

The Epidemiology and Associated Phenomenology of Formal Thought Disorder: A Systematic Review

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Background: Authors of the Diagnostic and Statistical Manual, Fifth Edition (DSM-V) have recommended to “integrate dimensions into clinical practice.” The epidemiology and associated phenomenology of formal thought disorder (FTD) have been described but not reviewed. We aimed to carry out a systematic review of FTD to this end. **Methods:** A systematic review of FTD literature, from 1978 to 2013, using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. **Results:** A total of 881 abstracts were reviewed and 120 articles met inclusion criteria; articles describing FTD factor structure ($n = 15$), prevalence and longitudinal course ($n = 41$), role in diagnosis ($n = 22$), associated clinical variables ($n = 56$), and influence on outcome ($n = 35$) were included. Prevalence estimates for FTD in psychosis range from 5% to 91%. Dividing FTD into domains, by factor analysis, can accurately identify 91% of psychotic diagnoses. FTD is associated with increased clinical severity. Poorer outcomes are predicted by negative thought disorder, more so than the typical construct of “disorganized speech.” **Conclusion:** FTD is a common symptom of psychosis and may be considered a marker of illness severity. Detailed dimensional assessment of FTD can clarify diagnosis and may help predict prognosis.

Key words: formal thought disorder/thought disorder/phenomenology/epidemiology/prognosis/psychosis/schizophrenia/language/communication

Introduction

Formal thought disorder (FTD) has long been of interest to phenomenologists. Since Bleuler’s description of “loosening of associations,” it has been considered a core symptom of psychosis.¹ The clinical conceptualization of FTD has evolved over time and it is now known that a variety of cognitive and linguistic abnormalities are

associated with it.^{2,3} FTD was once thought to be specific to schizophrenia but is now known to manifest in affective psychoses, nonpsychotic illnesses, and normal controls.⁴ Despite some promising findings in FTD research to date, a great deal about this symptom remains either uncertain or undiscovered.^{5–7} The clinical heterogeneity of FTD is relevant in this regard; its core clinical phenotype is yet to be conclusively defined.

FTD is an objective sign observed on mental state examination, which differentiates it from symptoms such as delusions and hallucinations. Up to 18 different abnormalities in the rate and organization of speech are described in FTD rating scales and it is unlikely that FTD is a discrete entity. Instead, it reflects a cluster of related cognitive, linguistic, and affective disturbances. Accordingly, FTD research has been approached from a diverse range of clinical perspectives, eg, neurolinguistics, cognitive neuroscience, and psychiatry.

Previous reviews have highlighted the role of semantic priming abnormalities, impaired executive functioning, and, potentially, genetics in the etiology of FTD.^{2,3,5} Neurobiological studies have implicated certain brain regions, such as the superior temporal gyrus, and receptors, such as *N*-methyl-D-aspartate, in its genesis.^{6–9} These diverse etiologies for FTD may help to explain the lack of consensus as to how to best conceptualize this symptom to date. It remains to be clarified how the depth of phenomenological detail that has been described in association with FTD is of clinical relevance.

The Diagnostic and Statistical Manual, Fifth Edition (DSM-V) recommends the integration of “dimensions into clinical practice.”¹⁰ This emphasis on dimensions is relevant to FTD, however the DSM-V is less prescriptive in its description of this symptom than for other domains of psychosis. This is a matter of concern, given that all psychiatric research is ultimately grounded in precise phenomenology. It is timely, therefore, to return to

the clinical conceptualization on which FTD research is based. To this end, we sought to carry out a review of the epidemiological and phenomenological research in FTD. We aimed to establish the clinical significance of FTD, including its place in the dimensional assessment of psychosis and highlight potential areas for future research.

Aims and Objectives

To examine the epidemiology and phenomenology of FTD in mental illness, in order to describe the core clinical phenotype of this symptom.

The objectives of this paper are to review:

1. The factor structure of FTD.
2. The epidemiology of FTD.
3. The clinical and demographic variables associated with FTD.
4. The prognostic value of FTD in mental illness.

Methodology

Identification of Studies

This review conforms to the criteria outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) current statement.¹¹ A formal search strategy was devised using both Medical Subject Headings (MeSH) and free-text search strings with the aim of collating all published studies on the factor analysis (FA), epidemiology, associated phenomenology, and outcomes of FTD. We used this strategy to search the medical databases (PubMed, Medline, and PsycInfo) covering the years 1978–2014 with limits set on humans. Titles and abstracts were reviewed and irrelevant studies excluded. We then searched the full text and reference

lists of the remaining studies for other potentially salient work.

PubMed Search Strategy

We performed free-text search (using quoted phrases such as “formal thought disorder,” “epidemiology,” and “prognosis”) which produced a set of 496 papers. The MeSH heading “Schizophrenia and disorders with Psychotic features” was combined with the MeSH headings “factor analysis,” “statistical,” and “prognosis” to retrieve 44 further relevant studies. Further free-text searches for well-known authors in the area of FTD research produced 341 references. In total, we considered abstracts of 881 published articles and, from these, the full texts of 161 articles were reviewed by E.R. and L.C. Where controversy occurred, a decision to include or exclude was made by the senior author M.C. A total of 120 articles were included in the review, 22 of which were obtained by hand-searching references. A flowchart of our search strategy is outlined in [figure 1](#).

Inclusion of Studies

We included studies that described the factor structure, epidemiology, associated phenomenology, or outcome of FTD in mental illness.

Exclusion of Studies

We excluded studies that reported on treatment or intervention for FTD. We also excluded studies where the sole aim was to investigate the etiology of FTD, eg, underlying cognitive or biological causes, as this has been the subject of several reviews to date.^{2,3,5}

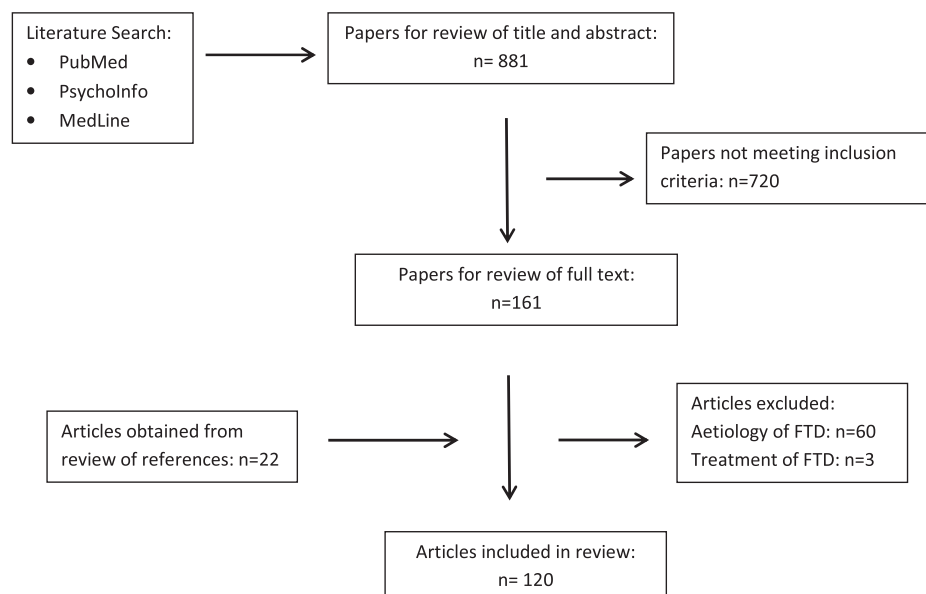


Fig. 1. Flowchart of search strategy for systematic review.

Results

The Factor Structure of FTD (n = 15)

Bleuler described “loosening of associations” as a fundamental symptom of schizophrenia.¹ He also emphasized the role of pressured speech, perseveration, blocking, and clanging and highlighted how topics of “emotional concern” are often the subject of abnormally associated thoughts. The assessment of FTD has since been operationalized and there have been 15 FA studies of FTD published in the English language. Ten of these have examined the factor structure of the Thought, Language, and Communication Disorders (TLC) scale, which describes 18 types of FTD.^{4,12–25} The TLC scale was hypothesized to reflect “thought,” “language,” and “communication” disorders; however, this division may not reflect FTD factor structure.^{23,26–28} Many other FTD scales have been developed, including the Scale for the Assessment of Positive Symptoms (SAPS), Scale for the Assessment of Negative Symptoms (SANS), the Positive and Negative Syndrome Scale (PANSS) for Schizophrenia, the Brief Psychiatric Rating Scale (BPRS), the Present State Examination (PSE), the Thought Disorder Index (TDI), the Thought and Language Index (TLI), and the Communication Disturbances Index (CDI), all of which are clinician-rated scales.^{15,29–35} A self-report FTD scale has also been developed.²²

FA studies generally comprise inpatients with a diagnosis of schizophrenia; however, other diagnoses have been examined, most commonly: mania, depression, the at-risk mental state (ARMS), and normal controls. The number of FTD factors identified may be influenced by the age profile of study participants, diagnostic heterogeneity, clinical status (acute or remitted psychosis), medication status, and the number of thought disorder items included in the analyses.^{16,17,36} Andreasen originally proposed a dichotomous, “negative” (poverty of speech and poverty of content) and “positive” (pressure of speech, tangentiality, derailment, incoherence, and illogicality) structure of FTD.¹³ These FTD subtypes were hypothesized to occupy opposite ends of a single spectrum of abnormal speech, however they have been shown to be weakly correlated ($r = .27$).¹⁸ They are differentiated by the fact that negative thought disorder is associated with poorer treatment response, lower educational attainment, and poorer functioning, whereas positive thought disorder has no such associations.¹⁹ Up to 7 different domains of FTD, within the TLC scale, have been identified, with the majority of variance (range: 42%–78%) accounted for by 2 or 3 domains. The well-circumscribed “disorganization domain” is characterized by FTD items typical of Bleuler’s “loosening of associations” (tangentiality, derailment, incoherence, illogicality, circumstantiality, and loss of goal). Some investigators ($n = 5$) identify a “negative” domain, comprising poverty of speech, poverty of content of speech, with or without perseveration.

Others ($n = 5$) identify a “verbosity” or “productivity” domain in which pressure of speech and poverty of speech both load, albeit inversely. Frequently ($n = 4$), pressure of speech will load on the disorganization domain, reflecting the blurring of categorical boundaries between mania and schizophreniform disorders.

Andreasen gave examples of poverty of speech (negative FTD) and incoherence (positive FTD) in her seminal article on FTD²⁸:

Poverty of speech:

Interviewer: “Were you working before you came to the hospital?”

Patient: “No”

Interviewer: “What kind of jobs have you had in the past?”

Patient: “Oh, some janitor jobs, painting”

Interviewer: “What kind of work do you do?”

Patient: “I don’t. I don’t like any kind work. That’s silly”

Incoherence:

Interviewer: “Why do you think people believe in God?”

Patient: “Um, because making a do in life. Isn’t none of that stuff about evolution guiding isn’t true anymore now. It all happened a long time ago. It happened in eons and eons and stuff they wouldn’t believe in him. The time that Jesus Christ people believe in their thing people believed in, Jehovah God that they didn’t believe in Jesus Christ that much.”

The Prevalence and Longitudinal Course of FTD (n = 41)

Prevalence. Observational studies, based mainly on inpatient populations, quote high prevalence rates for FTD based on structured assessments, most frequently the TLC scale. However, the literature in this area is very difficult to compare, due to the lack of cutoff scores to indicate the presence of FTD, the absence of validation studies in the general population, and the paucity of studies that employ more than one FTD assessment scale for comparative purposes. The single largest study ($n = 1665$) recorded that 50.39% of patients with schizophrenia demonstrated FTD (PANSS).³⁷ In a mixed diagnostic sample ($n = 660$), the prevalence was 72.7% (TLC scale).²⁴ Comparing mania and schizophrenia, findings are conflicting: some find FTD to be more frequent,^{4,38,39} others find that it is less frequent,^{17,40} and still others find that it is equally prevalent in mania as in schizophrenia.^{41,42} Relative prevalence may depend on whether a narrow or broad definition of FTD is employed.^{17,40} Up to 60% of patients with schizoaffective disorder, and 53% of depressed patients, have been reported to display FTD.^{13,26} Prevalence estimates based on bizarre idiosyncratic thinking (BIT) range from 36% in nonpsychotic disorders (including personality disorders, neurosis, and depression) to 81% in schizophrenia ($n = 191$).⁴³ Using the OPCRIT criteria, however, FTD prevalence among inpatients with schizophrenia-spectrum disorders was estimated to be only 27.4% ($n = 336$); this is likely to be more reflective of DSM guidelines that FTD

should be “severe enough to substantially impair effective communication.”^{44,45} Not only present in acute mania or schizophrenia, FTD has also been described in those with nonpsychotic disorders, as well as those in remitted psychosis.^{4,43} It likely that FTD exists on a continuum with normal speech, as 6% of normal controls have evidence of it.^{26,46,47} Disordered speech appears to progress along an exponential, rather than linear, gradient of increasing prevalence and severity, from normal to acutely psychotic or manic.

Longitudinal Course. The most comprehensive longitudinal study of FTD is the Chicago Follow-up Study (inpatient sample, $n = 77-191$), which assessed BIT over 8 years.^{43,48-51} BIT is a relatively broad construct, related to intelligence levels, and rated on the idiosyncrasy of responses given to stimuli, usually proverbs.⁵²⁻⁵⁴ Persistent BIT was found to be rare in nonpsychotic disorders (4%) and most common in those with schizophrenia (24%); intermediate rates of persistence are observed in non-schizophrenia psychotic disorders and schizoaffective disorder. The presence of BIT at follow-up assessment was best predicted by diagnosis and premorbid social and academic functioning. If severe BIT was present at follow-up, it usually reflected a chronic, unremitting illness, rather than an acute relapse of schizophrenia.

Bowie reported on a 2.3-year follow-up of FTD in a geriatric population and found that disorganized speech remained stable, while underproductive speech deteriorated.⁵⁵ Over 6 months, Andreasen and Grove found that FTD remitted to a greater extent in those with mania and schizoaffective disorder than schizophrenia.⁴ This finding was replicated by Jampala et al.⁴⁰ Wilcox et al found no difference in FTD severity between diagnostic groups at baseline, however, at 10- and 20-year follow-up, it was significantly more severe in those with schizophrenia compared with other diagnoses.⁴⁶ Winokur et al reported that FTD prevalence remained stable over the first 10 episodes of illness in those with psychotic disorders.⁵⁶

About 4.5 years after index admission, those with deficit syndrome demonstrate significant deterioration in FTD compared with nondescript schizophrenia.⁵⁷ Parnas et al reported that FTD increases in the 6 years following first episode, ie, nondescript schizophrenia ($n = 67$), however methodological limitations were acknowledged in this study.⁵⁸ Other investigators, examining smaller study samples, have reported that FTD either improves⁵⁹⁻⁶¹ or remains stable⁶¹⁻⁶⁵ at follow-up, with negative thought disorder more commonly persisting at follow-up when compared to positive FTD.^{61,64}

Diagnostic Category and FTD ($n = 22$)

Severity, subtype, and temporal course of FTD differentiate between diagnostic categories of psychosis, particularly mania and schizophrenia. Whether FTD in mania is more

severe^{38-40,66} or equally severe^{32,67} as that in schizophrenia depends on how broad a definition of FTD is employed.^{17,40} FTD, taken as a global measure, is more likely to persist in those with schizophrenia. FTD is associated with “core” or “Kraepelinian” schizophrenia, which is equivalent to the deficit syndrome, and it may also help distinguish paranoid from nonparanoid schizophrenia.⁶⁸⁻⁷⁰ The potential for circular reasoning when using FTD to differentiate between psychotic disorders must be acknowledged, as FTD is one of the diagnostic criteria of psychosis.

Andreasen and Grove viewed FTD as a positive and negative dichotomy, with “empty disorganized” speech in schizophrenia and “fluent disorganized” speech in mania.⁴ Others have found that verbal productivity alone distinguishes mania from schizophrenia.^{41,42} Those with schizophrenia have more “disorganization and idiosyncratic speech” than mania, in which there is more playful and “combinatory thinking”; this study reported that speech in schizoaffective disorder was more similar to schizophrenia than mania.^{67,71-73} Wykes and Leff found that the speech of those with mania was more cohesive than that in schizophrenia.⁷⁴ Docherty et al concluded that those with mania produce more speech, and, proportionately, more ambiguous word meanings, than those with schizophrenia in which there was more missing-information references.³² Taylor et al demonstrated that 91% of mania and schizophrenia diagnoses could be distinguished, based on relative severities of “verbiage disturbance” and “disconnected speech.”¹⁷ Most recently, Cuesta and Peralta found that schizophrenia was differentiated from other psychotic disorders only by the severity of idiosyncratic and impoverished speech; there was no difference in severity of disorganized speech when verbosity was controlled for.²⁴ Hoffman et al’s conclusion sums up some of the concepts described; those with mania displayed greater quantities of speech, and more deviance within that speech, than those with schizophrenia, however the overall coherence of manic speech was greater than that observed in those with schizophrenia, where there is “diminished discourse planning abilities.”³⁹

FTD and Associated Variables ($n = 56$)

Age, Demography, and FTD. It is likely that FTD prevalence and severity varies across the lifespan. In child and adolescent populations, FTD prevalence ranges widely, between 40% and 100%.^{75,76} However, it may not be possible to reliably interpret comparisons between FTD prevalence in adolescents and adults, due to methodological issues relating to the Kiddie FTD scale.^{77,78} Children and adolescents with mania may display less severe FTD than adults.^{79,80} Furthermore, studies of FTD in the children of people with schizophrenia suggest that FTD is a stable trait for children affected.²⁵

Neither Schultz nor Cuesta found any correlation between FTD and age, in those with early-onset psychosis,

suggesting that FTD prevalence remains stable over time.^{24,81} Early-onset schizophrenia is associated with significantly more prevalent positive and negative FTD than those with late-onset illness (27.4% vs 10.4%, $P = .005$ and 11% vs 2.2%, $P = .01$ respectively, total $n = 470$).⁴⁴ Pearlson's chart review had originally noted this trend (prevalence 5.6% in late-onset illness and 54.5% in early-onset illness), a finding confirmed in 5 other studies.⁸²⁻⁸⁷ There have been 2 exceptions to these findings, however methodological limitations, relating to those studies, were acknowledged by the investigators.^{88,89} Variation in the defined age cut-off for "late-onset psychosis" is noteworthy; it ranges from 45 to 65 years of age.

Apart from age, no other basic demographic variables appear to influence the presence or severity of FTD. Some have reported that those in rural areas, with lower educational achievement and those of Afrikaner, rather than American descent, demonstrate more severe FTD.^{21,90-92} These findings have not been replicated.

Comorbid Substance Abuse and FTD. Comorbid substance abuse impacts on the presence, severity, and longitudinal course of FTD in psychosis, although study design may impact on these findings. Cannabis abuse in the 6-month and 12-month time period, prior to first-episode psychosis, is associated with more severe FTD at presentation ($n = 502$).^{93,94} However, a smaller study ($n = 125$) found the reverse and Soyka et al found no association between the presence of FTD and a history of substance-use disorder (either lifetime or over the past 3 months) in schizophrenia (total $n = 447$).^{95,96} Cannabis abuse predicts the presence of significantly worse FTD at 5.5-year follow-up in those with schizophrenia.⁹⁷ Similarly, the presence of comorbid substance abuse disorder predicts a worse clinical course in schizophrenia, including a trend toward more severe FTD at 5-year follow-up.⁹⁸ Within a substance-abusing population, FTD was one of 6 variables demonstrated to predict a diagnosis of schizophrenia (present in 30% of those with schizophrenia vs 12% without), a result similar to the findings of Cornelius et al.^{99,100}

Comorbid Physical Conditions and FTD. FTD has been studied in children with epilepsy, where it is associated with communication deficits, seizure control, type of epilepsy, and intelligence level.¹⁰¹⁻¹⁰³ FTD has been consistently found to be related to intelligence levels in children in epilepsy populations, and results may therefore reflect general intellectual functioning rather than FTD specifically.⁷⁸

FTD, Anxiety, and Affect. The presence of FTD is negatively correlated with the diagnosis of anxiety disorder in schizophrenia; it is postulated that those affected are less prone to interpretational biases thought to underlie anxiety disorders.¹⁰⁴ Similarly, schizophrenia patients

with comorbid obsessive compulsive disorder have significantly less severe FTD and affective flattening than those without; a possible protective effect of obsessive symptoms on "psychic disintegration" is suggested.¹⁰⁵ Docherty et al found that negative conversation topics provoked an increase in positive, but not negative, FTD to a greater extent than topics that resulted in positive affect.¹⁰⁶ These findings were observed particularly in those with a positive family history of schizophrenia.¹⁰⁷

Social Functioning and FTD. Concurrent social functioning appears to be significantly affected by the presence of FTD. Among community-dwelling individuals with schizophrenia, verbal underproductivity predicts observer-rated social skills, while disconnectivity predicts social behavior in role play situations.¹⁰⁸ Additionally, positive FTD is predicted by poor appreciation of irony and poor mind-reading, while negative FTD is predicted by poor understanding of metaphors.¹⁰⁹ Two further studies found FTD to be the only symptom domain to impact on measures of social behavior.^{110,111} FTD may affect specific areas of social functioning, while sparing others; Cutting and Murphy showed that FTD was associated with poor conversational skills but had no impact on a test of knowledge of the real world.¹¹² Notably, Cramer et al reported 2 negative studies investigating the impact of FTD on social functioning and social cognition, as did Perry et al.¹¹³⁻¹¹⁵ It is likely that negative, but not positive FTD, adversely affects objective quality of life, a construct related to social functioning.^{116,117}

Illness Severity and FTD. For those who demonstrate FTD, hospital admission is both more likely and significantly longer, and involuntary admission is more likely.^{21,37,118,119} FTD might serve as a "severity index" for those with mania because it is associated with higher psychotic symptom burden and earlier age of illness onset, although those with FTD and mania improve to the same degree as those without FTD.⁴⁰ Vocisano et al also found that those with "deteriorated" affective disorder were significantly more likely to demonstrate FTD.¹²⁰ Similarly, verbal disconnectedness, but not verbal productivity, is significantly more severe in those with "Kraepelinian" schizophrenia.⁶⁹ Two studies have found FTD to be the sole measure of psychopathology associated with poor insight,^{121,122} although it is possible those exhibiting FTD are aware of their communication deficit.¹²³ An exception to these findings is Barrera's study, which found no significant association between insight and FTD.¹²⁴

The Impact of FTD on Outcome (n = 35)

At-Risk Mental State. The description of "cognitive slippage" in the speech of children of those with schizophrenia lead to a series of studies investigating FTD as a risk factor for the development of psychosis.¹²⁵ Verbal

associative processes, rather than FTD, were found not to predict transition to psychosis in high-risk individuals, however formalized assessments of FTD subsequently found otherwise.¹²⁶ At 18-month follow-up, the stand-alone predictive value of FTD as a predictor of transition to psychosis in the ARMS was relatively low (hazard ratio: 2.38). When included with 5 other clinical variables, however, the prediction model had an 83.3% positive predictive value for transition.¹²⁷ At 2-year follow-up, illogical thinking was uniquely predictive of conversion to psychosis (OR: 4.64).¹²⁸ It has been suggested that FTD is specific to the risk of transition to schizophrenia, more so than affective disorder and, furthermore, that FTD subtypes have different associations with outcome.^{77,129–132} Negative FTD predicts the development of schizophrenia, regardless of genetic risk, while positive FTD is more likely to be present in those who had an affective component to their presentation.¹⁸ Overall, it appears that negative FTD better predicts conversion to schizophrenia-like psychosis than positive FTD.^{133,134} Investigation of thought processes in ARMS samples may help our understanding of the progression from mental health to mental illness. The understanding of normal thinking development in children continues to evolve,¹³⁵ and the need for standardization of neurocognitive measures in this population has been highlighted.¹³⁶

Established Psychotic Illness. The Chicago Follow-Up Study provides the most comprehensive data on the impact of FTD on outcome in mental illness. Cohorts of up to 186 patients were followed in this study and BIT at baseline was found to have no predictive value for social outcome at 1.5, 2, and 4 years.⁴⁹ Conversely, the clinical course of BIT was found to influence overall outcome, work functioning, rehospitalization, and clinical symptoms up to 18 months post-hospitalization.^{137,138} A more persistent course of BIT was associated with worse outcome and a dose-response relationship was also apparent. BIT has a degree of predictive value in affective disorders, but more so in schizophrenia and particularly when present in the chronic rather than the acute stages. Earlier outcome reports, from the Chicago Study, were limited by the absence of any form of controlling for confounders in statistical analysis. More recent reports from this study, in which confounders were controlled for, indicate that BIT explains only 10%–15% of the variance in social and occupational functioning.^{50,139} The authors acknowledge that negative symptoms have a greater impact on functioning than FTD, thereby highlighting the limited stand-alone usefulness of FTD in prognosticating functional outcomes in mental illness.

There have been few other longitudinal examinations of FTD and functional outcomes. Andreasen and Grove reported that, 6 months following admission, negative FTD was the strongest predictor of global functioning, while positive FTD had no significant correlation.⁴

Docherty et al demonstrated that psychotic symptoms at follow-up were predicted by the baseline presence of low verbal productivity in those with schizophrenia or reference failure in those with mania.¹⁴⁰ Tirupati et al found that for community-dwelling, newly diagnosed patients with schizophrenia, FTD predicted worse global outcome at 1 year.¹⁴¹ Similarly, Knight et al reported that incoherence was correlated with global clinical outcome in schizophrenia.¹⁴² Within a chronically institutionalized cohort, verbal underproductivity predicted impaired social skills at 2.5-year follow-up to a greater extent than disconnected speech.¹⁴³ In an ARMS cohort, role functioning was predicted by referential cohesion, while social role functioning was predicted by poverty of content of speech at follow-up.¹²⁸ It is apparent from these studies that the predictive value of FTD, with respect to functional outcomes, is related to the presence of negative FTD rather than disorganized speech.

Wilcox et al found that FTD was the only variable to predict relapse in depression (7-year follow-up), manic psychosis (3 years), schizophrenia (2 years), and new-onset psychosis (10 and 20 years).^{46,144–146} Negative FTD predicted relapse to a greater extent than did positive FTD. In new-onset psychosis, negative FTD predicted both clinical outcomes (rehospitalization and BPRS score) and employment status. Positive FTD, however, was found to have “little prognostic value” in this study.⁴⁶ Jorgensen and Aagaard found that FTD predicted relapse in psychosis, and Harvey et al reported that negative FTD predicted the presence of psychosis at follow-up in those with schizophrenia, although not in those with mania.^{64,147} Lastly, the presence of baseline FTD was shown to predict failed outpatient treatment of mania after 1 month.¹⁴⁸ There are several examples of negative findings in the literature, with respect to the predictive value of FTD in schizophrenia, for follow-up periods up to 15 years in duration.^{58,149–151}

Discussion

Choice of Rating Scale

Most clinical and epidemiological FTD research has employed the TLC scale, however it reflects acute clinical states and is relatively insensitive to more subtle forms of speech disturbance, as discussed by Docherty.¹⁵² The use of multiple scales is preferable when exploring the association between FTD and neuropsychological deficits or functioning. While many have argued that FTD reflects a language deficit, some have found that ratings of FTD are weakly, or not at all, related to linguistic variables such as fluency, complexity, and cohesion.^{153,154} Further comparative studies of the TLC scale with other FTD scales, and more sophisticated neurolinguistic assessments, are required. Assessment of speech is influenced by the choice of clinical scale employed, as well as the

rating clinician, and investigators need to demonstrate adequate interrater reliability in FTD assessment.¹⁵⁵

Conceptualization of FTD

Although there is still no consensus factor structure for FTD, it is likely to comprise abnormalities related to the organization, rate, impoverishment, and degree of idiosyncrasy of speech. The construct of FTD described in daily clinical practice, however, is represented mostly by positive FTD or the disorganized domain of FTD. When considered in isolation, the acute thought-disordered state resolves in most individuals, but FTD may also be considered a trait marker, or endophenotype, of psychosis.¹⁵⁶ As it exists along a continuum with normal speech, FTD exhibits characteristics both of a categorical and dimensional form of psychopathology. Factor analyses have found that FTD generally loads on the disorganization symptom dimension, together with bizarre behavior, inappropriate affect and, perhaps, inattention.¹⁵⁷⁻¹⁵⁹ This dimension explains a greater amount of the variance of psychotic symptoms than FTD alone. While some studies of psychopathology in early psychosis have identified a disorganization dimension,^{160,161} not all do,¹⁶² suggesting that this dimension may evolve over the course of psychosis.

The descriptor, “formal,” in the term FTD helps distinguish disorganization in the flow of speech (ie, FTD) from abnormalities in speech content (eg, delusions, which some still describe as a type of thought disorder). There is an argument, however, for revising the term FTD to that of “speech disorder.”¹⁶³ Another issue with respect to FTD terminology relates to negative FTD, which has clinical correlates distinct from that of disorganized speech, and is also likely to have distinct neurocognitive and neuroimaging underpinnings.^{164,165} Negative FTD, therefore, is not simply the opposite of positive thought disorder. It is comprised mainly of poverty of speech and may be more appropriately classified as a type of negative symptom, ie, alogia, as it is in the DSM-V. Ultimately, diagnostic systems should emphasize *relative* severities of symptoms rather than absolute presence or absence; the ratio of negative to disorganized FTD is a case in point.

Epidemiology of FTD

Accurate prevalence data for FTD are lacking, for the reasons outlined. Nonetheless, an estimate of clinically significant FTD prevalence is 27.4%, as reported by Howard et al. FTD is very rare in late-onset psychotic illnesses and remains stable in early-onset illness; this phenotypic difference in clinical presentation warrants further investigation from the perspective of putative neurocognitive and neurobiological explanations. We could identify only one case report in the literature of speech and language intervention in an adult with schizophrenia and FTD.¹⁶⁶ If this intervention is to be considered in the treatment of

those with speech disorders, a more detailed understanding of the extent of speech disorders, as well as their associated functional impairments, needs to be established.

Phenomenology of FTD and Implications for Clinicians

Categorical differences between diagnoses, with respect to FTD, do not exist, and clinicians should focus on a more dimensional assessment of speech in mental illness. The relative severity of disorganized, idiosyncratic, pressured, and impoverished speech is likely to be a key factor in differentiating between schizophreniform and mood disorders. It may also be useful to consider disorganized speech a trait marker in the presentation of mental illness and an indicator of increased risk of transition to psychosis in those with ARMS. Much of the prognostic value of FTD quoted in the literature reflects the effect of negative FTD; the evidence for positive FTD having strong prognostic value is relatively weaker, unless it persists over time. The main prognostic value of positive FTD seems to be its ability to predict a more severe symptomatic course of illness.

Directions for Future FTD Research

There is a need to evaluate the factor structure of FTD in mixed diagnostic samples, for those in the early stages of psychosis and, if possible, in unmedicated individuals. Validation of the TLC scale in normal population samples, including among relatives of patients with psychosis, should be carried out. This would help to clarify the role of FTD as an endophenotype and to establish TLC scale cutoff scores. Improved understanding of the development of normal thinking processes in children would complement the existing literature on speech disturbance in the ARMS. Significant advances have been made in the area of neurolinguistics, and there is a need for comparative studies of the TLC scale with more sophisticated neurolinguistic assessments.^{167,168} Distillation of the FTD clinical phenotype will help to guide future research examining its neurolinguistic and neurobiological underpinnings, as well as its impact on functioning. Lastly, research into interventions, other than antipsychotic medication, are warranted, given the impact of FTD on outcome and its persistence in subgroups of patients, despite standard treatment.

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