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ORIGINAL ARTICLE

Evaluation sensitivity as a moderator of communication disorder in schizophrenia

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Background. Communication disturbance (thought disorder) is a central feature of schizophrenia that predicts poor functioning. We investigated the hypothesis that memory and attention deficits interact with beliefs about the gravity of being rejected (i.e. evaluation sensitivity) to produce the symptoms of communication disorder.

Method. Seventy-four individuals diagnosed with schizophrenia or schizo-affective disorder completed a battery of tests assessing neurocognition (attention, working and verbal memory, abstraction), symptomatology (positive, negative and affective), functioning, and dysfunctional beliefs.

Results. Patients with communication deviance ($n=33$) performed more poorly on the neurocognitive tests and reported a greater degree of sensitivity to rejection than patients with no thought disorder ($n=41$). In a logistic regression analysis, evaluation sensitivity moderated the relationship between cognitive impairment and the presence of communication disorder. This finding was independent of hallucinations, delusions, negative symptoms, depression and anxiety.

Conclusions. We propose that negative appraisals about acceptance instigate communication anomalies in individuals with a pre-existing diathesis for imperfect speech production.

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Key words: Communication disorder, evaluation sensitivity, neurocognitive impairment, schizophrenia.

Introduction

Observed in psychiatric patients for at least 200 years (Haslam, 1811), disruption of verbal communication is a cardinal feature of schizophrenia that was recorded by both Kraepelin (1913) and Bleuler (1911). Factor-analytic studies confirm that disordered speech is a core feature of schizophrenia that, together with inappropriate affect and bizarre behavior, consistently reflects a disorganization dimension distinct from delusions, hallucinations, and negative symptoms (Liddle, 1987; Andreasen *et al*. 1995). Presence of communication disorder, further, predicts poor educational, occupational and social functioning (Harrow *et al*. 1986; Norman *et al*. 1999).

Traditionally (e.g. Bleuler, 1911), speech disturbance has been seen as a reflection of underlying disturbance of thought. Thus, measures such as Andreasen's (1983) Scale for the Assessment of Positive Symptoms (SAPS) codify communication disturbance in terms of thought disorder. Other theorists have conceptualized communication disorder as arising from linguistic disorganization or deficits in neurocognitive abilities such as attention, memory and executive function (McKenna & Oh, 2005). We follow Docherty (2005) in (i) conceptualizing communication disorder in functional terms as a disruption of successful conveyance of meaning, and (ii) regarding thought disorder, linguistic disorganization and neurocognitive deficits as overlapping causal factors of communication deviance.

There is evidence, however, that psychological factors such as concerns and dysfunctional beliefs also play a role in communication difficulties. Several researchers have reported that communication disorder is instigated or aggravated when emotionally charged topics are discussed (Shimkunas, 1972; Docherty *et al*. 1994; Haddock *et al*. 1995). Criticism, specifically, has been shown to disorganize speech in patients with schizophrenia (Rosenfarb *et al*. 1995, 2000). We have, in a similar vein, collected clinical data suggesting that pharmacologically stabilized patients diagnosed as 'thought disordered' who have concerns of being negatively evaluated experience exacerbation of communication problems, whereas feelings of being accepted mitigate these problems.

The research literature and clinical observations of this sort suggest to us that patients with communication deviance are highly sensitive to possible criticism and hold strong beliefs regarding the impact

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Table 1. *Participant characteristics*[a]

Variable	Communication disorder ($n=33$)	No communication disorder ($n=41$)	Effect size
Mean age, years (S.D.)	38.6 (10.8)	32.1 (9.9)*	0.60
Gender, % male (*n*)	78 (26)	56 (23)	–
Mean parental education, years (S.D.)[b]	13.1 (2.7)	14.1 (2.8)	−0.35
Mean age at onset, years (S.D.)[c]	20.3 (4.4)	22.1 (5.4)	−0.36
Mean illness duration, years (S.D.)[c]	19.3 (11.2)	10.6 (8.5)*	0.81
Mean number of hospitalizations (S.D.)[d]	5.5 (5.0)	2.6 (3.2)*	0.67
Schizophrenia			
Paranoid, % (*n*)	21 (7)	49 (20)	–
Undifferentiated, % (*n*)	58 (19)	39 (16)	
Disorganized/catatonic, % (*n*)	9 (3)	0 (0)	–
Schizo-affective, % (*n*)	12 (4)	12 (5)	–

S.D., Standard deviation.

[a] Communication disorder = global positive formal thought disorder score of 'mild' or higher; no communication disorder = global positive formal thought disorder score of 'questionable' or lower; Scale for the Assessment of Positive Symptoms (Andreasen, 1983).

[b] Parental education is average of father's and mother's education level; data missing from eight patients, four in each condition.

[c] Data missing from two communication disorder patients.

[d] Data missing from 12 patients, six in each condition.

* Mean value was significantly different from that of the Communication disorder group ($p<0.05$).

of being rejected by other people (e.g. 'If others dislike you, you cannot be happy'). Such beliefs reflecting evaluation sensitivity are incorporated into cognitive schemas (Beck *et al*. 2004) and become activated in the context of potential negative evaluation. Beliefs about the consequences of not being accepted interact with memory and attention deficits (Kerns & Berenbaum, 2002; Phillips & Silverstein, 2003) to produce the symptoms of disorganized communication. Thus, we hypothesize that patients diagnosed with thought disorder will endorse more dysfunctional beliefs regarding acceptance and rejection than non-thought-disordered patients with schizophrenia. We also predict that these dysfunctional beliefs will moderate neurocognitive impairment to predict the presence of thought disorder. These effects will be independent of other symptom dimensions (i.e. hallucinations, delusions, and negative symptoms). We specifically expect that neither general levels of anxiety nor depression will predict communication deviance because the effect should be confined to specific social situations that pose the threat of evaluation.

Method

Participants

The sample included 74 adult out-patients (Table 1) recruited from a sample of potential participants at the Schizophrenia Research Center at the University of Pennsylvania who met Diagnostic and Statistical Manual of Mental Disorders 4th edition text revised (DSM-IV-TR; APA, 2000) criteria for schizophrenia or schizo-affective disorder. Patients were referred for a study of negative symptoms and poor functioning. Diagnosis was determined on a consensus best-estimate basis by an assessment team (M.D. and Ph.D.) based upon a structured interview (Nurnberger *et al*. 1994) conducted by an assessor trained to criterion (intra-class correlation >0.80). All recruitment contacts were made blind to current patient symptomatology and level of functioning. Of the referred patients, 33 showed at least mild levels of communication disturbance; 41 manifested no communication deviance (see below for details).

Procedure

All participants attended a single research session lasting between 2 and 4 h. A masters-level or Ph.D. interviewer trained to criterion (inter-class correlation >0.80 for ratings of positive and negative symptoms) administered symptom and attitude measures that included interviewer-rated and self-report instruments. Collateral information from family members and treating psychiatrists was factored into clinician ratings of symptoms and functioning, which were made blind to attitude endorsements and neurocognitive

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performance. Cognitive impairment was assessed via two computerized tasks selected to test abstraction, verbal memory and working memory, domains related to communication disturbance in schizophrenia (Kerns & Berenbaum, 2002). After the procedure was fully explained, written informed consent was obtained from all participants. This procedure was approved by the Institutional Review Board at the University of Pennsylvania. All participants were compensated for completing study assessment procedures.

Materials

Symptoms and functioning

Speech disorder was assessed using the global rating [i.e. 'absent' (0), 'questionable' (1), 'mild' (2), 'moderate' (3), 'marked' (4), 'severe' (5)] of the positive formal thought disorder subscale of SAPS (Andreasen, 1983). Patients rated 'mild' or higher were classified as communication disordered; patients rated as 'questionable' or lower were classified as not having communication disorder. Global ratings of the SAPS hallucinations and delusions subscales, respectively, indexed severity of psychotic symptoms. The total score (excluding attention subscale items, inappropriate affect and poverty of content) of the Scale for the Assessment of Negative Symptoms (Andreasen, 1984) assessed negative symptom severity. Depression and anxiety were self-reported on the Beck Depression Inventory II (BDI-II; Beck *et al*. 1996) and the Beck Anxiety Inventory (BAI; Beck & Steer, 1990) respectively. All symptom ratings reflect the previous week. Functioning was determined by Strauss–Carpenter Levels of Function (LEV; Strauss & Carpenter, 1974), a nine-item interviewer-scored instrument that indexes the previous month, with higher scores being indicative of better functioning. In the present sample, Cronbach's α was 0.94 for the BDI-II, 0.93 for the BAI and 0.85 for the LEV.

Belief endorsement

Evaluation sensitivity was assessed with a subscale of the Dysfunctional Attitude Scale (DAS; Weissman, 1978). The DAS consists of 40 statements to be rated on the following seven-point scale: 'agree totally' (7), 'agree very much' (6), 'agree somewhat' (5), 'neutral' (4), 'disagree somewhat' (3), 'disagree very much' (2) and 'disagree totally' (1). For each of the 40 items, participants were instructed to select the option that describes how they think most of the time. The DAS can be reliably administered (Blankstein & Segal, 2001) and its use in out-patient samples diagnosed with schizophrenia has been validated (Rector, 2004; Grant & Beck, 2008). The six items that compose the evaluation sensitivity subscale (see Appendix) were identified by factor analysis of responses in a large ($n=$ 2023) clinical sample (Beck *et al*. 1991)†. While Beck *et al*. labeled the subscale 'need for approval', the scale is better termed evaluation sensitivity, as the statements exaggerate the importance of being accepted and, correspondingly, the impact of being rejected by other people (e.g. 'If others dislike you, you cannot be happy'). Cronbach's α was 0.70 in the present study.

Neurocognitive assessment

In the Penn Word Memory Test (Gur *et al*. 1993), participants first sequentially view 20 target words and then complete a recognition task in which 20 distracters (matched for frequency, word length, concreteness and imagibility) are interleaved with the targets. The recognition task is repeated after 20 min with 20 new and equated distracter words. Each trial of the Abstraction and Working Memory Test (Glahn *et al*. 2000) consists of five stimuli: a single target stimulus appears at the bottom center of the computer screen and a pair of stimuli appears in both the upper-right and upper-left corner of the screen. The participant's task is to choose which pair of stimuli the target stimulus best matches. Match judgments are made on the basis of shape and color, guided by feedback. On half of the trials the target disappears before the match pairs are displayed. Neurocognitive tests were programmed in Flash media, presented in a window within a web browser (MOZILLA FIREFOX) on either a laptop or desktop computer, and presented in a fixed order across participants. Following previously established procedures (Gur *et al*. 2007), (i) accuracy was computed from raw scores of each test and converted to *z*-scores using normative data, (ii) verbal memory and abstraction/working memory domain scores were computed by averaging the appropriate standardized values, (iii) accuracy domain scores were reversed by subtracting the maximum value from each score, and (iv) these scores were averaged to form the variable 'cognitive impairment'. Higher scores indicate worse performance.

Data analysis

Because a majority of the sample ($n=39$) scored zero on communication deviance, and because our hypothesis is that cognitive impairment and evaluation

† The factor analysis was performed on a longer version (100 items) of the DAS, which fully contains the 40 items administered in the present study. Accordingly, the six evaluation sensitivity items are the subscale items common to both versions of the DAS.

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Table 2. *Group differences in psychopathology, neurocognition and attitudes*[a]

Variable	Communication disorder ($n=33$)	No communication disorder ($n=41$)	Effect size
Delusions	2.8 (1.4)	1.9 (1.6)*	0.56
Hallucinations	2.6 (1.7)	1.6 (1.7)*	0.51
Negative symptoms	29.3 (11.4)	23.4 (14.0)	0.45
Depression	16.3 (13.7)	14.0 (12.1)	0.18
Anxiety	13.3 (11.1)	12.5 (11.5)	0.07
Functioning	15.4 (5.8)	20.4 (7.8)**	−0.68
Cognitive impairment	2.5 (1.1)	1.5 (0.8)**	0.96
Evaluation sensitivity	24.5 (6.9)	19.8 (6.4)**	0.68

Values are given as mean (standard deviation).

[a] Communication disorder = global positive formal thought disorder score of 'mild' or higher; no communication disorder = global positive formal thought disorder score of 'questionable' or lower; Scale for the Assessment of Positive Symptoms (Andreasen, 1983). Delusions = global rating (scale 0–5); Scale for the Assessment of Positive Symptoms. Hallucinations = global rating (scale 0–5); Scale for the Assessment of Positive Symptoms. Negative symptoms = total score (scale 0–90); Scale for the Assessment of Negative Symptoms (Andreasen, 1984). Depression = total score (scale 0–63); Beck Depression Inventory II (Beck *et al*. 1996). Anxiety = total score (scale 0–63); Beck Anxiety Inventory (Beck & Steer, 1990). Functioning = total score (scale 0–36); Strauss–Carpenter Levels of Functioning (Strauss & Carpenter, 1974). Cognitive impairment = average standardized score. Evaluation sensitivity = subscale (6–42); Dysfunctional Attitude Scale (Weissman, 1978).

Mean value was significantly different from that of the Communication disorder group: * $p<0.05$, ** $p<0.01$.

sensitivity are trait-like factors that combine to disorganize speech in specific situations, we employed a moderated logistic regression analytic strategy (Jaccard, 2001; Agresti, 2007). Specifically, controlling for demographic variables (age and gender), we estimated two models: one in which the main effects of cognitive impairment and evaluation sensitivity predict the presence of communication disorder; a second model in which the interaction term alone predicts the presence of communication disorder. Thus, we follow the strategy of comparing alternative maximum likelihood models to see which fits the data the best (Fienberg, 1991), utilizing the Hosmer–Lemeshow test, in this instance, as our index of fit (Agresti, 2007). We predict that the Wald χ^2 statistic will be significant for the interaction term, and that the model that includes the interaction will fit the data best.

Results

Table 1 contains the sample summary statistics. The patients with communication disorder are, on average, in their mid-thirties, male, and diagnosed with undifferentiated schizophrenia. The control patients are in their early thirties, evenly split between male and female, and have equal numbers diagnosed with paranoid and undifferentiated schizophrenia. It is notable that the two groups do not differ statistically either for average age of onset [$t=-1.4$, degrees of freedom (df) = 70, $p>0.10$] or parental education ($t=-1.5$, df = 65, $p>0.14$). The communication disorder group has a longer illness duration ($t=3.8$, df = 70, $p<0.01$) and more hospitalizations ($t=2.6$, df = 54, $p<0.05$), differences consistent with these patients being, on average, older than participants in the non-communication disorder group. Of the patients, 19% in both the communication disorder (6/31) and the non-communication disorder (8/41) groups were taking typical antipsychotic agents (e.g. Haldol, Thorazine and Prolixin) at the time of testing. Zyprexa is the most common atypical agent (32% communication disorder patients *v.* 27% of the non-communication disorder patients), followed by Risperdal (26% *v.* 20%) and Abilify (16% *v.* 17%). All patients were taking medications at the time of study.

Both groups evidence (Table 2) comparable depression ($t=0.77$, df = 71, $p>0.4$), anxiety ($t=0.31$, df = 71, $p>0.9$) and a trend-level difference in negative symptoms ($t=1.9$, df = 72, $p>0.05$); the communication disorder group, however, manifests more

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Table 3. *Correlations between study variables* ($n = 74$)[a]

	Communication disorder[b]	Delusions	Hallucinations	Negative symptoms	Depression	Anxiety	Functioning	Cognitive impairment
Delusions	0.30**	–	–	–	–	–	–	–
Hallucinations	0.26*	0.51**	–	–	–	–	–	–
Negative symptoms	0.22	0.43**	0.25*	–	–	–	–	–
Depression	0.09	0.37**	0.20	0.26*	–	–	–	–
Anxiety	0.04	0.25*	0.23	0.22	0.60**	–	–	–
Functioning	−0.34**	−0.53**	−0.31*	−0.61**	−0.30*	−0.21	–	–
Cognitive impairment	0.48**	0.14	0.14	0.27*	0.03	0.06	−0.26*	–
Evaluation sensitivity	0.34**	0.19	0.14	0.30*	0.58**	0.39**	−0.43**	0.19

[a] Communication disorder = binary split (mild and above *versus* questionable/none) of global rating of positive formal thought disorder; Scale for the Assessment of Positive Symptoms (Andreasen, 1983). Delusions = global rating; Scale for the Assessment of Positive Symptoms. Hallucinations = global rating; Scale for the Assessment of Positive Symptoms. Negative symptoms = total score; Scale for the Assessment of Negative Symptoms (Andreasen, 1984). Depression = total score; Beck Depression Inventory II (Beck *et al*. 1996). Anxiety = total score; Beck Anxiety Inventory (Beck & Steer, 1990). Functioning = total score; Strauss–Carpenter Levels of Functioning (Strauss & Carpenter, 1974). Cognitive impairment = averaged standardized domain scores. Evaluation sensitivity = subscale; Dysfunctional Attitude Scale (Weissman, 1978).

[b] Point biserial correlations.

* $p < 0.05$, ** $p < 0.01$.

severe delusions ($t = 2.7$, df = 72, $p < 0.01$) and hallucinations ($t = 2.3$, df = 71, $p < 0.05$), demonstrates a greater cognitive impairment ($t = 4.7$, df = 72, $p < 0.001$), endorses evaluation sensitivity to a greater degree ($t = 3.1$, df = 72, $p < 0.01$) and has poorer functioning ($t = -3.0$, df = 71, $p < 0.01$) than the group without communication deviance. Group differences are all medium to large effect sizes. For example, the five-point difference in functioning means that, on average, the communication disorder group has fewer social contacts, fewer close relationships, and fewer vocational experiences than the group without communication disorder.

Correlations

Table 3 presents the correlations between the study variables for the entire sample. Germane to the moderation hypothesis, presence of thought disorder correlates significantly both with cognitive impairment and evaluation sensitivity. Greater communication disorder severity is associated with worse neurocognitive performance and greater agreement with evaluation sensitivity statements. Communication disorder also correlates significantly with positive symptom levels. However, hallucinations and delusions do not correlate reliably with either cognitive impairment or evaluation sensitivity. Negative symptom levels correlate significantly with both verbal memory and evaluation sensitivity; however, the partial correlation between thought disorder and both cognitive impairment ($r = 0.42$, df = 71, $p < 0.001$) and evaluation sensitivity ($r = 0.29$, df = 71, $p < 0.05$) are significant when negative symptoms are statistically controlled. Depression and anxiety, finally, are significantly associated with evaluation sensitivity, but not significantly associated with either thought disorder or cognitive impairment ($p > 0.44$ for both). This pattern of data suggests that evaluation sensitivity, cognitive impairment and communication disorder are linked in a manner independent of hallucinations, delusions, negative symptoms and negative affect. It is worth observing that cognitive impairment and evaluation sensitivity both correlate significantly with poor functioning.

Moderation

Both age and gender are potential confounders and were included in the logistic models in addition to the variables of interest. Gender was not a significant predictor ($p > 0.16$) in either and was trimmed. Table 4 contains the results of the logistic regressions. In the model that includes the main effects, age, cognitive impairment and evaluation sensitivity are all significant predictors of the presence of communication disorder. The model correctly classifies 74% of the patients and the Hosmer–Lemeshow test indicates a reasonably good fit ($\chi^2 = 8.7$, df = 8, $p = 0.41$). In the

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Table 4. *Logistic regression models of communication disturbance*

	β	S.E.	Wald	Exp β	95% CI for exp β
Predictor					
Age*	0.096	0.031	4.923	1.071	1.008–1.139
Cognitive impairment**	1.042	0.352	8.748	2.835	1.421–5.654
Evaluation sensitivity**	0.132	0.049	7.211	1.141	1.036–1.257
Predictor					
Age*	0.061	0.028	4.658	1.062	1.006–1.123
Cognitive impairment × evaluation sensitivity***	0.052	0.014	13.618	1.053	1.025–1.083

S.E., Standard error; CI, confidence interval.
* $p<0.05$, ** $p<0.01$, *** $p<0.001$.

logistic model of the interaction, both the age term and the cognitive impairment by evaluation sensitivity term are statistically significant predictors of the presence of thought disorder. This model also correctly classifies 73% of the sample. The Hosmer–Lemeshow test indicates a better fit ($\chi^2=2.8$, df = 8, $p=0.95$) than the model that just contains the main effects of cognitive impairment and evaluation sensitivity. An elevation of one point in the interaction term increases the likelihood that a patient will be classified as having thought disorder by a factor of 5% (95% confidence interval 2.5–8.1%). These data are consistent with moderation (Kraemer *et al*. 2001): evaluation sensitivity moderates the relationship between cognitive impairment and speech disorder. Fig. 1 represents this interaction graphically.

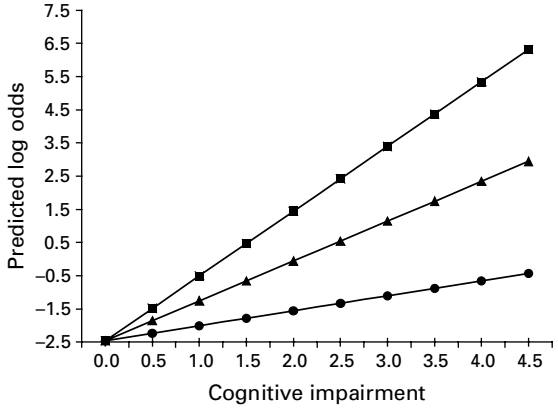

Fig. 1. Predicted log odds of communication disturbance as a function of the interaction of cognitive impairment and evaluation sensitivity scores. Cognitive impairment is indexed by an average standardized score; higher values reflect more severe impairment. Evaluation sensitivity is a subscale of the Dysfunctional Attitude Scale (Weissman, 1978). –■–, High evaluation sensitivity; –▲–, medium evaluation sensitivity; –●–, low evaluation sensitivity. Log odds rather than odds are employed here to illustrate the linear trend (Jaccard, 2001). Age has been set to the mean value.

Discussion

Our findings are consistent with the hypothesis that sensitivity to evaluation moderated the relationship between cognitive impairment and communication disorder in schizophrenia. Specifically, patients with thought disorder showed greater deficits in verbal memory, abstraction and working memory, as well as greater evaluation sensitivity than patients without thought disorder. Logistic regression, further, indicates that the interaction of cognitive impairment and concern about evaluation predicts thought disorder, and that the interaction fits the data better than either factor considered singly or additively. These results are independent of the severity of delusions, hallucinations, negative symptoms, depression, anxiety, as well as medications. Patients who have cognitive impairment and place a premium upon being accepted and not rejected are at elevated risk for communication disturbance relative to patients with either cognitive impairment or rejection sensitivity alone.

The significance of this finding can be explored within the framework of information processing theory (Phillips & Silverstein, 2003; Knudsen, 2007). Speech production entails a complex interaction of cognitive and motor processes (Levelt, 1989). Many of these processes (e.g. semantic access and memory representations) are executed automatically, placing little demand on overall resources, whereas other processes (e.g. responding to context), so-called controlled processing, require effort and can impose considerable cognitive demand. Analogue studies demonstrate that increasing cognitive load upon working memory and attention produces speech disturbance in healthy samples (Kerns & Berenbaum, 2003;

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Kerns, 2007*a*). Patients with schizophrenia, further, show impairment on controlled language-processing tasks but not tasks tapping automatic processes (Titone *et al*. 2000, 2007; Titone & Levy, 2004; Kerns, 2007*b*). We assume that individuals with attention and memory deficits have limited resources for controlled language processing. Accordingly, we theorize that evaluation sensitivity competes for resources with the controlled processes of speech production. The expectation of rejection allocates scarce resources to interpersonal cues and raises stress level: memory of what was just said is affected and leads to reference failures. Attentional selection amongst competing responses may also be impaired, allowing irrelevant material to slip into the speech stream.

Evaluation sensitivity is also germane to the emotional reactivity of communication disorder. As first reported by Shimkunas (1972), 'hot' topics (i.e. those eliciting negative affect) more readily disorganize the speech of patients with schizophrenia (Docherty *et al*. 1994; Haddock *et al*. 1995) than topics that produce positive emotions (Cohen & Docherty, 2005), the degree of emotional reactivity of speech varying both across time and across patients (Docherty, 1996; Docherty *et al*. 1998). Of interest, patients have been shown to produce aberrant verbalizations to proverbs when instructions stress personal involvement, an effect that goes away when instructions do not entail personalizing (Nahor & Vanicelli, 1976). We propose that evaluation beliefs, when activated, would give rise to ideas (e.g. 'He won't like me') that elevate arousal and disorganize speech. Differences in the strength of activation of these beliefs would explain both the variability across patients, as well as temporal variability within a particular patient. Thus, dysfunctional beliefs in schizophrenia serve as a source of stress reactivity and moderate day-to-day thought disorder in a manner similar to stress responses in other psychiatric disorders (Beck, 1976).

A question arises as to why speech production is specifically sensitive to the combination of evaluation sensitivity and cognitive impairment. The susceptible individuals evidently have a diathesis for communication disorder, which appears in their relatives (parents and siblings) who demonstrate attenuated communication disturbance (Docherty *et al*. 1999, 2004). Further, individuals with disorganized schizotypy simultaneously demonstrate attenuated communication deviance and attenuated neurocognitive impairment (Kerns & Becker, 2008), as well as reduced ability to integrate visual information (Uhlhaas *et al*. 2004). It has been suggested, accordingly, that the diathesis for thought disorder entails a disruption of cognitive coordination (Phillips & Silverstein, 2003). Within this framework, evaluation sensitivity would impact upon the diathesis to produce communication deviance.

A principal limitation of this study is the employment of cross-sectional methodology, which constrains causal inferences. Thus, it is possible that thought disorder causes evaluation sensitivity or cognitive impairment. Another limitation is our use of stable out-patients referred for negative symptoms or poor functioning, which limits generalizability. It remains for future research to determine if the rejection sensitivity is present at other points during the disorder. It is also of note that we did not employ a general measure of communication disturbance, such as the Communications Disturbances Index (Docherty *et al*. 1996), nor utilize laboratory tasks (Blankstein & Segal, 2001) to measure rejection sensitivity. If confirmed by such methods, the present findings suggest a role of appraisal in eliciting the communication disturbance observed in schizophrenia.

Appendix.

Evaluation sensitivity statements

1. I cannot be happy unless most people I know admire me
2. My value as a person depends greatly on what others think of me
3. If others dislike you, you cannot be happy
4. I do not need the approval of other people to be happy
5. I can be happy even if I miss out on many of the good things in life
6. What other people think about me is very important

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Declaration of Interest

None.

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