ between groups, and subclinical disorganized symptoms in Study 2, which were greater for those responding in their mother tongue, merit further investigation. The nonsignificant findings observed for disorganized symptoms in Study 1 correspond to Smirnova et al.'s (2015) notion that the same lexical markers of thought disorder are present in both the mother tongue and acquired language. Del Castillo (1970), on the other hand, would suggest that the acquired language makes an individual less aroused by taking him or her away from the psychotic symptoms, which would account for the results observed in Study 2.

Alternative explanations for differences in disorganized symptoms according to language may arise from cognitive load theory and the cognitive remediation hypothesis. Henik et al. (1995), for instance, found that distractibility plays a key role in symptoms of thought disorder. Henik et al. (1995) indicate that when asked to divide their attention, individuals with schizophrenia allocate a significant part of their attentional resources to distractors or secondary tasks, which compromises their performance on the primary task. If symptom reporting is conceptualized as the primary task, an individual with schizophrenia may become distracted by the secondary task of utilizing an acquired language, drawing attention away from the focus on symptomatology. Although this could yield more cognitive disorganization, it is also possible that shifting attention away from symptom severity could reduce the reported symptom severity. The cognitive remediation hypothesis, which suggests that engaging in challenging activities may improve cognitive faculties, presents an alternative explanation as to why individuals may gain some benefit—in this case, an apparent reduction in symptom severity—from speaking an acquired language (Medalia & Choi, 2009). At the same time, cognitive remediation appears to relate more to cognitive functioning and psychosocial functioning, whereas the effect on symptoms is small (McGurk, Twamley, Sitzer, McHugo, & Mueser, 2007). In Study 2, it is possible that differences are due to an issue of measurement invariance or differential item functioning across languages on the O-LIFE. Future research will help clarify this point.

Convergence across the two studies suggests that a "match" between mother tongue and language of interview may be key to uncovering the extent of positive symptoms of psychosis, both clinical and attenuated. Positive symptoms were the focus of Del Castillo (1970) and Hemphill's (1971) observations, and the majority of work on the effect of the language of clinical interview on apparent symptom severity has since focused specifically on hallucinations (e.g., De Zulueta, Gene-Cos, & Grachev, 2001; Oquendo, 1996). Although negative symptoms appear to be more persistent over time, positive symptoms are more susceptible to pharmacological, behavioral, and environmental influences: Along these lines, Weisman de Mamani and Caldas (2013) found ethnic

differences in symptom severity for positive but not negative symptoms of schizophrenia. The results of the present study suggest that the linguistic context of the clinical interview, on top of ethnic and cultural considerations, may affect clinical impressions, diagnoses, and treatment.

Practical Implications

The finding that positive symptoms of psychosis are reported as more severe in the mother tongue has important implications for the assessment and treatment of multicultural patients. The results suggest that it may be important to interview patients in the language learned in the first few years of life to obtain the full scope of psychotic symptoms, specifically the hallmark feature of hallucinations. Furthermore, clinicians may be able to tap into the client's language use for therapeutic purposes, using the mother tongue and acquired language interchangeably in therapy (Oquendo, 1996). Although the mother tongue seems to provide a robust picture of symptoms and affective issues, using a second language in treatment, and encouraging high-risk patients to use later acquired languages outside of therapy, may serve to ground patients in reality and mitigate psychotic or schizotypal experiences. This has been demonstrated in dominant bilinguals, where the working memory demands of speaking an acquired language appears to inhibit psychosis (De Zulueta et al., 2001; Matulis, 1977).

A strength of the present two-part research project is the implementation in both a clinical and nonclinical sample, as well as the fact that measures of similar domains (positive, negative and disorganized schizophrenia or schizotypy) were used in each case to allow for comparisons. This design allowed us to answer the question of whether greater symptom severity in the mother tongue occurs only after a certain threshold of psychotic illness is reached, or whether this pattern emerges even in the normal population. Results from Study 1 supported previous findings that psychotic symptoms are rated as more severe when a patient is interviewed in his or her mother tongue. However, the first study alone does not answer the question of whether this finding is specific to clinically significant psychosis. The convergent findings in Study 2, which indicated that a similar pattern occurs for subclinical positive symptoms in the general population, suggest that the phenomenon previously detected by Del Castillo (1970) and others is not simply specific to schizophrenia but rather occurs on a continuum. Consequently, the need to assess an individual in the mother tongue to determine the extent of his or her psychopathology is indicated not only in full-fledged schizophrenia but also in normative populations, and an acquired language may be similarly used to ground highly emotional but less severely impaired individuals in therapy. Of note, although the designs in Study 1 and Study 2 were not strictly parallel, the findings from the two studies juxtaposed here suggest a pattern that emerges across age groups, diagnostic categories, and methods of reporting.

Limitations

The studies described here have several limitations. In both studies, the participants were not necessarily bilingual, and in the cases where bilingualism was established, the relative proficiency of each language was not evaluated. As the data from Study 1

comes from a treatment study and Study 2 was for course credit, assessment language was not randomly assigned. This yielded unequal sample sizes, with a larger sample of individuals responding in their mother tongue in each case. In Study 1, the group interviewed in an acquired language consisted almost exclusively of Hispanic participants. In Study 2, all participants completed the survey in English, meaning some were bilinguals whose second language was English, whereas others were either monolingual English speakers or bilinguals whose primary language was English. Because individuals in Study 2 all responded in English, those with a mother tongue other than English were necessarily assessed in their acquired language (English), whereas native English speakers were all assessed in their mother tongue. Although ethnicity was considered as a potential covariate in analyses, it is possible that other group differences, including cultural variables relating to strength of ethnic identity, may have influenced the pattern of results.

The methodological differences across the two studies also merit consideration as potential limitations. Whereas Study 1 used an interview format, which engages both expressive and receptive language skills and involves some degree of clinical judgment, Study 2 relied on self-report pencil-and-paper measures. This is particularly relevant with regard to negative symptoms, which were entirely rated by the clinician in Study 1 but were self-reported in Study 2. Although certain features of an interview that may enhance disclosure, such as therapeutic alliance or the production of verbal responses, are not present in a self-report measure, it is also possible that the anonymity afforded by a self-report measure would make an individual feel more comfortable reporting severe symptoms. Finally, the relatively high mean age of participants in Study 1 suggests that this sample came from a population of individuals with a long duration of illness, meaning the results are not necessarily generalizable to individuals with a shorter duration of psychosis. Although the participants in Study 2 were undergraduates from a variety of majors and programs of study, this population may not generalize to normative populations of other ages and demographics.

Future Directions and Conclusions

In light of the above limitations, there is a need to replicate these results using a within-subjects design, ideally in a sample of bilinguals whose full proficiency in both languages is objectively established prior to assessment. It may be beneficial to use imaging studies as well as psychophysiological measures to further examine the mechanisms underlying observed differences in symptom severity according to the language of reporting. In particular, studies assessing cognitive processes such as effortful control may illuminate the mechanisms at work behind the greater severity of psychiatric symptoms in the mother tongue compared to an acquired language. If Del Castillo (1970) is correct in his assertion that the cognitive load involved in speaking an acquired language may serve to ground an individual in reality, greater effortful control could mediate the relationship between language and psychopathology.

References

American Psychiatric Association [APA]. (2013). *Diagnostic and statistical manual of mental disorders (DSM–5®)*. Washington, DC: Author.

Andreasen, N. C. (1979). Thought, language, and communication disorders. II. Diagnostic significance. *Archives of General Psychiatry, 36,* 1325–1330. http://dx.doi.org/10.1001/archpsyc.1979.01780120055007

Badcock, J. C., Waters, F. A., Maybery, M. T., & Michie, P. T. (2005). Auditory hallucinations: Failure to inhibit irrelevant memories. *Cognitive Neuropsychiatry, 10,* 125–136. http://dx.doi.org/10.1080/13546800344000363

Chu, J., Leino, A., Pflum, S., & Sue, S. (2016). A model for the theoretical basis of cultural competency to guide psychotherapy. *Professional Psychology: Research and Practice, 47,* 18–29. http://dx.doi.org/10.1037/pro0000055

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods, 1,* 16–29. http://dx.doi.org/10.1037/1082-989X.1.1.16

Del Castillo, J. C. (1970). The influence of language upon symptomatology in foreign-born patients. *The American Journal of Psychiatry, 127,* 242–244. http://dx.doi.org/10.1176/ajp.127.2.242

De Zulueta, F. I. S., Gene-Cos, N., & Grachev, S. (2001). Differential psychotic symptomatology in polyglot patients: Case reports and their implications. *British Journal of Medical Psychology, 74,* 277–292. http://dx.doi.org/10.1348/000712101160966

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). *Structured clinical interview for DSM–IV–TR Axis I disorders, research version, patient edition with psychotic screen (SCID- I/P W/PSY SCREEN)*. New York, NY: Biometrics Research, New York State Psychiatric Institute.

Garbin, G., Costa, A., Sanjuan, A., Forn, C., Rodriguez-Pujadas, A., Ventura, N., . . . Avila, C. (2011). Neural bases of language switching in high and early proficient bilinguals. *Brain and Language, 119,* 129–135. http://dx.doi.org/10.1016/j.bandl.2011.03.011

Hemphill, R. E. (1971). Auditory hallucinations in polyglots. *South African Medical Journal, 45,* 1391–1394.

Henik, A., Nissimov, E., Priel, B., & Umansky, R. (1995). Effects of cognitive load on semantic priming in patients with schizophrenia. *Journal of Abnormal Psychology, 104,* 576–584. http://dx.doi.org/10.1037/0021-843X.104.4.576

Hoffman, R. E. (1986). Verbal hallucinations and language production processes in schizophrenia. *Behavioral and Brain Sciences, 9,* 503–517. http://dx.doi.org/10.1017/S0140525X00046781

Hugdahl, K., Løberg, E. M., & Nygård, M. (2009). Left temporal lobe structural and functional abnormality underlying auditory hallucinations. *Frontiers in Neuroscience, 3,* 34–45. http://dx.doi.org/10.3389/neuro.01.001.2009

Ibaraki, A. Y., & Hall, G. N. (2014). The components of cultural match in psychotherapy. *Journal of Social and Clinical Psychology, 33,* 936–953. http://dx.doi.org/10.1521/jscp.2014.33.10.936

Johnstone, E. C., Ebmeier, K. P., Miller, P., Owens, D. G., & Lawrie, S. M. (2005). Predicting schizophrenia: Findings from the Edinburgh High-Risk Study. *The British Journal of Psychiatry, 186,* 18–25. http://dx.doi.org/10.1192/bjp.186.1.18

Karlsson, R. (2005). Ethnic matching between therapist and patient in psychotherapy: An overview of findings, together with methodological and conceptual issues. *Cultural Diversity and Ethnic Minority Psychology, 11,* 113–129. http://dx.doi.org/10.1037/1099-9809.11.2.113

Langdon, R., Ward, P. B., & Coltheart, M. (2010). Reasoning anomalies associated with delusions in schizophrenia. *Schizophrenia Bulletin, 36,* 321–330. http://dx.doi.org/10.1093/schbul/sbn069

Lukoff, D., Liberman, R. P., & Nuechterlein, K. H. (1986). Symptom monitoring in the rehabilitation of schizophrenic patients. *Schizophrenia Bulletin, 12,* 578–603. http://dx.doi.org/10.1093/schbul/12.4.578

Malgady, R. G., & Costantino, G. (1998). Symptom severity in bilingual Hispanics as a function of clinician ethnicity and language of interview.

Psychological Assessment, 10, 120–127. http://dx.doi.org/10.1037/1040-3590.10.2.120

Marcos, L. R., Alpert, M., Urcuyo, L., & Kesselman, M. (1973). The effect of interview language on the evaluation of psychopathology in Spanish-American schizophrenic patients. *The American Journal of Psychiatry, 130,* 549–553. http://dx.doi.org/10.1176/ajp.130.5.549

Mason, O., Claridge, G., & Jackson, M. (1995). New scales for the assessment of schizotypy. *Personality and Individual Differences, 18,* 7–13. http://dx.doi.org/10.1016/0191-8869(94)00132-C

Matulis, A. C. (1977). Schizophrenia—experiment in teaching a new foreign language to inpatients as an analeptic ego aid. *Dynamische Psychiatrie, 10,* 459–472.

McGurk, S. R., Twamley, E. W., Sitzer, D. I., McHugo, G. J., & Mueser, K. T. (2007). A meta-analysis of cognitive remediation in schizophrenia. *The American Journal of Psychiatry, 164,* 1791–1802. http://dx.doi.org/10.1176/appi.ajp.2007.07060906

Medalia, A., & Choi, J. (2009). Cognitive remediation in schizophrenia. *Neuropsychology Review, 19,* 353–364. http://dx.doi.org/10.1007/s11065-009-9097-y

Minzenberg, M. J., & Carter, C. S. (2012). Developing treatments for impaired cognition in schizophrenia. *Trends in Cognitive Sciences, 16,* 35–42. http://dx.doi.org/10.1016/j.tics.2011.11.017

Mueser, K. T., Curran, P. J., & McHugo, G. J. (1997). Factor structure of the Brief Psychiatric Rating Scale in schizophrenia. *Psychological Assessment, 9,* 196–204. http://dx.doi.org/10.1037/1040-3590.9.3.196

Oquendo, M. A. (1996). Psychiatric evaluation and psychotherapy in the patient's second language. *Psychiatric Services, 47,* 614–618. http://dx.doi.org/10.1176/ps.47.6.614

Ouane, A., & Glanz, C. (2011). *Optimising learning, education and publishing in Africa: The language factor—a review and analysis of theory and practice in mother-tongue and bilingual education in Sub-Saharan Africa.* Hamburg, Germany: UNESCO Institute for Lifelong Learning.

Paradis, M. (2008). Bilingualism and neuropsychiatric disorders. *Journal of Neurolinguistics, 21,* 199–230. http://dx.doi.org/10.1016/j.jneuroling.2007.09.002

Perani, D., & Abutalebi, J. (2005). The neural basis of first and second language processing. *Current Opinion in Neurobiology, 15,* 202–206.

Pew Hispanic Center. (2013). *2013 Survey of Hispanics.* Retrieved from http://www.pewhispanic.org/category/datasets/

Price, C. S., & Cuellar, I. (1981). Effects of language and related variables on the expression of psychopathology in Mexican American psychiatric patients. *Hispanic Journal of Behavioral Sciences, 3,* 145–160.

Sebastián-Gallés, N., & Soto-Faraco, S. (1999). Online processing of native and non-native phonemic contrasts in early bilinguals. *Cognition, 72,* 111–123. http://dx.doi.org/10.1016/S0010-0277(99)00024-4

Shin, H. B., & Kominski, R. (2010). *Language use in the United States, 2007.* Washington, DC: US Department of Commerce, Economics and Statistics Administration, US Census Bureau.

Smirnova, D., Walters, J., Fine, J., Muchnik-Rozanov, Y., Paz, M., Lerner, V., . . . Bersudsky, Y. (2015). Second language as a compensatory resource for maintaining verbal fluency in bilingual immigrants with schizophrenia. *Neuropsychologia, 75,* 597–606. http://dx.doi.org/10.1016/j.neuropsychologia.2015.06.037

Strik, W., Dierks, T., Hubl, D., & Horn, H. (2008). Hallucinations, thought disorders, and the language domain in schizophrenia. *Clinical EEG and Neuroscience, 39,* 91–94. http://dx.doi.org/10.1177/155005940803900214

Tsai, J., & Rosenheck, R. A. (2013). Psychiatric comorbidity among adults with schizophrenia: A latent class analysis. *Psychiatry Research, 210,* 16–20. http://dx.doi.org/10.1016/j.psychres.2013.05.013

Weisman de Mamani, A., & Caldas, T. (2013). A comparison of positive and negative symptoms in Anglo, Latino, and African-American patients with schizophrenia. *Revista Interamericana de Psicología, 47,* 407–412.

Weisman de Mamani, A., & Suro, G. (2016). A randomized clinical trial assessing the effect of a culturally-informed therapy for schizophrenia on self-conscious emotions and burden in caregivers of patients with schizophrenia. *Psychotherapy: Theory, Research, & Practice, 53,* 156–162. http://dx.doi.org/10.1037/pst0000038

Weisman de Mamani, A., Weintraub, M. J., Gurak, K., & Maura, J. (2014). A randomized clinical trial to test the efficacy of a family-focused, culturally informed therapy for schizophrenia. *Journal of Family Psychology, 28,* 800–810. http://dx.doi.org/10.1037/fam0000021