

EVALUATION OF A MULTI-ELEMENT TREATMENT CENTER FOR EARLY
PSYCHOSIS: PREDICTORS OF FUNCTIONAL OUTCOME AT 1 YEAR

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ABSTRACT

SARAH R. UZENOFF: Evaluation of a Multi-element Treatment Center for Early Psychosis:
Predictors of Functional Outcome at 1 Year
(Under the direction of David Penn, PhD)

Background: A growing international body of research has demonstrated the potential for comprehensive, phase-specific care to improve clinical and functional outcomes in early psychosis. However there have been no evaluations of such treatment models in the United States (US). This study is a naturalistic, prospective one-year follow-up of an early psychosis cohort treated in one of the first US-based multi-element treatment centers.

Method: Participants were 163 individuals treated at the Outreach and Support Intervention Services (OASIS) clinic, a multi-element treatment center for early psychosis. Data were collected as part of routine care at six-month intervals. Primary outcomes included role functioning, involvement in work or school, and subjective experiences of recovery. In addition, a novel definition of functional remission was proposed. Predictors of functional outcomes were examined using generalized estimating equations. Results: After one year of treatment, individuals experienced significant improvements in positive and negative symptoms, role functioning, and clinician- and patient-rated global functioning. Individuals were significantly more likely to achieve symptom remission, functional remission, and to be in school at one year than at baseline. There were also trend-level reductions in substance abuse. Symptom remission and age of referral emerged as significant predictors of role functioning across the first year of treatment. Individuals with active substance abuse over

the course of treatment had poorer role functioning by one year than did individuals not abusing substances. Discussion: This study provides preliminary support for the efficacy of comprehensive early intervention services in the US. Limitations and implications for future research are discussed.

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INTRODUCTION

Over the past two decades, a paradigm shift in the treatment of psychotic disorders has pointed research and treatment development efforts towards the early illness course. As a standard of care, early intervention seeks to minimize the treatment delays and stigma which have long prevented individuals from receiving optimal treatment early in the course of their illnesses, and to minimize the mortality and morbidity associated with illnesses such as schizophrenia (Lieberman & Fenton, 2000; Malla & Norman, 2002; McGlashan, 1998; McGlashan & Johannessen, 1996; McGorry, 1992; Stephenson, 2000). The early phase of psychotic illnesses (including the pre-psychotic period and extending through the first 3-5 years following treatment initiation) has been recognized as a critical period for treatment (Birchwood, Todd, & Jackson, 1998). This is the period during which much of the negative clinical progression in schizophrenia has been hypothesized to occur (Lieberman et al. 1998), and early outcomes during this period are one of the strongest predictors of long-term symptom and functional outcomes (Harrison et al., 2001). Given evidence that biological, psychological, and psychosocial influences may demonstrate maximum plasticity during this period, interventions targeted at the first episode of psychosis and the period immediately thereafter may have a disproportionate effect relative to later interventions (Birchwood et al., 1998; McGorry et al., 2007).

Rationale and Aims for Early Intervention

The rationale for early intervention in psychosis has been further bolstered by findings that refute the notion of a progressively deteriorating illness course. Instead, prospective

longitudinal studies following individuals who have recently experienced a first episode of psychosis have presented findings consistent with the an early plateau in the illness course that may be followed either by stability or by continued recovery (Bertelsen et al., 2009; Crumlish et al., 2009). In light of these findings, a recovery movement emphasizing optimism, access to opportunity, and pursuit of individual goals and meaningful community participation has gained momentum (Lieberman et al., 2008). International healthcare entities including the World Health Organization and the International Early Psychosis Association (IEPA) aim to raise wider societal awareness about the importance of early intervention while generating optimism and expectations of positive outcomes and recovery (Bertolote & McGorry, 2005).

Nonetheless, long-term follow-up studies suggest that psychotic disorders continue to be associated with significant impairment and morbidity, including high rates of suicide (Bromet, Naz, Fochtmann, Carlson, & Tannenber-Karant, 2005), frequent symptomatic relapses (Robinson, Woerner, Delman, & Kane, 2005), and difficulty returning to normative social roles (Robinson, Woerner, McMeniman, Mendelowitz, & Bilder, 2004). Accordingly, there is a pressing need for the development of treatments for the early illness course that can improve outcomes in these varying domains. Thus, early intervention for psychotic disorders has the following primary goals: a) reducing duration of untreated psychosis, b) accelerating remission, and preventing relapse and treatment resistance, and c) maximizing social and functional recovery (Birchwood et al., 1998; Spencer, Birchwood, & McGovern, 2001). These goals are described further below.

Reducing duration of untreated psychosis.

A converging body of literature suggests that the sooner antipsychotic treatment is initiated after the emergence of active psychosis, the better the clinical outcome. Duration of untreated psychosis (DUP) (i.e. length of time between the onset of an individual's initial psychotic episode and when that individual receives treatment) has been found to be predictive of clinical status upon presentation (Melle et al., 2004), as well as short-term symptom levels (Larsen, Moe, Vibe-Hansen, & Johannessen, 2000; Malla et al., 2002a) and social functioning (Addington, van Mastrigt, & Addington, 2004a; Barnes et al., 2008). Recent prospective naturalistic studies of FEP cohorts have also reported associations between DUP and long-term outcomes including symptom burden (White et al., 2009) and social functioning (Crumlish et al., 2009).

There are consistent associations reported between DUP and a variety of other indicators of prognosis, including age of onset, sex, premorbid functioning, socioeconomic status, and mode of illness onset (Norman & Malla, 2001; Perkins, Gu, Boteva, & Lieberman, 2005). Some have suggested that long DUP and delayed treatment may be a consequence of some other indicators of poor prognosis, in that an insidious illness onset and premorbid dysfunction would likely contribute to delayed help-seeking and delayed initiation of treatment (Barnes et al., 2000; Verdoux et al., 2001). However, suggestions that the relationship between DUP and outcome is confounded by these other factors are consistently not borne out in empirical studies (Singh, 2007). A systematic review (Marshall et al., 2005) and a comprehensive meta-analysis (Perkins et al., 2005) have concluded that prolonged DUP is modestly but consistently associated with poorer short-term outcomes in an array of domains, including symptom levels, overall functioning, quality of life, and likelihood of

symptom remission, and that these associations persist after controlling for the effects of other confounding variables, particularly premorbid adjustment. These findings therefore highlight reducing treatment delays as a malleable prognostic factor and a primary target for intervention studies aimed at improving outcomes.

Accelerating remission and preventing relapse and treatment resistance.

Antipsychotic medications comprise the frontline treatment for most psychotic disorders, for their efficacy in treating symptoms and preventing relapse (Fenton, Blyler, & Heinssen, 1997; Malla et al., 2006) as well as their potential to attenuate some of the biological correlates of disease progression (Lieberman et al., 2005b). Medication response following an initial psychotic episode is typically quite good, with a majority of patients (i.e. between 50-75%) experiencing significant improvement within 3 months of initiation of antipsychotic medication (Lieberman et al., 2003b; Schooler et al., 2005) and maximum symptomatic improvement occurring within the first 6 months of treatment (Szymanski, Cannon, Gallacher, Erwin, & Gur, 1996). Although estimates of the proportion of first-episode patients responding to acute antipsychotic treatment vary (based on the length of the medication trials, the definition of ‘response’ used, and the type of antipsychotic drug), most individuals will experience remission of psychotic symptoms in response to an adequate trial of antipsychotic medication within the first year of treatment (Bradford, Perkins, & Lieberman, 2003; Lieberman et al., 2003a; Robinson et al. 1999). Negative and cognitive symptoms tend to show less improvement following initiation of treatment with antipsychotic medications than do positive symptoms, which may represent a different time course for responsiveness, and/or more refractory properties of these symptoms (Bradford et al., 2003). International clinical practice guidelines for early psychosis include a

recommendation of pharmacotherapy for at least one to two years following symptom remission, with longer maintenance treatment for individuals who are slow to respond or who have frequent relapses (IEPAWG, 2005).

Symptom remission: clinical phenomenology and correlates.

Effective management and reduction of symptoms following an initial psychotic episode is a central goal of early intervention. Symptom remission is a generally accepted marker of symptomatic improvement, and one which holds advantages over other suggested heuristics (such as a 20% reduction in symptoms) that disregard baseline symptom levels and may have limited generalizability (Mortimer, 2007). Similar to the concept of remission in other psychiatric illnesses like anxiety and depression, symptomatic remission in schizophrenia is defined not by an absence of symptoms, but by minimal symptoms that are associated with no more than a mild level of disability. In recent years, a consensus definition for symptom remission across the illness course has been established by the Remission in Schizophrenia Working Group (Andreasen et al., 2005). This definition pertains specifically to core symptom domains (including psychoticism/reality distortion, disorganization, and negative symptoms) that were chosen to map onto the three dimensions of psychopathology identified by factor analyses and the five criteria for schizophrenia specified in DSM-IV. The resulting remission criteria have been operationalized onto select items from several of the most common measures of psychopathology, including the Positive and Negative Syndrome Scale for schizophrenia (PANSS)(Kay, Fiszbein, & Opler, 1987) and the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962). The definition includes both a severity component (i.e. mild or less) on each of the selected items as well as a time component (i.e. that symptom levels should endure for at least 6 months).

This definition of remission has been shown to be a sensitive and specific indicator of clinical status (Opler, Yang, Caleo, & Alberti, 2007). It has been validated by findings that it correlates significantly with established measures of symptom severity, functioning and quality of life, and appears achievable for a significant proportion of patients across the course of schizophrenia, including those with recent-onset psychosis (Lasser et al., 2007; van Os et al., 2006a; van Os et al., 2006b). Additionally, the remission concept has been demonstrated sufficient plasticity as an outcome measure by findings that clinically stable patients not yet at the remission criteria move to better clinical outcomes when exposed to adequate treatment (Lasser, Bossie, Gharabawi, & Kane, 2005).

Remission rates in first-episode psychosis (FEP) according to these criteria have been reported between 24-48% within the first 5 five years of treatment (Addington & Addington, 2008b; Bertelsen et al., 2009; Emsley, Rabinowitz, & Medori, 2007; Wunderink, Nienhuis, Sytema, & Wiersma, 2007), with higher rates of remission reported (36%-77%) when only the severity criterion is required (Addington & Addington, 2008b; Boden, Sundstrom, Lindstrom, & Lindstrom, 2009; Emsley et al., 2007; Menezes et al., 2009; Petersen et al., 2008). Indeed, in a secondary analysis of six studies including participants with varying illness chronicity, Dunayevich and colleagues (2006) reported that only about 1/3 to less than 1/2 of the patients meeting the severity threshold for remission maintained this level of improvement at the one-year time point, leading the authors to conclude that meeting the severity threshold alone holds limited utility in predicting sustained improvement at later time points. However, Cassidy and colleagues (2009) found that the predictive validity of the remission criteria did not decrease when a 3-month time criterion was used rather a 6-month criterion.

The association between symptomatic remission and a broad array of outcomes highlights early and sustained symptomatic remission as a primary treatment goal in early intervention. First, early illness course, including early symptom remission, has been shown to predict longer-term illness course. This has been demonstrated in a 24-month follow-up study of 2,690 individuals with varying duration of illness (Lambert et al., 2006), and in a 5-year follow-up of a first-episode cohort in which failure to achieve symptom remission after two years of treatment was found to predict a continuous course of illness at five-years (Bertelsen et al., 2009). Additionally, persistent symptoms are among the highest risk factors for prematurely disengaging from treatment. This has been demonstrated both in community treatment (Schimmelmann, Conus, Schacht, McGorry, & Lambert, 2006) as well as in clinical drug trials for FEP (i.e. comprising non-epidemiological samples) (Perkins et al., 2008). Therefore symptomatic remission early in the illness course may have significant impact on future illness course and treatment engagement.

Symptom remission has also been found to be associated with satisfaction with life (Boden et al., 2009), well-being (Lambert et al., 2006), and self-reported quality of life (Emsley et al., 2007; van Os et al., 1999; but not Wunderink et al., 2007). Van Os and colleagues (2006b) found that changes in symptomatic remission status were associated with large and clinically relevant changes in clinician-reported and, to a lesser extent, patient-reported functional outcomes in schizophrenia. Boden and colleagues (2009) found that symptom remission had adequate discriminatory capacity for determining good functioning (as defined by objective measures) from poor functioning in a FEP sample. Furthermore, individuals with remitted symptoms may require less support in activities of daily living and require less health care resources (Helldin, Kane, Karilampi, Norlander, & Archer, 2007).

These findings (discussed further in following sections) support the assertion that symptom remission may in fact be a prerequisite for social and functional gains (Andreasen et al., 2005; Robinson et al., 2004; van Os et al., 2006a).

Relapse: clinical phenomenology and correlates.

Unfortunately, despite the fact that many will achieve symptomatic remission following an initial psychotic episode, relapses are frequent. Relapse rates of 21- 33% are reported within one year of initial hospitalization, with the rates increasing up to 40% by three years (Chen et al., 2005; Ucok, Polat, Cakir, & Genc, 2006) and to over 90% within 5 years of initial treatment response (Perkins et al., 2005). Accordingly, relapse prevention is a primary goal of treatment in FEP. Relapse following an initial psychotic episode is associated both with subjective experiences of despair, hopelessness and lack of control as well as an increased risk of developing treatment resistant symptoms (Birchwood & Spencer, 2001). Indeed, the proportion of patients who become treatment resistant or only partially responsive to antipsychotic medications increases several-fold (up to 30-60%) following the initial episode (Lieberman, 1999; Lieberman et al., 1993). Decreases in medication response during successive illness episodes, which may represent either illness progression or development of tolerance to antipsychotic treatment effects, have been shown to be accompanied by more residual positive symptoms, an increase in negative symptoms, as well as decreased levels of functioning (Lieberman et al., 1996). Research demonstrating that the likelihood of illness chronicity increases with each subsequent episode highlights the importance of relapse prevention and clinical intervention early in the course of a psychotic illness (Wiersma, Nienhuis, Slooff, & Giel, 1998).

In FEP, increased likelihood of symptom remission has been found to be associated with patient characteristics upon treatment presentation including shorter DUP (Addington & Addington, 2008b; Emsley et al., 2006; Emsley et al., 2007; Simonsen et al., 2007), female sex (Szymanski et al., 1995), later age at onset (Malla et al., 2006; Simonsen et al., 2007), better premorbid adjustment (Addington & Addington, 2008b; Malla et al., 2006), and lower baseline symptom levels (Addington & Addington, 2008b; but not Emsley et al., 2006; Novick et al., 2007). On the other hand, clinically useful predictors of long-term relapse risk have been difficult to determine (Bradford et al., 2003). However, variables during the course of treatment including medication adherence and substance abuse have shown significant associations with both risk of relapse and likelihood of symptom remission.

Medication nonadherence is one of the largest impediments to achieving optimal symptom outcomes (Nasrallah & Lasser, 2006) and is one of the strongest factors associated with relapse in schizophrenia (Davis, 1975; Fenton et al., 1997; Kane, 1999). High rates of medication discontinuation have been reported in early psychosis, with approximately 60% of individuals becoming nonadherent within the first year of treatment (Coldham, Addington, & Addington, 2002; Mojtabai, Lavelle, Gibson, & Bromet, 2003; Mojtabai et al., 2002). Furthermore, poor medication adherence during the first 6 months after an individual's initial presentation has been shown to strongly predict poor medication adherence throughout the first 2 years after treatment, and is associated with an episodic course of illness and involuntary readmission (Verdoux et al., 2000). In sum, a large proportion of individuals receiving treatment for psychotic disorders will become nonadherent to their medication regimes shortly after initial treatment, reducing the likelihood of symptom remission and increasing the risk of relapse.

Substance use disorders (SUDs) are also associated with failure to achieve symptom remission (Lambert et al., 2005), as well as a significantly increased risk of relapse which remains after controlling for medication adherence (Hides, Dawe, Kavanagh, & Young, 2006; Malla et al., 2008; Sorbara, Liraud, Assens, Abalan, & Verdoux, 2003; Wade et al., 2006). As many as half of patients receiving treatment for FEP will have a SUD (Addington & Addington, 2007; Lambert et al., 2005; Wade et al., 2006), with higher rates among younger clients, male clients, and those who are unemployed (Wade et al., 2005). Substance abuse during recovery from FEP is also associated with disengagement from treatment (Schimmelmann et al., 2006). Wade and colleagues (2007) found in a 15-month prospective follow-up that individuals with heavy SUD had significantly poorer symptom and functional outcomes as compared to individuals with no SUD as well as compared to individuals with mild SUD, after controlling for the effects of sex, DUP, and medication adherence. This highlights the importance of SUD screening for all individuals entering care for early psychosis, and recommends timely intervention to educate clients about the risks associated with persistent substance use.

Interventions targeting symptom remission and relapse.

Interventions which facilitate treatment engagement during the critical period and address barriers to symptom remission following an initial psychotic episode have the potential to make considerable impact on an individual's recovery trajectory. There are a number of cognitive-behavioral interventions that have now shown promise in reducing acute symptom levels (Lewis et al., 2002a; Lewis et al., 2002b; Tarrier et al., 2004), improving attitudes towards antipsychotic medications (Uzenoff, Perkins, Hamer, Wiesen, & Penn, 2008), and reducing cannabis use (Edwards et al., 2006) in early psychosis. Psychosocial

interventions aimed at reducing rates of relapse and rehospitalization in FEP have had less success. Individual cognitive behavior therapy has shown minimal efficacy in reducing relapse and hospitalization (Penn, Waldheter, Perkins, Mueser, & Lieberman, 2005). However, some multimodal (Gleeson et al., 2009) and family therapies (Zhang, Wang, Li, & Phillips, 1994) have reported benefits in relapse prevention.

In sum, cognitive-behavioral therapies and other psychosocial interventions during the critical period have the potential to improve outcomes and facilitate the goal of timely symptom remission and effective illness management strategies. Relapse prevention and symptom remission are central goals in early intervention due to their association with illness course and a range of social and functional goals. In the next section, factors impacting social and functional recovery will be explored in more depth.

Maximizing social and functional recovery.

A final central goal of early intervention is improving functional outcomes and subjective experiences fundamental to the notion of ‘recovery.’ In addition to freedom from persistent psychotic symptoms and symptomatic relapse, additional essential components of recovery from psychotic illnesses include satisfaction with life and suitable functioning in everyday life (Harvey & Bellack, 2009). However, a majority of individuals with early psychosis experience significant social and functional impairments which persist even after symptoms remit (Gupta et al., 1997; Robinson et al., 2004; Tohen et al., 2000). Whereas most individuals recovering from a first psychotic episode who function well are free from symptoms, a large proportion of individuals who experience a symptomatic remission fail to meet functional recovery standards (Wunderink, Sytema, Nienhuis, & Wiersma, 2009). Indeed in studies examining recovery trajectories, reported rates of functional recovery

(including social, occupational, and independent living goals) are consistently lower than rates of symptomatic remission (Cassidy et al., 2009; Crumlish et al., 2009; Emsley et al., 2006; Menezes et al., 2009; Petersen et al., 2008; Whitehorn, Brown, Richard, Rui, & Kopala, 2002; Wunderink et al., 2009).

Social and occupational functioning.

A wide array of measures of social and occupational functioning have been developed, and these include both subjective and objective measures. Notably, however, subjective measures (including ratings of feelings, thoughts and views on one's situation) and objective measures (i.e. facts about the situation which can be objectively and unequivocally assessed) of social and functional outcomes have shown only weak correlations (Priebe, 2007). Whereas the low association between objective situations and subjective appraisal has led some to discredit subjectively-assessed status in psychotic disorders, these discrepancies may fluctuate with the illness course and provide important information about recovery experiences. For instance, Priebe and colleagues (Priebe, Roeder-Wanner, & Kaiser, 2000) found that although a sample of first-admitted schizophrenia patients had favorable objective indicators of quality of life in comparison to both in- and out-patients with chronic schizophrenia, the first-admitted patients endorsed lower subjective quality of life than both of the other groups. The authors suggest that these findings may reflect the recency of illness onset for individuals with FEP who have not yet had time to adapt to distressing symptoms and changes in life circumstances. Furthermore, individuals operating at similar functional levels (i.e. engaging in the same amount of work or school activities) may be bothered differentially by symptoms, and may or may not derive a sense of fulfillment from their

occupational activities. Therefore both objective and subjective reports of functioning are important and should be contextualized accordingly.

Quality of life, one of the most commonly utilized constructs used to discuss social and functional status, is typically assessed using measures with both subjective and objective components. Reduced quality of life has been reported for individuals who have recently experienced a first psychotic episode in comparison to non-clinical control samples using both subjective and objective evaluations (Addington, Young, & Addington, 2003b; Law et al., 2005). Among individuals with FEP, poor quality of life has been found to be associated with high levels of negative (Browne et al., 2000; Ho, Nopoulos, Flaum, Arndt, & Andreasen, 1998; Sim, Mahendran, Siris, Heckers, & Chong, 2004) and depressive (Law et al., 2005; Priebe et al., 2000; Sim et al., 2004) symptoms, with negative symptoms typically showing stronger associations with objective indices and depressive symptoms showing stronger associations with subjective indices (Górna, Jaracz, Rybakowski, & Rybakowski, 2008; Malla et al., 2004). This is supported by Cassidy and colleagues' (2009) finding that symptom remission as defined by remitted positive symptoms alone did not significantly predict objective functioning, however when severity of negative symptoms was added, predictive validity increased. Thus, not only may social and functional outcomes show considerable heterogeneity deriving from differences between subjective and objective means of assessment, but different outcome measures may be impacted differentially by symptoms and premorbid factors, particularly by negative symptoms. For instance, in a review of early intervention studies for FEP, Malla and colleagues (2005) identified the following predictors of poor vocational adjustment: poor premorbid adjustment, negative symptoms at initial assessment, concurrent psychotic and negative symptoms, and poor

global cognitive functions. Likewise, predictors of social and community functioning included negative symptoms, premorbid adjustment, medication adherence, residual symptoms, and cognitive functions. And Siegel and colleagues (2006) found that overall functioning in FEP (including social, vocational and community functioning) was predicted by level of education and level of functioning at intake in addition to positive, negative and depressive symptoms at intake.

Difficulties in social and occupational functioning in early psychosis may be explained by a number of experiences common to FEP in addition to persistent symptoms. Individuals recovering from an initial psychotic episode frequently have reduced social networks (Grant, Addington, Addington, & Konnert, 2001; MacDonald, Hayes, & Baglioni, 2000), which may result from losing touch with old friends due to concerns of real or perceived stigma, as well as a desire to distance oneself from harmful lifestyles or activities (MacDonald, Sauer, Howie, & Albiston, 2005). Furthermore, there is some evidence that social cognitive impairments widely observed in individuals with more chronic illness courses (including impaired theory of mind, affect recognition and social cue perception) are present at the time of the first episode (Addington, Penn, Woods, Addington, & Perkins, 2008; Bertrand, Sutton, Achim, Malla, & Lepage, 2007; Pinkham, Penn, Perkins, Graham, & Siegel, 2007). Finally, individuals recovering from an initial psychotic episode frequently experience disruptions in work or school functioning at the time of illness onset. Unemployment rates are significantly higher for individuals recovering from FEP than in a comparable general population (Killackey, Jackson, Gleeson, Hickie, & McGorry, 2006), the consequences of which include increased reliance on other sources of support (i.e. family

and/or public welfare), downward social drift, and loss of momentum in the development of occupational interests and development during early adulthood.

These facets of social and occupational functioning are therefore central aspects of recovery in early psychosis. Both financial strain as well as the size and quality of one's social network have shown independent contributions to objective functional outcomes in FEP (Mattsson, Topor, Cullberg, & Forsel, 2008). Employment status has been associated with self-reported (Sim et al., 2004) and clinician-rated (Turner et al., 2009) quality of life in FEP, as well as quality of life and self-esteem among individuals diagnosed with schizophrenia (Marwaha & Johnson, 2004). Furthermore, social support has shown strong associations with overall functioning in FEP (Erickson, Beiser, Iacono, Fleming, & Lin, 1989; Górná et al., 2008), and strong support networks may impact other positive aspects of functioning, including medication adherence (Rabinovitch, Bechara-Evans, Schmitz, Jooper, & Malla, 2009). Therefore re-establishing social, work, and family relationships are a crucial step towards functional recovery in FEP (Edwards & McGorry, 2002).

Subjective experience of recovery.

In addition to quality of life and related social and occupational goals, there are other subjective experiences in the critical period that are important to assess in evaluating recovery status. On the one hand, this includes relief from negative emotional sequelae related to one's illness. Individuals with recent-onset illnesses may experience feelings of loss or disruption in their life, self-blame and guilt, worries about the reactions of friends and family members to their illness, and the fear and reality of social stigma (Miller & Mason, 2005; Tarrier, Khan, Cater, & Picken, 2007). Given the prevalence of traumatic experiences accompanying FEP (Conus, Cotton, Schimmelmann, McGorry, & Lambert, 2007; Mueser &

Rosenberg, 2003), symptoms of PTSD, depression, social anxiety disorder, low self esteem and suicidality are all too common (Addington, Addington, & Patten, 1998; Birchwood et al., 2006; Morrison, Frame, & Larkin, 2003).

On the other hand are components described by Mays (2004) as comprising ‘psychological recovery’, a concept distinguished from the aforementioned concepts of ‘clinical’ or ‘social’ recovery and defined as the “process of developing ways to understand and manage psychotic experiences and regain some sense of structure in one’s life” (Mays, 2004 p. 247). Indeed, there is some evidence that psychological well-being (a multi-dimensional construct pertaining to feelings of autonomy, environmental mastery, personal growth, and self-acceptance) may be lower for individuals with FEP than for matched peer comparison groups (Uzenoff et al., in press). Accordingly, subjective experiences fostered in recovery include adaptation to one’s illness (Jackson, McGorry, & Edwards, 2001a), increased feelings of hope and empowerment (Brown, Rempfer, & Hamera, 2008), building a positive personal and social identity, and becoming active in one’s own recovery (Mays, 2004).

Interventions targeting social and occupational outcomes and subjective experiences of recovery.

A number of psychosocial interventions have shown promise in impacting aspects of functional recovery in FEP. An open trial of Jackson and colleagues’ Cognitively Orientated Psychotherapy for Early Psychosis (COPE) was associated with significant benefits in a measure of adaptation to illness (Jackson et al., 1998; Jackson et al., 2001b). Cognitive-behavioral therapies have also been associated with reduced experience of traumatic sequelae following a first episode of psychosis (Jackson et al., 2009) and decreased

suicidality and improvements in hopelessness and quality of life (Power et al., 2003). The Graduated Recovery Intervention Program (GRIP), a cognitive-behavioral therapy program designed to facilitate functional recovery in early psychosis, has shown preliminary benefits in social functioning and goal attainment (Waldheter et al., 2008). And with respect to objectively assessed functioning, targeted vocational interventions have been associated with positive vocational outcomes, including increased employment rates and job longevity (Killackey, Jackson, & McGorry, 2008; Major et al., 2009).

Functional remission.

Unlike the consensus-definition of symptom remission, there is no agreement on what might define ‘functional remission,’ nor a gold standard assessment for measuring functional outcomes (Mausbach, Moore, Bowie, Cardenas, & Patterson, 2009). One approach (e.g. Lambert et al., 2006) focuses primarily on objective markers and defines functional remission as at least six months of full- or part-time vocational functioning (i.e. employment or involvement in school activities) along with independent living. Alternately, Harvey and Bellack (2009) suggest that both objective and subjective evaluations of productive activities, residential and self-maintenance activities, and social relationships comprise essential domains of functioning to be considered as criteria for functional remission. Likewise, Liberman and Kopelowicz (2002) suggest a definition of functional recovery including independent living, social engagement with peers and subjective satisfaction with life, along with the central recovery aims of resilience and ability to cope with life stressors. Each of these approaches reflects a unique definition of functional recovery, and is accompanied by limitations related to the subjective and/or objective measurements involved. One notable tradeoff is that although objective measures usually boast good face validity, they tend to be

more susceptible to ceiling effects and are slower and more difficult to change (Priebe, 2007).

Beyond establishing domains included in a remission definition, there is an additional challenge involved in specifying the level of functioning required for remission. For instance, whereas designating a ‘healthy range’ of functioning is difficult because it requires a variety of value judgments about the types of interactions and involvements one should have with one’s environment, a definition emphasizing return to premorbid functioning is complicated by the fact that oftentimes premorbid functioning itself may have been impacted by the illness prodrome (Harvey & Bellack, 2009). And finally, in determining the time frame for functional remission, it is necessary to consider the fact that attaining and maintaining functional gains might require a longer time period than does symptom remission, given the differential responsiveness of negative and cognitive symptoms to antipsychotic medications, both of which have shown to significantly predict a variety of social and functional outcomes (Dickerson et al., 2008; Mueser, Douglas, Bellack, & Morrison, 1991; Robinson et al., 2004).

Finally, efforts to define functional remission have gone hand in hand with attempts to define a broader concept of recovery that incorporates both symptom and functional components (Lieberman, 2002; Torgalsboen & Rund, 2002). In this model, a UCLA group developed a definition of recovery derived from an aggregated body of empirical research including components generally supported by the first-hand experience of a panel of consumers, practitioners, and researchers (Lieberman, Kopelowicz, Ventura, & Gutkind, 2002). Components of this recovery concept include symptom remission, vocational functioning, independent living, and social relationships over a 2 year period. However, across the literature examining global outcomes in FEP, various definitions of recovery have

been adapted. Some have used single established scales (including the Role Functioning Scale, Clinical Global Impression Scale, Social and Occupational Functioning Assessment Scale, and Strauss-Carpenter Scale) as a proxy for global outcome and/or recovery (Lucas, Redoblado-Hodge, Shores, Brennan, & Harris, 2008; Menezes et al., 2009; Whitehorn et al., 2002; Whitty et al., 2008), whereas others have used Andreasen et al.'s (2005) consensus symptom remission criteria in addition to a set of a priori functional goals (such as paid or unpaid full- or part-time employment, involvement in school or head, independent living, ability to perform day-to-day living tasks without supervision, and social interactions outside the family at least once per week) (Lambert et al., 2006; Robinson et al., 2004). Still others have used the consensus remission criteria in addition to an established proxy scale of functioning (i.e. the Groningen Social Disabilities Schedule) (Wunderink et al., 2009), or idiosyncratic symptom and functional criteria (Petersen et al., 2008; White et al., 2009).

Predictors of combined symptom and functional recovery include baseline negative symptom levels (Petersen et al., 2008; White et al., 2009; Whitty et al., 2008), DUP (Robinson et al., 2004; White et al., 2009; Whitty et al., 2008; Wunderink et al., 2009), years spent in education (Whitty et al., 2008), premorbid adjustment (Lucas et al., 2008; White et al., 2009), baseline social role functioning (Wunderink et al., 2009), baseline medication adherence (Petersen et al., 2008), and cognitive functioning (Robinson et al., 2004). It should be noted, however, that it is difficult to interpret these findings given the heterogeneity of recovery definitions specified. Notably, rates of achieving both symptom and functional remission have generally been lower than those of achieving either symptomatic or functional recovery alone (Bertelsen et al., 2009; Lambert et al., 2006; Petersen et al., 2008; Robinson et al., 2004; Wunderink et al., 2009).

Summary: rationale and aims for early intervention.

Early intervention aims to reduce duration of untreated psychosis, facilitate symptom remission, prevent relapse and treatment resistance, and improve social and functional outcomes, including a subjective experience of recovery. Reducing DUP has shown associations to improvements in both symptom and functional outcomes, highlighting the importance of early identification of psychotic illnesses and swift engagement in treatment. Relapse prevention and symptom remission are central goals in early intervention due to their association with illness course and a range of social and functional goals. There is a strong body of evidence suggesting that adherence to medication regimens and abstinence from substance use decreases the likelihood of relapse and poor illness course during the critical period. Therefore, fostering positive attitudes towards treatment and medications through psychoeducation and other psychosocial interventions during the critical period is an essential treatment goal. Furthermore early intervention is needed to help individuals with the tasks of social and functional recovery that often persist once symptoms have remitted. The subjective experience of recovery includes building adaptive coping skills in the light of illness-related stressors and losses, and helping individuals to re-engage with the tasks of daily life that frequently have been disrupted.

Therefore, early intervention is called for based on a firm base of evidence linking treatment in the critical period to improved outcomes. But it is also based on an imperative from the research and consumer communities (i.e., from clients with early psychosis) to ameliorate suffering and further a model of care in which there is both the possibility and expectation of recovery. Treatment of FEP has previously been beleaguered by systemic problems in standard psychiatric care including delays in initial treatment, traumatic

experiences in the process of hospitalization, and poor treatment engagement and continuity of care (Edwards & McGorry, 2002; Garety & Rigg, 2001; Mueser & Rosenberg, 2003; Norman & Malla, 2001; Yung, Organ, & Harris, 2003). These concerns highlight the potential for service changes to greatly improve the standard of care for early psychosis.

State of Early Intervention Treatment Programs for Early Psychosis

Early intervention in psychosis has seen increased specialization and continues to emerge as a treatment modality defined by unique treatment models and techniques (McGorry, 2004; Owen, 2003). International clinical practice guidelines for the treatment of early psychosis have now been established, and these emphasize the key principles of early identification/detection, community-wide education, phase-specific programs of care, family involvement in care, and the responsible use of antipsychotic medications along with psychosocial interventions (IEPAWG, 2005). At present, changes in service delivery to meet these principles have been heralded primarily by the development of specialized treatment centers and programs around the globe. These programs are unique in that they target many of the issues that are particularly problematic among young individuals experiencing psychosis through a variety of therapeutic approaches, emphasizing both symptomatic and functional recovery.

Early intervention services in general are distinguished from standard care by both the structure of their services and by their content (McGorry, 2004). They focus on early detection and phase-specific treatment and take the form of treatment centers, service initiatives, and research programs dedicated to providing comprehensive services to young people and their families. Some estimate that close to 200 such efforts are underway

worldwide (IEPA, 2008; McGorry, Killackey, & Yung, 2007a). This treatment model and the evidence base for it will be examined in the next section.

The multi-element treatment model.

Multi-element treatment centers provide multiple services under one roof, offering comprehensive psychosocial and pharmacological interventions from dedicated first-episode clinics. Most multi-element programs adhere to an assertive case management model and prescribe low doses of atypical antipsychotic medications as front-line pharmacological treatment, in keeping with international treatment guidelines. Other treatment elements, including individual, group and family therapy, are offered to varying extents within different programs. Some multi-element programs have an additional goal of reducing DUP through community education and early detection initiatives.

The Early Psychosis Prevention and Intervention Centre (EPPIC) in Australia, one of the best-established and empirically evaluated multi-element treatment centers, is one of few such centers to incorporate a first-episode dedicated inpatient unit in addition to mobile assessment services, in- and out-patient case management, and individual, group and family therapy (McGorry, Edwards, Mihalopoulos, Harrigan, & Jackson, 1996). The Prevention and Early Intervention Program for Psychosis (PEPP) (Malla, Norman, McLean, Scholten, & Townsend, 2003) (which also includes inpatient services) and Calgary Early Psychosis Treatment Program (EPP) (Addington, Leriger, & Addington, 2003a) in Canada are additional examples of established early intervention centers.

Comprehensive care may also be delivered via multi-element models of community care, in which specialized early psychosis services are offered as supplements to treatment as usual at generalized mental health care clinics, or as assertive outreach components in health

care systems in which no such services previously existed. Among models of community care, the OPUS trial in Denmark has developed an integrated treatment consisting of an enriched assertive community treatment (ACT) program, individual or group social skills training, and individual and family psychoeducation that has been rigorously evaluated in a randomized controlled trial (Jorgensen et al., 2000). Other programs, such as the Lambeth Early Onset (LEO) Team (Craig et al., 2004) and the Croyden Outreach and Assertive Support Team (COAST) (Kuipers, Holloway, Rabe-Hasketh, & Tennakoon, 2004) in the U.K. have developed similar treatments in the community using the assertive outreach model. The Swedish Parachute Project (Cullberg, Levander, Holmqvist, Mattsson, & Wieselgren, 2002) is a collaboration among multiple psychiatric clinics to implement comprehensive early psychosis services including individual and family therapy and overnight crisis homes as an alternative to hospitalization. And the Early Treatment and Identification of Psychosis (TIPS) Project (Johannessen, Larsen, McGlashan, & Vaglum, 2000; Johannessen et al., 2001) in Norway and Denmark investigated whether supplementing multi-element care with early detection and community outreach efforts was associated with better long-term outcomes. (For further description of many of these programs, see Edwards, Harris, & Bapat, 2005; Edwards & McGorry, 2002; Penn et al., 2005).

Across the literature, ‘early intervention’ can inform the development of services with the following different aims: a) preventing the emergence of psychosis through pre-psychotic interventions, b) detecting hidden morbidity in the community by identifying untreated cases of the disorder, and c) improving outcomes in people with established psychosis by facilitating and consolidating recovery (Singh, 2007). Although considerable research is emerging in the service of evaluating the first two aims, the present study focuses

primarily on the evidence base for treatments targeting the final aim alone. Accordingly, in this study, the phrase “early intervention” refers to intervention early *after* the emergence of psychosis; that is, treatment early in the course of an identified psychotic illness aimed at secondary prevention.

Empirical evidence.

Multi-element models of early intervention for psychosis have been included in several empirical reviews to date. Penn and colleagues’ (2005) review of psychosocial interventions for FEP identified benefits associated with multi-element treatment in a wide range of symptom and functional outcomes, including symptom reduction and/or remission, improved quality of life and social functioning, low rates of inpatient admissions, less time spent in the hospital, decreased substance abuse, fewer self-harm behaviors, and reduced trauma secondary to psychosis and hospitalization. The authors caution that these results pertain primarily to one-year outcome evaluations, and that due to the uncontrolled design of most trials evaluated, findings should be interpreted with caution.

Malla and colleagues’ (2005) review found that in uncontrolled studies, rates of remission between 75-85% have been reported for specialized early intervention, although they note that these rates are similar to those observed for individuals treated in routine care among the studies they reviewed. Most studies in this review reported significant improvements in positive, negative, depressive, and anxiety symptoms, with change in negative symptoms more limited than that reported for positive symptoms. Malla and colleagues conclude that specialized early intervention is associated with modestly superior benefits including high rates of remission, better control of symptoms, and greater adherence and retention in treatment, as well as various benefits related to satisfaction, quality of life,

and broadly defined functional outcomes. They found less evidence of differential benefits for vocational outcomes in programs that did not specifically target this domain.

In a meta-analysis, Harvey and colleagues (2007) examined psychosocial interventions for FEP including both multi-element programs as well as well-defined specific psychosocial treatments across multiple sites and studies. This analysis found benefits in both symptom and functional domains for adjunctive psychosocial interventions. For individuals receiving enriched interventions, including those attending a multi-element treatment program for at least 6 months, the mean effect sizes for reduction of positive, negative, and overall symptom levels as well as functional improvement at follow-up, were significantly greater for enriched intervention than for standard care.

Since these reviews, multi-element treatment centers for early psychosis and models of community care have been consistently associated with positive and negative symptom reduction and/or remission in randomized controlled trials (Petersen et al., 2005a; Petersen et al., 2005b; Petersen et al., 2008; Thorup et al., 2005) and uncontrolled pre-post trials (Cocchi, Meneghelli, & Preti, 2008). Other comparisons (Cullberg et al., 2006; Garety et al., 2006; Rosenbaum et al., 2005) have reported no differences between the specialized interventions and parallel control groups. Benefits for multi-element treatment have also been reported in improved quality of life and social functioning (Cocchi et al., 2008; Garety et al., 2006; Petersen et al., 2005b) and decreased substance abuse (Lambert et al., 2005; Petersen et al., 2005a; Petersen et al., 2005b).

Although relapse rate comparisons are difficult given varying definitions of relapse (i.e. hospital admission, increase in symptoms, etc.), relapse rates reported from early intervention trials (29-36%) have been significantly lower than those reported by centers

providing non-specialized care to FEP clients (over 50%) and in the broader literature for first-episode clients treated in routine care (55-70%) (Addington, Addington, & Patten, 2007a; Malla et al., 2008). While these data suggest the benefits of early intervention, it is difficult to say to what extent these improved outcomes reflect the effectiveness of the specific interventions used above and beyond the other salutary correlates of earlier treatment (Addington et al., 2007a).

Reduced inpatient and emergency service utilization translates to cost-savings for many of these health care systems. The introduction of the PEPP program was accompanied by a significant mean reduction in costs per case with respect to hospital bed use and hospital emergency service usage, however analyses failed to confirm that these savings could be attributed specifically to the introduction of the early intervention services (Payne, Malla, Norman, Windell, & Brown, 2006). Likewise, mean direct costs for individuals treated in the experimental arm of the Parachute Project were approximately half those for individuals treated in the prospective comparison group (Cullberg et al., 2006). Since the Parachute group had substantially increased outpatient service usage but decreased inpatient service usage, this suggests that the savings reflect the extent to which inpatient hospitalizations drastically increase treatment costs (though it should be noted, however, that indirect costs were not assessed in that study). Cost savings related to reductions in inpatient service usage have also been reported for early intervention services at EPPIC (Mihalopoulos, McGorry, & Carter, 1999) as well as through the OPUS trial of assertive community care (Bertelsen et al., 2008), for which there was evidence that the savings were directly related to reduced use of supported housing.

A recent economic evaluation of EPPIC provides one of the most dramatic demonstrations of cost savings. In a matched historical control group design, a cohort of 65 individuals was followed for eight years after initial treatment via either EPPIC or general mental health services (Mihalopoulos, Harris, Henry, Harrigan, & McGorry, 2009). EPPIC treatment was associated with superior outcomes in several clinical and functional domains at one-third of the annual treatment cost of standard public mental health services. Individuals receiving care through EPPIC were significantly more likely to be in symptomatic remission than the matched cohort, and 56% were involved in paid employment in the past two years as opposed to 33% of controls. Indeed, mental health care costs are incurred not only by psychological and psychiatric services, but across sectors including primary healthcare, school systems, and juvenile justice and social service agencies. Costs to the family of the individual in treatment include direct costs (e.g. travel) as well as indirect costs, including care givers' ability to work and the family's and patient's lost earnings (Costello, Copeland, Cowell, & Keeler, 2007). Further economic evaluations of early intervention programs are currently underway and may be essential in swaying policy for future service development (McCrone & Knapp, 2007).

Overall, multi-element treatment for early psychosis has been associated with improvements in symptom and functional domains as well as relapse prevention. In reviewing the empirical evidence base, there are several methodological concerns with should be taken into consideration. First, the durability of gains needs to be further explored. Caveats noted in earlier reviews (i.e. Penn et al., 2005) regarding the predominance of publications reporting only short-term outcomes are becoming less salient, as benefits conferred by multi-element programs beyond one year have been reported (Cassidy, Schmitz,

Norman, Manchanda, & Malla, 2008; Craig et al., 2004; Garety et al., 2006; Joa et al., 2008; Malla et al., 2008; Petersen et al., 2005a; Thorup et al., 2005). Bertelsen and colleagues (2008) recently reported on 5 year-outcomes of the OPUS trial, following the 3-year period after which the enhanced early intervention services were withdrawn, and found that the previously noted benefits in symptom reduction and global functioning improvement (Petersen et al., 2005a) were no longer present. However, in comparison to individuals treated in routine care, those who received the early intervention services still had an advantage in percentage utilizing supported housing as well number of hospital days over the course of the study. Overall, this suggests that while enhanced treatment improved functional outcomes, there was little symptomatic improvement that endured once services were withdrawn. Likewise, individuals followed 1-2 years following discharge from EPP continued to demonstrate functional improvement, as well as improvement in negative symptoms, despite no further improvement in positive symptoms (Addington & Addington, 2008a).

One of the longer term evaluations of multi-element treatment has come from EPPIC, wherein approximately 8 years after treatment initiation, individuals treated at EPPIC had lower levels of psychotic symptoms, were more likely to be in remission, and had a more favorable course of illness than did a historical control comparison group treated in community care (Mihalopoulos et al., 2009). Longer term follow-ups from other initiatives will be required to better characterize the impact of treatment transitions following specialty care in the critical period.

Secondly, as noted in other recent reviews of this area (Edwards et al., 2005; Penn et al., 2005), much of the research on multi-element programs is based on quasi-experimental

designs comprising historical and parallel comparison groups, or on single-group designs, which track the progress of one group over a specified period of time. Recent publication of data from the OPUS (Bertelsen et al., 2008; Petersen et al., 2005a; Petersen et al., 2005b; Thorup et al., 2005), LEO (Craig et al., 2004; Garety et al., 2006; Power et al., 2007), and COAST (Kuipers et al., 2004) trials represents a promising trend in the scientific evaluation of multi-element programs. Nonetheless, there has been little randomized controlled research in this area (Marshall & Lockwood, 2003; Marshall & Rathbone, 2006) and the body of findings needs to be interpreted with caution.

Another important consideration in evaluating these programs is the varying degree to which interventions are standardized and replicable (e.g. Craig et al., 2004; Kuipers et al., 2004), which may pose a threat to the external validity of the findings. For one, treatments offered as part of randomized clinical trials may fundamentally differ in type or quality from those offered in routine clinical settings (e.g. Slade, Holloway, & Kuipers, 2003). Likewise, the use of assessors who are not blinded to treatment condition (e.g. Petersen et al., 2005a; Petersen et al., 2005b) may be associated with biased ratings on a variety of clinical outcomes and should be noted with caution. Additionally, services vary in type, quality and quantity between these various multi-element programs. As Birchwood comments (author's reply to Manchanda, Norman, & Malla, 2004), the focus in this area of early intervention has largely been on engagement of clients and on the initial challenges of service development and provision within existing healthcare systems: it is perhaps most accurate to say that these programs have largely served as a vehicle for intervention, rather than comprising interventions themselves. Indeed, with the exception of EPPIC, which has tested several specific component interventions in controlled trials (see Edwards, Hinton, Elkins, &

Anthanasopoulos, 2003; Edwards, Wade, Herrman-Doig, & Gee, 2004; Jackson et al., 2001b; Power et al., 2003), few of the programs report utilizing treatment manuals or fidelity assessments for the therapies delivered within their multi-element programs. This only contributes to difficulties in replicating the services offered by these programs.

Finally, the breadth of services offered by EPPIC and other initiatives highlights the potentially complex mechanisms through which multi-element services confer benefits. It is yet unclear which ‘key ingredients’ are responsible for improved outcomes, including functional gains that are frequently more elusive. Harvey and colleagues (2007) speculate that the superior effect sizes for positive symptom improvement in enriched care above and beyond those reported in standard care in their meta-analysis may be explained by any number of mechanisms specific to multi-element programs, including better treatment adherence, better engagement early in treatment, greater involvement or inclusion of family in treatment, increased attention to specific personal or social goals, or increased attempts to reduce drug and alcohol use through case management and therapy. Notably Petersen and colleagues (2005a) report that the significant advantage in positive symptom reduction at both 1 and 2 years for individuals in integrated treatment versus standard care in the OPUS trial was not accounted for by differences in use of antipsychotic drugs, although individuals in the integrated condition were less likely to discontinue treatment for at least a month than were individuals in standard care. A variety of mechanisms may also be proposed for reduction in substance use, which has been observed in the OPUS (Petersen et al., 2007), EPP (Addington & Addington, 2001b), and EPPIC (Lambert et al., 2005) programs in the absence of a specialized substance abuse intervention.

There is some evidence that increased attention and resources devoted to treatment engagement may be a potent element of comprehensive treatment for early psychosis. In narrative accounts, individuals recovering from first-episode psychosis have articulated a preference for spending time with people who had similar experiences, who understood them, and with whom there was a mutual trust (MacDonald et al., 2005). Therefore a treatment environment geared towards the particular developmental needs of a first-episode population may be more attractive to these individuals and successful in engaging them in treatment. Additionally, because individuals with early psychosis often have reduced social networks and are more likely to count service providers in their support networks (MacDonald et al., 2000), there is a substantial potential for mental health providers to impact early treatment attitudes including attitudes towards medication and substance use behaviors. Good treatment engagement additionally allows for more consistent and frequent assessments, which can increase providers' ability to monitor clinical status, including changes in medication side effects or suicidality (Addington, Williams, Young, & Addington, 2004b; IEPAWG, 2005).

Of particular interest are findings that multi-element treatment is associated with improvements in negative symptoms, given the fact that such symptoms are typically more treatment refractory. A historically controlled investigation of EPPIC found sustained improvement in negative symptoms in the EPPIC group that was not observed for controls, although levels of depressive symptoms remained relatively low and constant for both groups, suggesting that the reduction in negative symptoms was not due to a decrease in depression (although this study did not control for doses or duration of antipsychotic medication treatment) (McGorry et al., 1996). Harvey and colleagues (2007) reported in

their meta-analysis that enriched interventions reduced negative symptoms by a greater magnitude than standard care. And perhaps most noteworthy, in the OPUS RCT, negative symptoms showed significantly greater reductions in the integrated treatment group as compared to standard care (Petersen et al., 2005a). Notably, the integrated group also received significantly lower doses of second generation antipsychotics. Limitations of the OPUS findings include the fact that raters were not blinded and negative symptom ratings only demonstrated moderate inter-rater reliability. Thorup et al (2005) conducted an analysis on the 2-year follow-up data in this trial to examine the influence of different components of the integrated treatment on clinical outcomes, including the significant reductions in negative symptoms. The findings revealed important information on the relative efficacy of a variety of treatment components, including medication, social skills training, and multifamily groups. However, none of these treatment elements could independently account for the combined effects of the integrated treatment program as a whole.

The above findings highlight the difficulties posed by the current nosology by which schizophrenia is defined, and the likelihood that primary negative symptoms (or those which are core symptoms of the disorder and of insidious onset) and secondary negative symptoms (or those which may be attributed to extrinsic factors such as medication side effects, social deprivation or isolation, or psychological reactions to psychotic symptoms) (Carpenter, Heinrichs, & Wagman, 1988) may be differentially impacted by treatment (Arango, Buchanan, Kirkpatrick, & Carpenter, 2004). Thorup (2005) suggests that the negative symptom reductions in the OPUS findings are likely attributable to improved treatment planning, including lower doses of second generation antipsychotics and reduced incidences of inpatient readmission, whereas Harvey et al. (2007) speculate that increased attention to

individuals' social and environmental conditions, including social contacts, family relations, and educational or vocational pursuits may be responsible for the negative symptom reduction they reported. Mechanisms through which multi-element treatment may impact either primary or secondary negative symptoms are still unclear. However, evidence is also consistent with the possibility that a multimodal, comprehensive approach to treatment may indeed produce the greatest improvements in patient outcomes than isolated medical or psychosocial interventions alone (Lenroot, Bustillo, Lauriello, & Keith, 2003; Marder, 2000).

Challenges in multi-element service development.

The call for further research in multi-element treatment includes attempting to replicate services and generalizing findings beyond the extant programs. However, as highlighted in the review of findings in this paper, multi-element treatment thus far has flourished predominantly in a handful of Western European nations as well as in Australia, Canada, and the UK. The extent to which multi-element interventions can be widely implemented and integrated into existing mental health care systems around the globe is determined in large part by local political environments and healthcare infrastructures. And even in regions where the necessary institutional supports are in place, incorporating new treatments, policies, and service structures can pose a multitude of challenges. A closer look at systemic factors that facilitate comprehensive early intervention services, as well as those that serve as barriers, helps contextualize the body of published findings in this field and highlights challenges for future research.

Supportive system factors.

Research in multi-element treatment has flourished in several regions in which the government has dedicated funding and health care jobs to early psychosis care. The UK is an

exemplar of a nationalized health care system that has recently undergone restructuring with an emphasis on first-episode treatment with the result of substantially increased services. Following a 2000 National Health Service policy release, which identified mental health provision as one of the nation's top 3 priorities, a plan for the development of 50 new early intervention services over the course of several years was released. These service needs were influenced heavily by input from consumer advocacy groups that had identified a high level of dissatisfaction in services offered during the critical period (Joseph & Birchwood, 2005). Likewise, in Australia, state-directed initiatives have heralded significant increases in funding and services allocated to early intervention. For instance, the Early Intervention Worker initiative in Victoria allocated funds in each of the state's 21 geographically defined mental health regions for a mental health clinician dedicated to the early identification and treatment of serious mental disorders, including FEP, in young adults aged 16-25.

Access to epidemiological (or nearly epidemiological) samples of individuals seeking care for early psychosis is another systemic factor which has made research and service development in multi-element treatment possible. For instance, Australia has an integrated mental health service that mandates 24-hour, 7-day per week crisis intervention, assertive community care and acute inpatient care when needed. Consequently, in regions that are home to specialized early intervention services and in which there are few private practitioners, such as the EPPIC catchment area of Melbourne, nearly all individuals presenting for treatment for a first psychotic episode will receive specialized care (Conus et al., 2007).

Whether a clinic's catchment area is served by either one or multiple mental health care providers may change the illness severity and demographics of individuals presenting

for care. Indeed this is a source of selection bias in many studies, in that the most ill patients in a system where there are multiple providers may be funneled to specialty care, which therefore leads to poorer outcomes and higher attrition. Other considerations include the size of the center, as smaller or mid-size units have been found to work more effectively for this type of specialized mental health care than larger centers (Malla et al., 2007; Marshall, Lockwood, Lewis, & Fiander, 2004).

Systemic barriers in the US.

These concerns and others need be taken into consideration in furthering research and treatment agendas in the US, owing to political and organizational characteristics that distinguish this country from the others previously discussed. Although the US is home to approximately one fifth of the 30 early psychosis programs listed in an online directory by the IEPA (IEPA, 2008), at present no publications regarding early intervention services have originated from the US. Whereas service development in other English-speaking nations has formed an essential research base upon which successive efforts can be launched, there are significant differences between the mental health care policies and financing of other Westernized nations and those of the US that pose challenges to generalizing findings and disseminating practices.

The US is alone among developed nations in lacking a universal health care system. Although the country does have significant publicly funded components (namely Medicaid and Medicare) which cover approximately one quarter of the population, another 16% of the population (or 47 million people) are uninsured (Census Bureau, 2006). As most people in the US are covered by a health insurance plan related to employment, the increasing number of uninsured individuals represents people who cannot obtain health insurance through their

employer or are unable to afford individual coverage. An additional proportion of uninsured people in the US include individuals under the age of 30 who don't believe they need to purchase health care, and others who are eligible for Medicaid but have not applied.

Young people with psychotic disorders are at a particular disadvantage with regard to being insured. The likelihood of being covered by health insurance rises with income, and unemployment rates are significantly higher for individuals experiencing FEP than in a comparable general population (Killackey et al., 2006). Indeed, data from a large epidemiologic sample of FEP patients (N=525) found that 44% of this sample was uninsured, with 39% receiving private insurance and another 15% receiving either Medicaid or Medicare (Rabinowitz et al., 1998). In this sample, there was a trend wherein private insurance was associated with a greater likelihood of being hospitalized within 3 months of the onset of psychosis, being admitted voluntarily, and being admitted to a community hospital rather than a public hospital. In short, disparities in insurance coverage place individuals with early psychosis at a potentially significant disadvantage to receiving timely care.

Indeed, individuals with psychotic disorders have traditionally been among the most disadvantaged groups with respect to insurance coverage and service utilization. There is a gap between healthcare need and service utilization for individuals with severe mental illness, with one national survey indicating that three-fifths of such individuals did not received specialty psychiatric care within a 12-month period (McAlpine & Mechanic, 2000). As compared to individuals being treated for primary mood or anxiety disorders, individuals with schizophrenia and other psychotic disorders are less likely to belong to a health plan of any kind (i.e. either private or public) after controlling for sex, ethnicity, education, and

employment, and are nearly twice as likely to receive public assistance (i.e. Medicaid or Medicare) (Compton, Weiss, Phillips, West, & Kaslow, 2006). Therefore, lack of insurance serves as a primary barrier to receiving appropriate services (McAlpine & Mechanic, 2000).

US healthcare differs in other important ways from the majority of the Western nations that have piloted multi-element early intervention programs. For one, the US offers primary medical care through the three different (and at times competing) major specialty disciplines of general internal medicine, family medicine, and general pediatrics, rather than a single primary medical specialty (i.e. the ‘general practitioner’ model) (Halvorsen, 2008). This fragmentation poses challenges to broad-based educational interventions directed to non-psychiatric medical professionals aimed at identifying early psychosis and reducing treatment delays. Additionally, because data on the means by which individuals with early psychosis enter treatment has been gathered primarily from countries with nationalized healthcare systems and differently structured primary care provision, we still have a poor idea of what these pathways to care look like in nations like the U.S.

Another system-related factor in the US is the increasing privatization of community mental health centers, wherein services are contracted to not-for-profit agencies rather than provided directly by states or government municipalities. As a result, these centers are typically cost-conscious and less able to justify dedicating resources to employing clinical psychologists and other providers best trained in direct service provision of some of the component elements of comprehensive treatment for early psychosis, including cognitive-behavioral therapy for psychosis, medication adherence interventions, and treatments for comorbid conditions (Roe, Yanos, & Lysaker, 2006). In sum, lagging research progress on the multi-element treatment model in the US is further understood when taking into

consideration the multiple indices on which mental health care policy and service provision differ in the US from many of the countries with well-established early psychosis initiatives. Our challenge remains, however, to work within this infrastructure to contribute to the knowledge base regarding best practices and to act upon our commitment to a recovery model.

Summary: state of treatment for early psychosis.

A rapidly expanding body of research in multi-element interventions for early psychosis marks an international effort to address inadequacies in standard mental healthcare for this population, as well as a resounding affirmation of a recovery model which acknowledges the potential to ameliorate suffering and disability with timely intervention. Research to date in adjunctive psychosocial interventions for FE psychosis suggests that such treatments may help patients across stages of recovery on a number of different outcomes. Comprehensive multi-element interventions show promise to positively impact short-term outcomes following an initial episode of psychosis, such as clinical status and social functioning, as well as likelihood of relapse and hospital readmission. It is unclear how long these benefits persist, although there is limited data suggesting that functional improvements may outlast symptomatic improvement.

Multi-element treatment centers have typically utilized a quasi-experimental or pre-post design to evaluate a program's effectiveness, as has the majority of published research in this area. As Edwards and colleagues (2005) discuss, randomized experimental research with multi-element programs poses both logistical and ethical dilemmas, including community concerns regarding withholding comprehensive services from patients and negative feelings of staff who are providing control conditions. With pre-post designs, one

cannot control for factors such as spontaneous remission and the role of therapeutic attention. Thus, findings from uncontrolled trials must be interpreted with caution. Nevertheless, data emerging from interventions across multiple sites and countries have been encouraging and the evidence base at present certainly does not recommend against future attempts to model early psychosis care according to international guidelines for timely and comprehensive treatment. In order for policy and ideology to meet with respect to early intervention in psychosis, recovery-oriented interventions must be pushed to the forefront of treatment outcome research, especially in the US.

Overview of Current Study and Hypotheses

The purpose of this study is first, to describe the baseline characteristics and course of clinical and functional outcomes of an early psychosis cohort treated in a US-based multi-element treatment center, and second, to examine predictors of functional outcome one year after initiation of specialized treatment. The study will provide a naturalistic prospective follow-up of individuals with early psychosis consecutively treated at the Outreach and Support Intervention Services (OASIS) clinic affiliated with the University of North Carolina (UNC) Hospitals. Founded in 2005 (by Diana Perkins, MD, David Penn, PhD and Barbara Smith, LCSW), this clinic provides services to adolescents and young adults who are experiencing early psychosis, or who are at risk for developing psychosis. OASIS is a comprehensive multi-element treatment program, offering phase-specific treatments tailored to first-episode psychosis. Services are provided on- and off-site, including; psychiatric assessment, medication management, psychosocial assessment, individual therapy, family support, multifamily group, educational group, group therapy, case management, assertive outreach, crisis services, and recreational activities. OASIS is one of few multi-element

programs offered in the United States that is specially designed to meet the needs of young people experiencing early psychosis. The primary study aims are as follows:

Aim 1: Descriptive analysis of a US-based multi-element treatment center for early psychosis.

The first aim of this study is to characterize the population accepted for treatment at OASIS during its first three years of operation (June 2005-June 2008) on demographic variables including age at referral, sex, race, employment or schooling status, marital status, living situation, DUP, and insurance coverage. This information is collected routinely through the clinic and maintained in both paper charts as well as an electronic database. Only individuals referred for first-episode psychosis (including both affective and non-affective psychoses), rather than for prodromal symptoms, will be included in analyses.

These data will be compared descriptively to published samples at other established first-episode clinics including EPPIC (i.e. Conus et al., 2007; Henry et al., 2007), EPP (i.e. Addington & Addington, 2001b; Addington & Addington, 2008b; Addington et al., 2003a; Addington et al., 2004b; Addington et al., 2003b), and PEPP (i.e. Malla et al., 2002a; Malla et al., 2002b; Malla et al., 2003). To evaluate the representativeness of the sample treated at OASIS, a subsample of the study cohort will be compared to a sample treated in other North Carolina mental health care settings matched on age (18-30), insurance status (Medicaid/Medicare and self-pay), primary diagnosis (schizophrenia and other psychotic disorders) and number of previous hospitalizations. These data, available publicly from the NC Department of Mental Health (DMH), are part of routine outcome data collected statewide for individuals receiving Medicaid/Medicare/state-funded treatment. These two

samples will be compared on baseline global functioning and substance use as well as demographic variables including sex, ethnicity, living situation, and employment status.

Aim 2: One-year longitudinal evaluation of symptom, social and vocational outcomes for individuals treated at OASIS.

The second aim of this study is to examine whether the treatment offered at OASIS is associated with improvement on core indices of recovery. Data collected at one year will be used to assess within-subject change on outcome variables as well as the percentage of individuals in the sample meeting important recovery benchmarks, including symptom remission, functional remission, and combined symptom and functional remission.

Additional outcomes reported will include number of nights hospitalized over the course of one year, and the percentage of participants disengaging from treatment prematurely (i.e. against treatment team recommendation). Individuals who disengage from treatment prematurely will be compared to those still in treatment on baseline clinical and demographic characteristics. Finally, billing records will be examined to determine service utilization (including initial assessment, medication management, individual therapy, group therapy, community support, case management, phone contact, and family services) over the one year period. Exploratory correlation analyses will be conducted to examine the relationship between service utilization and various indices of functional outcome. It is hypothesized that comprehensive OASIS treatment will be associated with improvement in each of the outcome domains, including symptomatic and functional recovery.

Aim 3: Examination of predictors of one-year functional outcomes.

The final aim of the current study is to examine predictors of functional outcome in early psychosis. This aim builds on previous findings suggesting that lower symptom levels,

and particularly symptom remission early in the course of treatment, may impact functional outcomes. The goal is to examine the relationship between symptom remission during the initial phases of treatment and functional outcomes, as well as the impact of medication adherence and substance use during treatment on these functional outcomes. Functional outcomes will include subjective experiences of recovery and both objective and subjective measures of social and occupational functioning. Based on their association to functional outcomes in the literature, the following predictors will be entered as covariates into the regression model: sex, age, and DUP. It is hypothesized that failure to achieve symptomatic remission, poor medication adherence, and substance use over the course of treatment will negatively influence social and functional outcomes, controlling for variables with known prognostic value, including sex, age, and DUP.

METHOD

Participants

OASIS serves adolescents and young adults aged 16-36 who have been treated for psychosis (i.e. have been taking antipsychotic medications) for no more than three years, as well as previously unmedicated individuals who have been ill for up to 5 years. OASIS also provides services to individuals who are experiencing prodromal symptoms and may be at risk of developing psychosis. Referrals to OASIS come from several sources, primary among which are the inpatient and emergency treatment services of the UNC Hospital System. Additional referral sources include the UNC counseling center, family members, and community mental health providers. OASIS serves clients living within approximately one hour's driving distance of the clinic site. Priority is given to residents of the two most immediate local communities (Orange and Durham counties); residents from other counties may receive services based on initial assessment and the program's capacity to provide services. For patients in need of emergency psychiatric care or inpatient hospitalization, OASIS clinicians work with the patient and his or her family to facilitate coordination of care including disposition planning upon hospital discharge. When possible, patients in need of inpatient hospitalization are treated within the UNC Healthcare system.

The first point of contact with OASIS involves a phone screening, conducted by the clinic director or a clinical social worker. At this point a brief history is obtained. Exclusionary criteria for acceptance into the program include head trauma, mental retardation, and pervasive developmental disorders. Individuals accepted for treatment are

then scheduled for an intake appointment. For the purposes of this study, all individuals accepted for treatment for early psychosis (i.e. meeting diagnostic criteria for schizophrenia, schizophreniform disorder, schizoaffective disorder, bipolar disorder, major depressive disorder with psychotic features, brief psychosis/brief psychotic episode, and psychosis not otherwise specified) were included in analyses. Individuals determined to be experiencing prodromal symptoms at the time of intake were excluded from all proposed analyses. A cohort of individuals accepted for treatment at OASIS (i.e. those who completed a baseline visit) in the time period from the clinic's opening (June 2005) through June 2008 ($N=163$) were analyzed.

Setting

OASIS is a comprehensive, multi-element center for the treatment of early psychosis. The clinic is operated by the UNC Health Care System, a not-for-profit integrated healthcare system, owned by the State of North Carolina and based in Chapel Hill, NC. The OASIS program was developed by a multidisciplinary team of specialists in the Department of Psychiatry at the UNC School of Medicine (Diana Perkins, MD, Barbara Smith, LCSW, and David Penn, PhD). Consistent with the program's emphasis on community outreach and accessibility, the clinic is located separate from the primary hospital complex in an easily accessible office suite. The clinic is located on the local public transportation bus line and has ample free parking. OASIS has a clinical capacity of approximately 100 patients.

The mission of OASIS is to foster successful recovery from early psychosis and to increase public understanding of psychotic disorders. Key program aims are to provide early identification and treatment of psychotic disorders, prevent relapse and hospitalization, minimize disruption in individuals' lives, and support individuals in the workplace, school

and relationships. Within the community, OASIS has the aims of educating the community and other providers to recognize early psychosis and the importance of early treatment, to provide educational opportunities for mental health professionals, and to provide access to state of the art clinical research programs. Services are provided in a youth-friendly environment with a strong focus on sustained engagement in treatment.

The clinical staff at OASIS includes licensed clinical social workers, psychiatrists, and psychologists. Every patient is assigned a primary clinician (a licensed social worker) who provides clinical services and case management based on individual need. Interventions range from engagement techniques (i.e. making phone calls to engage reluctant or withdrawn clients) to various aspects of case management to providing individual supportive and cognitive-behavioral therapy. All clients are assessed for eligibility to receive community support, which broadly encompasses assistance in living skills with an objective of helping recipients achieve autonomy and stability. Services are frequently provided in the community or at the client's home in addition to in the office.

Each patient at OASIS also receives psychiatric assessment and medication management from a psychiatrist. Antipsychotic medications are typically prescribed in low doses in keeping with recommendations for the treatment of early schizophrenia with a goal of positive symptom remission. Patients and their families are provided education about medication and medication side effects, and patients are monitored closely for the emergence of side effects, including weight gain and metabolic side effects. Patients are weighed at each visit and lipids and glucose monitored semi-annually. Additionally, diet and exercise counseling is routinely provided by the OASIS psychiatrist. A change in antipsychotic medication is considered if the patient is not having a robust clinical response, or if

intolerable side effects emerge. Comprehensive treatment plans are developed by the psychiatrist in collaboration with the OASIS treatment team, who meets weekly to discuss cases.

Family engagement and support are important aims of the comprehensive treatment offered at OASIS. Family psychoeducation is typically provided upon initiation of treatment in sessions with the patient's keyworker or psychiatrist. Family members may meet individually with members of the treatment team for additional education and support. Multifamily groups are held on a bi-monthly basis, and single family sessions are offered at the family's request.

Other time-limited groups lasting for 8-12 weeks are offered periodically depending on interest and need. Topics include psychoeducation, healthy lifestyle habits, stress management, substance abuse and social skills training. In addition to these opportunities for peer support and interaction, OASIS offers social activities to clients that aim to mitigate feelings of isolation and to give clients a safe environment to practice social skills. Outings such as bowling trips, pizza socials, and seasonal parties are held throughout the year. These activities help to engage clients in services as well as to foster a sense of community while facilitating integration back into normative social roles that may have been interrupted.

Finally, a certified substance abuse counselor provides substance abuse assessment, individual therapy and leads a group following the integrated dual diagnosis modality of treatment. These targeted substance abuse interventions were developed after the first several years of clinic operation and therefore were not available to a large proportion of the study sample. During the initial years of clinic operation, substance abuse was addressed in psychoeducation provided in groups, individual therapy, and psychiatrist visits.

Measures

During the OASIS intake appointment, an extensive psychosocial history is obtained. At this point, baseline objective and subjective clinical data is gathered. Data is collected routinely at six month intervals. The schedule of assessments is found in Table 1.

Demographic and clinical information.

Demographic information collected includes age, sex, race, marital status, county of residence, living situation, health insurance status, and school or employment status (including whether the client is employed and/or in school, and how many hours are spent in each). This information was verified and/or updated at each subsequent visit. Clinical information obtained at baseline includes an estimate of the following information via interview with the patient, the patient's family members, and other sources of collateral information (i.e. hospital discharge summaries): date of first psychotic symptoms (i.e. symptoms designated in Criterion A of DSM-IV diagnosis for schizophrenia), date of first contact with a health professional for psychotic symptoms, and the date the patient first took at least one dose of an antipsychotic medication for his/her psychotic symptoms. This information was used to estimate DUP. A primary diagnosis was entered for each visit beginning at baseline, as well as the status of the diagnosis (i.e. active, partial remission, or remission). Secondary and medical diagnoses were also noted.

Hospitalizations and service utilization.

Days hospitalized over the preceding six-month period were assessed at each evaluation time-point following baseline. Service utilization was determined from a billing audit. Number of visits was recorded for each of the following types of services: initial

assessment, individual therapy, group therapy, community support, case management, phone contact, family therapy, and medication management.

Symptoms.

The expanded Brief Psychiatric Rating Scale (BPRS-E) (Lukoff, Liberman, & Nuechterlein, 1996) is a 24-item scale developed from the Brief Psychiatric Rating Scale originally developed by Overall and colleagues (Overall & Gorham, 1962). This measure assesses symptom levels based on clinical observations during the interview and subjects' verbal report of symptoms in the 2 week period leading up to the interview. Each item is rated on a 7-point scale, rated from 1 (*not present*) to 7 (*most severe*). Per Lukoff and colleagues (Lukoff et al., 1996), ratings of 2-3 indicate a nonpathological intensity of a symptom whereas ratings of 4-7 indicate a pathological intensity of that symptom.

One of the most widely used measures of symptom levels, the BPRS has been shown to be highly sensitive to change (Mortimer, 2007). Varying four-factor solutions have been suggested by several different confirmatory and exploratory factor analyses (Dingemans, Linszen, Lenior, & Smeets, 1995; Mueser, Curran, & McHugo, 1997; Van der Does, Linszen, Dingemans, Nugter, & Scholte, 1993; Velligan et al., 2005; Ventura, Nuechterlein, Subotnik, Gutkind, & Gilbert, 2000). In this study, a four-factor solution including Positive Symptoms, Activation, Negative Symptoms, and Depression/Anxiety (Velligan et al., 2005) was used due to previous demonstrations of its validity for a recent-onset psychosis population as well as across the illness course (Kopelowicz, Ventura, Liberman, & Mintz, 2008). Acceptable internal consistency has been reported for these factors (Positive $\alpha=.67$, Activation/Mania $\alpha=.68$, Negative $\alpha=.79$, Depression/Anxiety $\alpha=.78$) (Velligan et al., 2005) and this was replicated in the present study (see Appendix for factor composition).

Symptom remission was defined according to criteria proposed by Andreasen et al. (2005). In order to be considered ‘remitted,’ individuals must have ratings of mild or less (≤ 3) simultaneously on all of the following BPRS items: Grandiosity (Item 8), Suspiciousness (Item 11), Unusual thought content (Item 15), Hallucinatory behavior (Item 12), Conceptual disorganization (Item 4), Mannerisms/posturing (Item 7), and Blunted Affect (Item 16). Additionally, symptom levels must stay below the severity threshold for six months in order to meet the remission criteria. Therefore, in order to meet remission criteria at six months, individuals must have met severity criteria at both the baseline and six-month visits. Participants were classified as either “in symptomatic remission” or “not in symptomatic remission” at six months and at one year.

Substance use.

Alcohol and illicit drug use was assessed with the Alcohol Use Scale (AUS) and Drug Use Scale (DUS), respectively (Drake, Mueser, & McHugo, 1996). The AUS and DUS were developed to assess and track substance use among individuals with severe mental illness. On each scale, individuals receive a rating of 1-5, corresponding with diagnostic criteria for abstinence, use without impairment, abuse, dependence, or dependence with institutionalization. Ratings are made based on the previous six months, and are based on client self-report, clinician observation, and information from collateral sources. The AUS and DUS have demonstrated good psychometric properties (Drake et al., 1996). In longitudinal studies of individuals with severe mental illness living in the community, test-retest reliability for both scales has been excellent (i.e., close to 100%), and inter-rater reliability has also been good ($\kappa = .80-.95$). In this study, presence of substance abuse at

each evaluation point was defined by any AUS/DUS items rated ≥ 3 . Absence of AUS/DUS items rated ≥ 3 was classified as ‘substance abuse absent.’

Medication adherence.

Medication adherence was assessed via a single-item rating made by the psychiatrist at each visit. The clinician was asked to rate the frequency with which the patient takes his/her medication using the following prompt: “*How many days have you missed your medication in the past month?*” The number of days of missed medication was then coded according to the following scale: 1=*always/almost always adherent* (76-100% of the time), 2=*usually adherent* (51-76% of the time), 3=*sometimes adherent* (26-50% of the time), 4=*never/almost never adherent* (0=25% of the time). At each time point, individuals with ratings of 1 were classified as ‘adherent’, and those with ratings of 2 through 4 were classified as ‘nonadherent.’

Global functioning.

Measures of both objective and subjective global functioning were used. The Global Assessment of Functioning (GAF) scale (American Psychiatric Association, 2000) was used to measure objective global functioning. The GAF is a unidimensional rating of global functioning based on psychological, social, and occupational criteria made by a clinician. Ratings are made on a scale from 1-100 and are divided into 10 ranges of functioning, with higher ratings indicating better functioning. The description of each 10-point range in the GAF scale has two components covering symptom severity and functioning. A rating is made within a particular decile if either the symptom severity or the level of functioning falls within that range, and the final GAF rating always reflects the worse of the two. In this study,

the period rated was the past week. This scale is associated with adequate reliability and has been reported to be highly sensitive to change (Mausbach et al., 2009).

Subjective global functioning was assessed using the Outcome Questionnaire (OQ 45.2) (Lambert et al., 1996). The OQ 45.2 was designed to measure change following psychological interventions and includes items relevant to three domains of mental health: symptom distress, interpersonal relations, and social role performance. The OQ 45.2 is a self-report measure that includes 45 items and requires subjects to rate their feelings on a five-point Likert scale ranging from 0 to 4 (i.e. 0=*never*, 4=*almost always*). After reverse scoring nine items, a total score and three subscale scores are calculated with the following ranges; Total Score=0-180 (clinical range= >63), Symptom Distress=0-100 (clinical range= >36), Interpersonal Relations=0-44 (clinical range= >15), Social Role=0-36 (clinical range= >12) (see Appendix for full scale and subscales). The OQ 45.2 has been shown to possess adequate stability, test-retest reliability, and internal consistency in populations of undergraduate students as in well as clinical samples (Lambert et al., 1996), and adequate internal consistency was demonstrated in this study as well (see Appendix).

Role functioning and recovery.

Both objective and subjective measures of recovery were used. The Role Functioning Scale (RFS) (Goodman, Sewell, Cooley, & Leavitt, 1993) was used to measure objective social and functional recovery. The RFS comprises four single rating scales for evaluating the functioning of individuals in specified areas of everyday life: Working Productivity, Independent Living and Self Care, Immediate Social Network Relationships, and Extended Social Network Relationships. The values on each of the four scales range from one, which represents a very minimal level of role functioning, to seven, the hypothetically optimal level

of role functioning, and each of the seven points on the scales is accompanied by a behaviorally defined description (See Appendix for full scale). The scale is designed to be completed following a standard intake interview and ratings are based on the patient's functioning in the week prior to the evaluation. The total score represents a Global Role Functioning Index with scores ranging from 4 to 28. The RFS has been found to have high internal consistency and adequate test-retest reliability (Goodman et al., 1993). Excellent internal consistency was demonstrated in this study as well (see Appendix).

The Recovery Assessment Scale (RAS) (Giffort, Schmook, Woody, Vollendorf, & Gervain, 1995) was used to measure the subjective experience of recovery. The scale is composed of 41 items on which patients describe themselves using a five-point agreement scale (1=*strongly disagree* to 5=*strongly agree*) (see Appendix for full scale). This measure has been shown to be valid and reliable (Corrigan, Giffort, Rashid, Leary, & Okeke, 1999), and correlates with other measures of recovery (McNaught, Caputi, Oades, & Deane, 2007). This measure had excellent internal consistency in the current study (see Appendix).

As previously noted, school or employment status (including whether the individual is employed and/or in school, and how many hours are spent in each) was documented by either the clinic director or primary clinician at each evaluation time point. The following levels of employment status were defined; unemployed, seeking employment, volunteer, work (1-10 hrs/wk), work (11-20 hrs/wk), work (21-30 hrs/wk), work (31-40 hrs/wk), and work (40+ hrs/wk). School status was recorded as a binary response (i.e. "*Is the patient currently involved in school?*" Yes or No) and clinicians were asked to document number of hours per week spent in school involvement. For the purposes of this study, individuals were considered to be working or attending school at least half-time if employment status was 21-

40+ hours/wk or if the individual was involved in school activities for at least 20 hours per week.

Given the lack of a widely accepted measure of functional remission, functional remission was defined in this study using face valid, objective criteria pertaining to social, occupational and independent living skills. Functional remission at each visit was defined by adequate to optimal role functioning (i.e. scores ≥ 6 on each of the four RFS subscales) and working or attending school at least half-time. As with symptomatic remission, participants were classified into two categories: 'in functional remission' and 'not in functional remission' at each visit.

Data Analytic Plan

The following steps were taken in analyzing the data for this study. First, a descriptive analysis of the OASIS sample was completed in order to characterize the study cohort. Baseline demographics and clinical characteristics of the OASIS sample were examined alongside those of a matched sample treated in other North Carolina mental health care settings.

Next, within-subject change from baseline to one-year on symptom, social and vocational outcomes was examined using paired-sample t-tests. Effect sizes for paired data were calculated per the suggestion of Cohen (1988) ($d = \text{mean difference}/\text{standard deviation of the mean difference}$) and evaluated according to accepted standards: small ($d = .20$), medium ($d = .50$), and large ($d = .80$). Logistic regression analyses were used to test changes in proportions of individuals meeting criteria for symptomatic remission, functional remission, and other binary functional outcomes of interest. All of the aforementioned

analyses were conducted using PASW Statistics 18, Release Version 18.0.0 (SPSS Inc., Chicago, IL, USA).

Finally, a generalized estimating equations (GEE) approach (Liang & Zeger, 1986) was used to examine predictors of functional outcomes over time. GEE is an extension of the generalized linear model that is ideally suited for repeated measures data sets where unknown correlation is present. GEE models are population-averaged (or marginal) models that allow the correlation of outcomes within an individual to be estimated and taken into account in the formula which generates the regression coefficients and their standard errors. This approach holds significant advantages over repeated measures analysis of variance, which can only be used with interval outcomes and in datasets in which there are equal numbers of observations for each subject (Katz, 2006). GEE can accommodate covariate-dependent missing data and therefore is suited for a naturalistic longitudinal study such as this one. Effect sizes of explanatory variables are regression coefficients (B) for continuous variables and odds ratios (ORs) for categorical variables.

In GEE, repeated measures for each outcome at each time period (i.e. baseline, six months and one year) are pooled to produce an estimate of the population-averaged effect of the predictors on each outcome. Each functional outcome (RFS scores, RAS scores, functional remission status, and work/school status) was modeled as a function of time, symptom remission status (in remission or not in remission), substance abuse status (present or absent), and medication adherence status (present or absent). These associations were adjusted for confounding factors by including sex and age of referral as time-invariant covariate factors. All GEE analyses were conducted using SAS 9.2 (SAS Inc., Cary, NC, USA).

RESULTS

Between the dates of June 1, 2005 and June 1, 2008, 405 individuals were phone-screened by OASIS clinicians. Of these 405 individuals, 150 were referred out for meeting exclusion criteria (see Methods section) and 255 individuals were accepted for treatment (See Figure 1 for treatment flow diagram). The rate of referrals during the initial months of the clinic's operation was steady, resulting in meeting clinic capacity within the first 18 months of operation (see Figure 2). Of the 255 individuals accepted for treatment at OASIS, 31 individuals did not attend an intake appointment (i.e. did not follow-up to schedule an appointment or no-showed a scheduled appointment). An additional 24 individuals had psychosocial intakes but never received a baseline assessment (10 of these individuals were consults and therefore did not receive baseline assessments, and an additional 14 individuals were lost to follow-up). Of the 200 individuals who received baseline assessments, 2% ($n = 4$) were consults (i.e. did not receive ongoing care at OASIS) and 17% ($n = 33$) were accepted for monitoring at OASIS due to their clinical at-risk (i.e. prodromal) status. The remaining 163 individuals comprise the early psychosis cohort that was analyzed in this study.

A total of 64 individuals (39% of the study cohort) were discharged prior to one year, 31 of whom were discharged between baseline and six months. Two individuals discharged prior to six months later re-contacted the clinic and were readmitted prior to the one-year evaluation. In both cases, the individuals experienced a return or worsening of psychotic symptoms and contact was reinitiated by family members. Of the 64 individuals discharge

before one year, 33% ($n = 21$) were refusing treatment at the time of discharge. Discharge reasons for individuals not refusing treatment ($n = 43$) included; geographic relocation ($n = 18$), no longer appropriate for care at OASIS (i.e. too chronic or in need of more intensive services) ($n = 10$), return to work or school full-time ($n = 6$), preference for another provider ($n = 6$), program dissatisfaction ($n = 1$), probation violation/incarceration ($n = 1$), and death ($n = 1$).

Because data collection occurred as part of routine care and was completed by full-time clinicians, missing data were expected to occur due to both clinician factors (including failure to administer all assessments at each time point) as well as client factors (including refusal to complete self-report measures, failure to attend appointments on or near the six-month or one-year study visits, and attrition). Missing data were examined on both a visit-wise and measure-wise basis. The database was constructed such that all required assessment forms are generated simultaneously at the time a visit is manually established by a clinician. As a result, a visit only appears in the database if one or more of the outcome measures is completed at that time point, and any other required forms that are not completed will appear in the database as blank. At six months, visits were missing for 16 patients (i.e. 12% of 132 expected visits), and at one year visits were missing for 14 patients (i.e. 12% of 116 expected visits).

Additional missing data were observed within existing study visits. A systematic inspection of electronic study records was conducted for 25% of the study cohort in order to better characterize data missing measure-wise. Forty-two records were randomly selected and reviewed for the presence of 9 different assessments that were to be collected at each study visit. Among the 42 sets of records reviewed, an average of 66% of the generated

forms were complete in the database (i.e. 34% were left blank). Across visits for the entire study cohort, self-report measures (including the OQ and RAS, together comprising approximately 30% of all missing forms) were the most frequently missing outcome forms, and the most consistently collected outcome form was the GAF (which accounted for less than 1% of missing forms).

Characterization of the OASIS Sample

Sixty-seven percent of the study cohort was male, and 66% was Caucasian (see Table 2). Mean age at the time of intake to the clinic was 23.1 years ($SD = 4.5$), with a higher mean age for females than males ($F(1,161) = 3.24, ns$). Most individuals (91%) had never been married and were living in private residences (91%). A majority (61%, $n = 96$) had private insurance at baseline, whereas 19% ($n = 31$) received public assistance via Medicaid/Medicare and 22% ($n = 35$) were uninsured (insurance status was not reported for 1 individual, and 3 individuals reported both Medicaid/Medicare and private insurance).

The most common diagnosis was schizophrenia, followed by psychosis NOS (see Figure 3). At the time of intake, 29% ($n = 47$) of the study cohort carried a secondary diagnosis of active substance abuse ($n = 31$) or dependence ($n = 16$), with an additional 6% ($n = 10$) diagnosed with substance abuse or dependence in partial remission. These findings are consistent with AUS/DUS ratings taken at baseline. Of the 122 individuals for whom AUS/DUS data were collected at baseline, 23% ($n = 28$) were abusing one or more substances at baseline, with cannabis and alcohol representing the most frequently abused substances.

Information on duration of untreated psychosis (DUP) was only available for 76 individuals in the study cohort. DUP for the study cohort ranged from 0 to 63 months, with a

mean DUP of 4.74 months ($SD = 11.51$, $Mdn = 0$, mode = 0). Over half of individuals for whom DUP data were available (53%, $n = 40$) had a DUP < 1 month, and an additional 28% ($n = 21$) had a DUP ≤ 3 months. Only 2 individuals had a DUP > 36 months. Due to concerns regarding to the validity of DUP calculations, DUP was not used in successive analyses as initially proposed.

Previous treatment and hospitalizations.

A majority of individuals in the study cohort were referred from inpatient hospital units (35%) and outpatient hospital clinics (32%). Additional referrals coming from family members (14%), private practitioners (6%), a local transitional housing/employment program (4%), ER/crisis services (3%), the University counseling service (3%), and self-referrals (2%).

Data on previous treatment and involvement with the correctional system was available for approximately 2/3 of the study cohort ($n = 109$). Of these individuals, 71% had been in outpatient treatment for a psychiatric disorder prior to engaging with OASIS, however only 15% were receiving concurrent services outside of OASIS at the time of baseline. Individuals had a mean of 1.4 previous hospitalizations ($SD = 1.29$, $Mdn = 1$, mode = 1, range = 0-6). Fifty seven percent of individuals had been hospitalized once, 13% had been hospitalized twice, and 12% had been hospitalized three times or more. Seventeen percent had never been hospitalized for psychiatric reasons. Six percent were under correctional supervision at the time of baseline, and 22% had prior arrests. There were no significant differences in baseline symptom (BPRS total scores) or levels of global functioning (GAF) between individuals who had data on previous treatment and those who did not.

Medications and medication adherence.

Medication data was recorded for 72% ($n = 117$) of the sample at baseline. Of these individuals, 86% ($n = 101$) were prescribed at least one atypical antipsychotic medication, and 9% ($n = 10$) were prescribed a second atypical antipsychotic medication. An additional 4% ($n = 7$) of individuals with medication data at baseline were prescribed a first-generation antipsychotic medication. One individual (<1%) was prescribed a first-generation antipsychotic medication in addition to an atypical medication, and one individual (<1%) was prescribed two first-generation antipsychotic medications.

Most frequently prescribed atypical antipsychotics were; olanzapine ($n = 36$), risperidone (oral) ($n = 32$), aripiprazole ($n = 24$), quetiapine ($n = 8$), ziprasidone ($n = 8$), risperidone (intramuscular) ($n = 2$), and clozapine ($n = 1$). The most common first-generation antipsychotic medications were haloperidol ($n = 4$), followed by perphenazine ($n = 2$), fluphenazine (decanoate) ($n = 1$), fluphenazine (oral) ($n = 1$), and haloperidol decanoate ($n = 1$). Sixty individuals (51%) were prescribed at least one additional class of medications, with benzodiazepines being the most frequently prescribed class ($n = 24$), followed by SSRI antidepressants ($n = 20$), mood stabilizers ($n = 17$), other second generation (i.e. non-SSRI) antidepressants ($n = 13$), heterocyclic/MAO antidepressants ($n = 5$), vitamins ($n = 4$), other anxiety/sedative (i.e. non-benzodiazepine) medications ($n = 1$), and others ($n = 14$). One individual was not prescribed any medications.

Of individuals prescribed antipsychotic medications, 91% ($n = 76/84$) were rated as adherent (i.e. scores of “1=always/almost always”, 76-100%) to their medication regimens. In cases where individuals were prescribed more than one antipsychotic medication, the lower adherence rating was used.

Sample representativeness.

Aggregated data from the NC-TOPPS outcome monitoring program were examined in order to determine the characteristics of individuals treated for early psychotic disorders elsewhere in the state of North Carolina. Data collected during the period June 1, 2005 through June 30, 2007 were extracted from the NC-TOPPS database for individuals 18 and older. Search criteria used to approximate an early psychosis cohort were: age ≤ 30 years, diagnosis classification of “Schizophrenia and other psychotic disorders,” and prior inpatient mental health admissions ≤ 1 (the criterion of one or fewer previous inpatient mental health admissions was selected based on findings that 74% of the OASIS study cohort fell into this same category). Additionally, data for the provider IDs assigned to UNC Hospital’s Schizophrenia Treatment and Evaluation Program (STEP) clinic as well as OASIS were excluded from this query. This search identified a comparison sample of 1,440 individuals.

For the purposes of this comparison, a subsample of individuals in the OASIS study cohort was selected based on the following criteria: insurance status of Medicaid/Medicare or self-pay, age ≤ 30 years. There were 55 individuals who met these criteria. Of these individuals, data on previous hospitalizations was available for $N=37$ individuals, of whom 59% ($n = 22$) had one or no previous hospitalizations. This subsample of individuals did not differ from the rest of the OASIS sample on age, sex, race, marital status, GAF score, percentage in labor force, history of prior arrest, correctional status, or substance abuse or dependence diagnosis at baseline. A significantly lower proportion of individuals in the subsample were living in private residences as compared to the rest of the OASIS sample (Fisher exact test, $p < .05$).

Demographic and baseline clinical characteristics for the subsample of individuals treated at OASIS as compared to individuals identified to approximate a first-episode psychosis sample elsewhere in the state of NC are presented in Table 3. Given the large difference in sample sizes, formal inferential statistics were not conducted. However, the pattern of data suggests that the OASIS sample had a higher GAF and included a greater proportion of White/Caucasian individuals than did the NC-TOPPS sample.

One-year Outcomes

Service utilization.

Services offered at OASIS were classified into the following categories: initial assessment/interview, medication management, individual psychotherapy, group therapy, family therapy, multi-family group therapy, phone contact, and community support. Over the course of the initial year of treatment, individuals receiving care at OASIS had a mean of 20.31 service contacts ($SD = 20.24$, $Mdn = 13.00$), with medication management and individual psychotherapy accounting for the most frequent types of services utilized, regardless of insurance status (see Table 4). Individuals with both Medicaid/Medicare and private insurance received the most services, however it should be noted that there were only 3 individuals with this insurance status (including one individual with a total of 116 service contacts who fell over five standard deviations above the group mean total service utilization). Ninety-two percent of individuals in the study cohort received at least one medication management visit, 62% received at least one session of individual psychotherapy, 51% received at least one session of family therapy, 33% received at least one session of multi-family group therapy, and 23% received at least one session of group therapy. Only 4% of the study cohort was billed for community support.

Exploratory analyses were conducted to examine the relationships between service utilization and symptom and functional outcomes at one year (see Table 5). Number of medication management sessions showed significant negative correlations with GAF scores and RFS total, Working Productivity, and Extended Social Network scores, as did total number of contact hours. Likewise, number of community support contacts showed significant negative correlations with GAF scores and RFS total, Working Productivity, and Independent Living scores. For all of these associations, as the number of contacts increased, severity or functioning level on these scales worsened. Number of individual psychotherapy sessions showed a significant negative correlation with OQ social role subscale scores (i.e. as number of contacts increased, distress on this subscale decreased) and a significant positive correlation with BPRS Depression/Anxiety subscale scores (i.e. as number of contacts increased, symptoms on this subscale increased in severity). Number of group therapy sessions showed significant positive correlations with OQ total, Symptom Distress, and Social Role scores, wherein as the number of contacts increased, distress on each of these scales increased. These findings should be interpreted very cautiously, however, for two primary reasons: 1) they are exploratory in nature; 2) there was no effort to correct for conducting multiple correlations, thus any significant bivariate correlations may reflect Type I error.

Hospitalization and involvement in the criminal justice system.

Fifteen percent ($n = 15/99$) of the study cohort were hospitalized for psychiatric reasons during the first six months of treatment, and those hospitalized spent a mean of 13.67 nights in the hospital ($SD = 12.53$, range = 3-54). Eighteen percent ($n = 13/73$) of the cohort had psychiatric hospitalizations between six months and one year, and those hospitalized

during this time period spent a mean of 9.92 nights in the hospital ($SD = 5.00$, range = 4-20). Complete hospitalization data for the entire study period was available for 70 individuals, 27% ($n = 19$) of whom had been hospitalized for a mean of 13.84 nights ($SD = 11.02$, $Mdn = 11$, range = 4-45) over the course of their first year of treatment. Overall, individuals were hospitalized for a mean of 3.76 nights ($SD = 8.37$, $Mdn = 0$, range = 0-45). Individuals with complete hospitalization data did not differ significantly from those with incomplete data on baseline demographic or clinical variables (including age, sex, DUP, symptom remission status, functional remission status, GAF, or private vs. not private insurance status).

Six percent ($n = 6/98$) of individuals were arrested during their first six months of treatment, and there were no arrests reported between six months and one year. Eight percent ($n = 8/96$) were under correctional supervision during their first six months in treatment, and half of these individuals remained under supervision for at least a portion of their second six months in treatment.

Medication adherence and substance abuse.

Prevalence of substance abuse in the overall study sample fell from 23% ($n = 28/122$) at baseline to 19% ($n = 16/84$) at six months and to 13% ($n = 10/80$) at one year. Likewise, for individuals with paired baseline and one year data ($n = 67$), substance abuse prevalence fell from 24% at baseline to 12% at one year, though there was no statistically significant change in likelihood of substance abuse from baseline to one year ($OR = 0.48$, 95% CI [0.22, 1.05], $p = .067$).

The percentage of individuals rated as adherent to their antipsychotic medication regimens decreased from 91% ($n = 76/84$) at baseline to 84% ($n = 63/75$) at six months, and was 85% ($n = 61/72$) at one year. For those with paired baseline and one year data ($n = 49$),

medication adherence fell from 90% at baseline to 86% at one year. There was no significant change in the proportion of adherent individuals from baseline to one year. Seventy-six percent of the sample ($n = 32/40$) were adherent to their medications at all three study visits.

Changes in primary outcomes over one-year.

One-year visits were established in the OASIS outcome database for 87 individuals. Individuals who were missing one year visits for any reason (including discharge, lost to follow-up, uncompleted forms, etc.) did not differ significantly from individuals with one year visits in age, sex, symptom remission status, functional remission status, or private vs. not private insurance status at baseline. Individuals with and without one year data also did not differ significantly on any baseline outcome measures. Baseline means for the entire sample, paired means for individuals with both baseline and one-year data, and corresponding significance tests and effect sizes are presented in Table 6.

Symptoms, global functioning and experience of recovery.

Significant symptom reduction from baseline to one year was observed on the BPRS total score as well as on the Positive symptoms, Activation, and Negative symptoms factors, with changes corresponding to small to medium effect sizes. There was no statistically significant change on the Depression/Anxiety factor. There was also a statistically significant improvement in GAF scores from baseline to one year, corresponding to a large effect size and a shift from serious symptoms or level of impairment to mild symptoms or level of impairment (American Psychiatric Association, 2000).

Improvements in OQ scores from baseline to one year reached statistical significance for the Symptom Distress and Social Role subscales as well as for the total score. These improvements corresponded to medium effect sizes but failed to reach the reliable change

indices (RCIs) calculated by Lambert et al (2004) to denote clinically significant change on each (i.e. RCI for Total Score = 14 points; RCI for Symptom Distress = 10 points; RCI for Interpersonal Relations = 8; RCI for Social Role = 7). There were no statistically or clinically significant changes on the Interpersonal Relationship scores.

It should be noted that in comparison to the sample for whom OQ data were available at baseline ($n = 94$) (who were within or close to the clinical range cut-off on total scores as well as subscale scores), individuals for whom OQ data were available at both baseline and one year ($n = 29$) fell below the clinical range on the total score and all subscale scores at baseline. Individuals showed trend level improvements on the RAS which were not significant.

Role and occupational functioning.

Scores on each of the four RFS items (Working Productivity, Independent Living, Immediate Social Network, and Extended Network) showed significant improvement from baseline to one year, corresponding to medium to large effect sizes. Change on the total score was also statistically significant and corresponded to a large effect size. Individuals were significantly more likely to have adequate to optimal role functioning across domains on the RFS (i.e. scores ≥ 6 on each item) at one year than at baseline ($OR = 3.46$, 95% CI [1.64, 7.26], $p = .001$). Overall, 22% ($n = 12/55$) of the sample for whom paired data were available moved from not demonstrating adequate to optimal role functioning at baseline to doing so at one year, and only 2% ($n = 1/55$) moved from demonstrating adequate or optimal role functioning at baseline to not doing so at one year.

Occupational status was examined with respect to time spent in work and or/school activities (see Table 7). Individuals were significantly more likely to be involved in school at

one year than at baseline ($OR = 2.40$, 95% CI [1.33, 4.33], $p = .004$), and significantly less likely to have no occupational involvement (i.e. neither work nor school involvement) ($OR = 0.42$, 95% CI [0.24, 0.73], $p = .002$). Likewise, there was an increased likelihood of at least half-time occupational functioning between baseline and one year, but this change was not statistically significant ($OR = 1.52$, 95% CI [0.87, 2.67], $p = .14$). Overall, 14% ($n = 12/86$) of the study cohort moved from not working or attending school at least half-time at baseline to doing so at one year, and 7% ($n = 6/86$) moved from working or attending school at least half-time at baseline to not doing so by one year.

Symptom and functional remission.

There was a significant increase in the proportion of individuals meeting symptom remission criteria as determined by severity only from baseline to one year ($OR = 3.02$, 95% CI [1.67, 5.47], $p < .001$) (see Table 8). Eighty-four percent ($n = 48/57$) of individuals met remission severity criteria at one or more study visits over the course of the year, and 63% ($n = 36$) experienced symptom remission for a duration of at least six months at some point during the study period. Fifty-seven percent of the cohort ($n = 38/67$) met both severity and time criteria for symptom remission at one year.

There was also a significant increase in proportion of individuals meeting functional remission criteria from baseline to one year ($OR = 3.63$, 95% CI [1.16, 9.71], $p = .025$). Eighteen percent ($n = 9/51$) met functional remission criteria at one or more study visits over the course of the year, though only 8% ($n = 4/51$) were able to sustain this level of functioning for two consecutive study visits (six months and one year, in all cases).

At both baseline and one year, whereas the majority of those in functional remission also experienced symptom remission, it was less common for those meeting symptom

remission criteria to also meet functional remission criteria (see Table 8). When symptom remission as determined by both severity and time was considered at one year ($n = 50$), 80% of those meeting functional remission criteria also met full symptom remission criteria, whereas 15% of those experiencing symptom remission also met functional remission criteria. There was no significant increase in the likelihood of concurrently meeting symptom and functional remission criteria from baseline to one year.

Predictors of Functional Outcomes

Prior to conducting all predictor analyses, correlations between all independent variables and covariates were examined (see Table 9). In general, significant correlations were consistent with the wider literature. There was a significant correlation between age and sex, wherein older age at the time of referral was associated with female sex, as well as a significant correlation between substance abuse status and sex, wherein a status of ‘substance abuse present’ was associated with male sex. However, it is important to note that the absolute magnitude of these correlations is small and that this analysis did not correct for multiple comparisons.

Using PROC GENMOD in SAS, GEE models were run using a repeated statement to specify within-patient clustering and an exchangeable working correlation matrix. For models predicting work/school status (working/attending school at least half-time versus not) and functional remission status (in remission versus not), a binary distribution and logit link function were specified. Across models, time was treated as a categorical factor with three levels (baseline, six months and one year) rather than a continuous covariate based on scatter plots indicating non-linear change on the dependent variables across the three time points. Symptom remission status, medication adherence status, and substance abuse status were

entered as 2-level categorical factors (i.e. “present” or “absent” for each variable). Model covariates included sex and mean-centered age. Additionally, Symptom Remission X Time, Medication Adherence X Time, and Substance Abuse X Time interaction terms were included in each model.

Primary predictor analyses.

In the model predicting RFS total scores, there was a significant main effect of symptom remission status ($B = 1.39, SE = 0.52, p = .007$), wherein individuals in symptom remission had significantly higher role functioning scores across time points in comparison to individuals whose symptoms had not remitted. There was also a significant main effect of age ($B = 0.20, SE = 0.09, p = .024$), wherein older age at the time of referral predicted significantly higher role functioning across time points. Finally, there was a significant interaction between time and substance abuse, wherein the impact of substance abuse on role functioning changed between baseline and one year ($B = 2.29, SE = 1.00, p = .022$), and an interaction that approached statistical significance between six months and one year ($B = 1.87, SE = 0.96, p = .050$) (see Figure 4). Whereas substance abuse was associated with higher role functioning at baseline and six months, by one year substance abuse predicted lower role functioning. In contrast, role functioning continued to improve over the course of the year for individuals who were not abusing substances.

In the model predicting functional remission status, interaction terms for Substance Abuse X Time and Medication Adherence X Time were excluded due to the low frequency of functional remission across time points and insufficient population in some data cells. In the resulting model, the only significant predictor of functional remission status was age (adjusted $OR = 1.21, 95\% CI [1.09, 1.35], p < .001$). Individuals who were older at age of

referral were significantly more likely to be in functional remission across time points. Similar findings emerged for the outcome of working or attending school half time or more, wherein age emerged as the sole significant predictor (adjusted $OR = 1.10$, 95% CI [1.00, 1.21], $p = .042$), with older age at referral predicting greater likelihood of being engaged in work or school half-time or more across time points. There were no significant main effects or interactions in the model predicting RAS scores.

Sensitivity analyses.

Because some participants were missing data at one or both of the post-baseline visits, sensitivity analyses were conducted to examine whether differential attrition could have biased the findings. Individuals were divided on the basis of their missing data pattern into the following dummy-coded groups; group 0 = reference group with one year visit present ($n = 87$), group 1 = discharged prior to one year for reasons other than refusing treatment *or* one year visit missing for unspecified reasons ($n = 55$), and group 2 = discharged prior to one year for refusing treatment ($n = 21$). For each of the functional outcomes of interest, this categorical group variable was entered into a GEE model adjusted for mean-centered age and sex along with Time X Group interaction terms. Because groups 1 and 2 did not have one year data, only two levels of time (i.e. baseline and six months) were used in the interaction terms for each model. Contrasts of slope estimates were selected to determine whether there were any significant differences in patterns of change on functional outcomes between baseline and six months based on group membership.

There were no significant differences in patterns of change on RFS scores or on likelihood of working or attending school half-time or more between baseline and six months amongst the three groups. For the logistic GEE model predicting functional remission status,

there were only two individuals in group 2 (discharged for refusing treatment) with data at six months (both of whom were not in functional remission), and as a result only a contrast between change in groups 0 and 1 was examined. There were no significant differences in change in likelihood of being in functional remission between baseline and six months for those in groups 0 and 1.

On the RAS, there was a significant difference in the pattern of change between groups 1 and 2, wherein individuals missing visits at one year for reasons other than refusing treatment endorsed increased subjective experiences of recovery between baseline and six months, whereas individuals missing one year visits for reasons of refusing treatment reported decreased experiences of recovery during that same time period (difference in slopes = 19.14, $SE = 4.99$, $p < .001$) (see Figure 5). The difference in pattern of change between groups 0 and 2 also approached statistical significance, with the reference group demonstrating a more moderate (but still positive) change in recovery scores between baseline and six months, which was significantly different than the decrease in recovery scores for the refusal group (difference in slopes = 10.36, $SE = 5.55$, $p = 0.062$). Because time was treated as a categorical factor in each of the predictor analyses, it was not possible to average effects across missing data groups using a pattern-mixture model (Hedeker & Gibbons, 1997).

One-way ANOVAs, Fisher exact tests and χ^2 analyses were used to test for significant differences in baseline demographic and clinical variables between the three missing data groups. There were no significant differences in baseline demographic variables including age, sex, race (African-American versus Caucasian), or insurance status (private versus not). Furthermore, the groups were not statistically different on any clinical outcome

measure at baseline with the exception of the BPRS activation factor ($F(2, 118) = 3.88, p = .023$). Tukey post-hoc comparisons of the three groups indicated that individuals missing data at one year for reasons of refusing treatment (i.e. group 2) ($M = 6.92, 95\% \text{ CI } [5.07, 8.78]$) had significantly higher activation factor scores than those in the reference group (i.e. group 0) ($M = 5.31, 95\% \text{ CI } [4.87, 5.75]$), as well as significantly higher scores than those with one year visits missing for reasons other than refusing treatment (i.e. group 1) ($M = 5.30, 95\% \text{ CI } [4.71, 5.88]$). Finally, there were no significant differences in symptom remission, substance abuse, or medication adherence status between groups at baseline. Overall, it appears that the results of GEE analyses predicting functional outcomes were not biased by missing data resulting from differential attrition patterns.

DISCUSSION

The present study is the first systematic evaluation of a US-based multi-element treatment center for early psychosis. The aims of this naturalistic prospective study were threefold; to characterize the population presenting for treatment during the clinic's first three years of operation, to examine the course of the first year of treatment, and to explore correlates and determinants of short-term functional outcomes. Discussion of the findings with respect to these three aims is presented below.

Characteristics of an Early Psychosis Sample Presenting for Community-Based Care

During the first three years of the clinic's operation, OASIS received over 400 referrals from the surrounding community and was operating at full capacity within approximately 18 months of operation. Whereas OASIS received the majority of referrals during this initial period of operation from hospital clinics and other mental health providers, it is expectable that over time and with increased visibility in the community, referrals from non-psychiatric sources would increase, as has been seen in well-established early intervention programs such as EPPIC (McGorry et al., 1996). The individuals accepted for treatment for early psychosis at OASIS share characteristics with samples reported by other specialized early psychosis treatment programs with respect to sex, age, marital status, and ethnic composition (Addington et al., 2009; Malla et al., 2003). Although OASIS provides care for individuals with both affective and non-affective psychoses, an overwhelming majority (94%) of patients were diagnosed at baseline with non-affective psychoses. In addition, the findings attest to the fact that this is a high-risk population, as one fifth had been

arrested before entering treatment and approximately one quarter met criteria for either substance abuse or substance dependence. Overall, it is clear that there is a need for mental health services for this population in the state of NC and that a model of community-based multi-element treatment for early psychosis is feasible.

OASIS is one of the few specialty clinics of its kind within a large geographic region in the United States. Although the cohort examined in this study cannot be considered epidemiological (inasmuch as there were other mental health care resources available to the target population), individuals receiving care at OASIS appeared to be similar to a large comparison sample from the rest of the state of North Carolina on most demographic and clinical variables (although formal inferential statistics were not conducted). The possibly greater proportion of White/Caucasian individuals in the OASIS subsample may reflect differences in the ethnic composition of the county in which OASIS is situated, as compared to the state as a whole (Census Bureau, 2010).

Additionally, baseline global functioning scores at OASIS were higher than those reported at other mental health treatment centers in NC, and they are also notably higher than those in published reports from other multi-element treatment programs (Conus et al., 2007; Meneghelli, Cocchi, & Preti, 2010). This difference likely reflects differences in treatment models and referral sources. Because OASIS does not offer its own inpatient services, patients are referred after their acute symptoms have resolved, in contrast to clinics such as EPPIC where the first point of contact after admission to the service may be an inpatient admission. For instance, Power et al. (1998) reported that 63% of patients were hospitalized within their first three months of treatment at EPPIC, and that the majority of these hospitalization occurred within the first day of contact. It is also important to note that the

population served at OASIS is best characterized as an “early psychosis” cohort representative of individuals within the broader critical period of early intervention, rather than a strictly “first-episode” or “first presentation to treatment” sample.

Another unique characteristic of the sample is that a majority of individuals receiving care at OASIS had private insurance. This is in contrast to findings from a large, US-based epidemiological study of standard-care for first-episode psychosis, which included a larger proportion of uninsured individuals and fewer privately insured individuals (Rabinowitz et al., 1998). However, it is difficult to draw any between-group comparisons based on insurance status, given the heterogeneity of financial and disability statuses within each of these groups. Furthermore, because OASIS is operated by a state-owned, not-for-profit healthcare system, uninsured individuals (as well as those whose insurance benefits have been exhausted) may be eligible to receive financial assistance from state funds. Because of this, the clinic is better able to provide services for the uninsured than are other community mental health models in NC who are limited to resources allocated by local management entities. Thus, it is not possible to make any confident conclusions about the association between service utilization and insurance status within our sample.

In regard to service utilization, while the majority of individuals received individual therapy and medication management visits during the course of one year of treatment at OASIS, family therapy, multi-family therapy and community support were less frequently utilized services. However, there are several factors suggesting that the billing audit conducted for this study produced a conservative estimate of service utilization during the study period. First, there was a concurrent trial of an individual cognitive-behavioral therapy program (the Graduated Recovery Intervention Program; GRIP) (Penn et al., in preparation;

Waldheter et al., 2008) underway at OASIS during the study period, through which some individuals received up to 36 sessions of individual psychotherapy that were not captured in the billing audit. Second, at various points during the study period, there were trainees offering services under the licenses of their supervisor, and in most cases these sessions were not billed. And third, phone contact was also likely grossly under-captured, especially since crisis calls are not billed. As a result, the service utilization reported here may not adequately capture the treatment ‘dosage’ received within a multi-element treatment center.

It is not surprising that OASIS’s service utilization statistics fell below those reported for the integrated arm of the OPUS trial, wherein at one year follow-up individuals had received a median number of 42 outpatient visits (as compared to 11 in standard care) (Petersen et al., 2005a). Whereas assertive community treatment is one of the chief components of the OPUS intervention program and others, such as LEO (Craig et al., 2004), care at OASIS is primarily clinic-based, with therapeutic services provided in the community (including in the clients’ homes) based on individual need. Indeed, one of the primary assets of the multi-element treatment model is that comprehensive services are offered under one roof. However, such clinic-based treatment comes with additional challenges to treatment engagement and participation.

Despite the fact that treatment engagement is a perpetual challenge in early intervention services, OASIS was able to successfully engage a high proportion of individuals entering treatment. Only 13% of the cohort was discharged for reasons of refusing treatment over the course of the first year. At EPPIC, the rate of disengagement over the course of 18-months, as defined by refusal of treatment or being untraceable despite clinician efforts, was 23% (Conus et al., 2010), and an early psychosis program in New

Zealand found 25% terminating despite therapeutic need (Turner, Smith-Hamel, & Mulder, 2007). In this study, an extremely conservative rate of disengagement (33%) can be calculated by including individuals who had geographic relocations, returned to work or school, left for reasons of program dissatisfaction, or missed two consecutive visits in the system, in addition to those who were discharged for reasons of refusing treatment. Nonetheless, these statistics reinforce the potential for multi-element early intervention services to engage young adults much more successfully than standard care (Garety & Rigg, 2001) or in interventions limited to medication management alone (i.e. in drug trials for first-episode psychosis) (Emsley et al., 2007; McEvoy et al., 2007), where rates of treatment disengagement of 40-50% have been reported over the course of one year.

Likewise, treatment at OASIS was associated with high rates of adherence to antipsychotic medications. Seventy-six percent of individuals treated at OASIS were rated as adherent to their medication over the entire study period, and this rate is similar to medication adherence statistics recently reported in two Canadian centers for early psychosis (i.e. 76-83% adherent over the entire first year) (Addington et al., 2009). These rates are notably higher than those reported in standard care, particularly in comparison to findings in an epidemiological US sample that 60% of individuals receiving standard care became nonadherent to prescribed medication regimens within the year following an initial hospitalization for psychosis (Mojtabai et al., 2002). Adherence statistics from this study are also notably higher than those reported in drug trials for chronic schizophrenia (Lieberman et al., 2005a), as well as for early psychosis (McEvoy et al., 2007). These findings underscore the potential of multi-element programs to impact treatment adherence in early psychosis.

One-Year Patient Outcomes

Over the first year of treatment, individuals in treatment at OASIS experienced significant improvements in global functioning and significant decreases in positive and negative symptom levels. These findings contribute to the growing body of evidence suggesting that multi-element programs facilitate symptom improvement during the early illness course (Harvey et al., 2007; Malla et al., 2005; Penn et al., 2005). Although the within-group effect sizes observed for symptom change in this study were small to moderate, the magnitude of change for positive symptoms was greater than that observed in the OPUS trial ($d = 0.19$ on the SAPS), and equal to that observed for negative symptoms ($d = 0.31$ on the SANS), with each of these improvements being greater than those observed in standard care in the OPUS trial (Petersen et al., 2005a) (although formal statistical comparison of these effect sizes was not conducted). Large improvements in GAF scores, which tend to demonstrate larger correlations with symptom levels rather than functioning levels (Goldman, Skodol, & Lave, 1992; Hilsenroth et al., 2000; Moos, McCoy, & Moos, 2000; Moos, Nichol, & Moos, 2002; Skodol, Link, Shrout, & Horwath, 1988) support these conclusions.

In this study, symptom remission was utilized as a benchmark of symptomatic improvement because it has shown promise of being a sensitive marker of more comprehensive clinical improvement across the illness course. There was a significant increase in the proportion of individuals meeting symptom remission criteria, as determined by severity only, from baseline to one year, with rates of remission at one year approaching those reported at other multi-element treatment centers using these same criteria (i.e. 69-78%) (Addington et al., 2009; Cocchi et al., 2008; Menezes et al., 2009). Furthermore, OASIS had a favorable percentage of individuals who met remission severity criteria at one

or more study visits over the course of the year in comparison to the only other study that has reported on this same statistic in a multi-element treatment model for early psychosis (i.e. Addington & Addington, 2008b) (84% vs. 77%).

To best understand these symptom improvements and the potential mechanisms of change within the multi-element treatment model, it is helpful to consider change that has been observed in medication trials. The percentage meeting severity remission criteria at any point during the first year of treatment at OASIS surpasses the rates of symptom remission reported in two large randomized, double-blinded trials of atypical antipsychotic medication effectiveness (84% vs. 58-70%), one of which used the same standardized remission criteria as our study (Emsley et al., 2007), and one of which used slightly modified remission criteria (McEvoy et al., 2007). Similarly, OASIS had a noticeably greater percentage of individuals experience symptom remission for a duration of at least six months (at some point during the course of one year) as compared to a randomized medication trial that monitored remission using the same criteria over a much longer study period of 2-4 years (i.e. Emsley et al., 2007) (63% vs. 24%). These descriptive comparisons suggest that treatment at OASIS may be associated with increased likelihood of meaningful symptom reduction above and beyond what is to be expected through medication management alone.

One limitation of assessing symptom remission using BPRS scores is that, in comparison to the same remission definition as assessed using other measures such as the PANSS (Kay et al., 1987) or the SAPS and SANS (Andreasen, 1982; Andreasen & Olsen, 1982), the BPRS does not include items that capture some central negative symptoms, such as avolition/apathy, anhedonia, or lack of spontaneity (Andreasen et al., 2005). Given that only one item pertaining to a negative symptom of schizophrenia is included in the definition

of symptom remission used in this study (i.e. Item 16, Blunted Affect), it is possible that some individuals who experienced symptom remission may still have demonstrated some negative symptoms that were not captured in this definition.

Nonetheless, the negative symptom factor of the BPRS-E used in this study has demonstrated high correlations with specific measures of negative symptoms (Nicholson, Chapman, & Neufeld, 1995), which suggests that we may have been able to accurately assess changes in negative symptomatology independent of symptom remission. Of particular interest is the significant improvement in negative symptoms over the course of one year in the absence of significant decreases in depression. This replicates findings reported from an historically controlled study conducted at EPPIC, in which patients treated at EPPIC demonstrated sustained improvement in negative symptoms that were not observed for the historical control group, despite low and constant levels of depression for both groups (McGorry et al., 1996). The controlled EPPIC study did not control for doses or duration of antipsychotic medication treatment, and similarly for the purposes of the present study, we did not examine changes in medications across time periods. Therefore, it is possible that changes in negative symptom levels may be impacted by changing antipsychotic medication profiles, as was observed in the OPUS trial (Petersen et al., 2005a). Nonetheless, these findings may point to an ability of specialized early intervention to impact negative symptoms, which have traditionally shown less improvement in standard care (Harvey et al., 2007).

The reduction in the rate of substance abuse over the course of the study also adds to the growing body of literature indicating that multi-element treatment for early psychosis is associated with rapid decline in substance abuse over the first several months of treatment

(Carr, Norman, & Manchanda, 2009; Hinton et al., 2007). It is particularly notable that these reductions in substance abuse occur despite the absence of a specialized substance abuse intervention (Addington & Addington, 2001b; Archie et al., 2007; Hinton et al., 2007; Petersen et al., 2007). At OASIS, targeted substance abuse interventions (i.e. substance abuse assessment, individual and group sessions led by a certified substance abuse counselor following the integrated dual diagnosis modality of treatment) were developed after the first several years of clinic operation and therefore were not available to a large proportion of the study sample. During the initial years of clinic operation, substance abuse was addressed in psychoeducation provided in groups, individual therapy, and psychiatrist visits according to a phase-specific model of care for early psychosis. Although substance abuse reductions did not reach statistical significance in this study, these findings suggest that substance abuse is a potentially malleable treatment target in early intervention.

A central finding of this study is that individuals receiving care at OASIS demonstrated significant improvements across functional outcome domains over the course of the first year of treatment. Individuals were significantly more likely to be involved in school at one year than at baseline, and there was a trend-level improvement in occupational status as demonstrated by an increased proportion of individuals working or attending school at least half-time at one year. In addition, the proportion of individuals neither in work nor school at one year (31%) is lower than reported at another multi-element treatment center (36% at EPP) (Addington, 2009), and in both the integrated and control arms of the OPUS trial (42% and 53%, respectively)(Petersen et al., 2005b). Improvement in objective functional outcomes are further demonstrated on a multi-dimensional measure of role functioning, wherein after one year of treatment at OASIS, individuals were significantly

more likely to have adequate to optimal role functioning across role functioning domains than they were at baseline, and these improvements demonstrated moderate to large effect sizes.

It is notable that subjective experiences of recovery were among the few indices on which no significant improvement was observed. On the other self-reported measure in our battery, (i.e. the OQ), there was significant improvement in the symptom distress and social role domains, but not in the interpersonal relationship domain. This may point to the distinction between subjectively and objectively assessed functional outcomes, wherein an improvement in the size or availability of social networks (as evidenced in the significant improvements in the Immediate and Extended Social Networks items of the RFS) may not necessarily be associated with increased satisfaction with those networks or relationships (Priebe et al., 2000). It should be noted, however, that the average baseline score on the RAS was quite high (corresponding to a mean item score of 4.1 on a 5-point agreement scale). Therefore, one possible interpretation of the non-significant improvement on this measure is that many individuals may have been experiencing a positive sense of recovery at baseline which remained unchanged over the course of the study.

The pattern of findings among one-year outcomes in this study may help further elucidate relationships between intra- and interpersonal facets of the broader recovery experience. The RAS has previously demonstrated significant positive associations with self-esteem, empowerment and social support (Corrigan et al., 1999). Additionally, a previous report examining baseline characteristics amongst a subset of individuals included in the present study found that greater perceived social support and lower levels of depression were significant predictors of psychological well-being, a component of subjective quality of life

that taps positive aspects of mental health and wellness that are consistent with the recovery concept (Uzenoff et al., in press). Taking these preliminary findings into consideration, the lack of significant improvements in depression, experiences of recovery, and satisfaction with interpersonal relationships in this study highlights the complex relationships between subjective components of recovery from an initial psychotic episode.

Finally, care at OASIS was associated with a low hospitalization rate, as compared to other early psychosis treatment programs as well as to standard care. Twenty-seven percent of individuals treated at OASIS were hospitalized during their first year of treatment, which is similar to rates reported at two Canadian multi-element programs for FEP (i.e. 27-30%) (Addington et al., 2009), though rates from 5-59% have been reported elsewhere (Addington, 2009; Petersen et al., 2005a). This is also lower than a 12-month rehospitalization rate (36.5%) reported in an epidemiological study of standard care for individuals recently experiencing an initial hospitalization for psychotic disorders (Craig, Fennig, Tanenberg-Karant, & Bromet, 2000). There was only one death due to suicide, and this rate of 0.6% is comparable with rates of suicide in the integrated care arm of the OPUS trial as well as the EPP program (Addington et al., 2004b).

Predictors of Functional Outcomes

This study proposed a novel definition of functional remission including adequate to optimal role functioning in the areas of occupational involvement, independent living skills, and involvement with social networks, as well as at-least half-time work or school involvement. By this definition, there was a significant increase in the proportion of individuals meeting functional remission criteria from baseline to one year, and like symptom remission, fewer were able to sustain this level of functioning for two consecutive

study visits. It is notable that in all cases, the sustained functional remission occurred between six months and one year, suggesting that enduring functional gains may take longer than symptomatic ones. Rates of functional remission were also much lower than rates of symptom remission, which has been widely observed in early psychosis using varying definitions of functional recovery (Cassidy et al., 2009; Crumlish et al., 2009; Emsley et al., 2006; Menezes et al., 2009; Petersen et al., 2008; Whitehorn, Brown, Richard, Rui, & Kopala, 2002; Wunderink et al., 2009).

To better understand the relationship between clinical risk factors during the early course of treatment and comprehensive indices of recovery, we examined the impact of symptom remission, substance abuse, and medication adherence on several different functional outcomes. Symptom remission emerged as a significant predictor of role functioning across visits during the first year of treatment, which supports previous associations between symptom remission and clinician-rated functional outcomes (Boden et al., 2009; Helldin et al., 2007; van Os et al., 2006b). This finding contributes to the predictive validity of the symptom remission criteria set forth by the Remission in Schizophrenia Working Group within early psychosis populations, which has only been examined in two previous studies (Cassidy et al., 2009; Wunderink et al., 2009). The finding that symptom remission contributed significantly to changes in role functioning across domains provides support for the use of this measure as a clinically sensitive predictor of functional outcomes in first-episode psychosis, and contributes to a growing body of research indicating that symptom remission may be a necessary, but not sufficient, step towards functional recovery (Andreasen et al., 2005; Robinson et al., 2004; van Os et al., 2006a).

This study also adds to findings suggesting that substance abuse over the early course of treatment has a negative impact on functional outcomes (Lambert et al., 2005; Wade et al., 2007). Whereas those abusing substances had higher role functioning at baseline and six months, by one year, these individuals were functioning at a lower level than those not abusing substances. In contrast, role functioning continued to improve for those who were not abusing substances over the course of the year. These findings point to the importance of developing interventions to detect and reduce persistent substance use during the early course of treatment, as has been done by Edwards and colleagues at EPPIC (Edwards et al., 2006; Edwards et al., 2003). These results are also consistent with evidence that, even for those abusing substances at the time of entry to treatment, substance discontinuation following an initial psychotic episode contributes to improved outcomes (González-Pinto et al., 2009).

Surprisingly, neither symptom remission, substance abuse, nor medication adherence significantly predicted functional remission in our sample, nor did they predict one of its component criteria, working or attending school half-time or more. There are several potential explanations for these findings, including the likelihood that these binary measures were not sensitive enough to detect meaningful differences in a relatively small sample. In particular, the number of individuals achieving functional remission was quite low at each visit. It is also possible that the one year follow-up period was not long enough for most individuals to achieve the functional benchmarks examined in these analyses. For instance, Boden and colleagues (2009) found that at five years following initial presentation for an initial psychotic episode, symptom remission significantly predicted working or studying half-time or more, and symptom remission discriminated between those with ‘good outcome’ in three different areas of functioning and those without. It is possible that both symptom

remission and substance abuse would show stronger associations to these objective measures of recovery in a longer-follow-up study.

We also did not find any significant predictors of subjective recovery experiences in early psychosis. Previous studies have reported a significant impact of symptom remission on subjective outcomes, including satisfaction with life (Boden et al., 2009), well-being (Lambert et al., 2006) and self-reported quality of life (Emsley et al., 2007). There was a substantial amount of missing data from this measure, which may have limited our ability to detect relationships between recovery experiences and our predictor variables.

Older age at the time of referral predicted significantly higher role functioning, working or attending school half-time or more, and being in functional remission. This robust effect likely points to a strong association between age of referral and age of illness onset, which has been observed in other early intervention studies (Malla et al., 2006) and is a primary marker of successful efforts at early identification. Indeed, age of illness onset is a well-known predictor of outcome in psychotic disorders, with younger age of illness onset showing significant associations to poorer long-term outcomes (DeLisi, 1992; Häfner, Löffler, Maurer, Hambrecht, & an der Heiden, 1999; Ho, Andreasen, Flaum, Nopoulos, & Miller, 2000). Unfortunately, we did not have a sensitive measure of duration of untreated illness, DUP, or premorbid adjustment, and therefore it is difficult to make definitive conclusions regarding this finding.

Despite the missing data in this study, it appears that findings were not biased by differential patterns of attrition within the study cohort. However, sensitivity analyses revealed that individuals who left treatment against clinician recommendation experienced decreases in subjective sense of recovery early in the course of treatment. Given the fact that

this was the only significant difference to emerge between missing-data groups, these findings should be interpreted cautiously. However, this finding highlights the importance of fostering recovery-oriented attitudes and goals within individual and group therapies, as well as assessing subjective experiences of recovery as a means of reducing treatment disengagement during the critical period.

Strengths and Limitations

This study has multiple strengths. The prospective longitudinal study design allowed for careful examination of the characteristics of an early psychosis cohort presenting to a specialized, phase-specific treatment program, as well as the course of the first year of treatment. There have been few epidemiological studies of first-episode psychosis conducted in the US (e.g. Bromet et al., 1992; Tohen et al., 1992), and each of these has examined presentation and course in standard, rather than specialized care. Indeed, this is the first examination of a multi-element treatment center for early psychosis in the US. The use of well-validated measures of symptoms, a consensus definition of symptom remission, and both subjective and objective measures permit comparisons of key outcomes across the early intervention literature based on standards of care set forth in the International Declaration on Early Psychosis (Addington, 2009; Addington et al., 2005; Addington et al., 2009; Addington et al., 2007b; Bertolote & McGorry, 2005). Findings highlight the possible efficacy of the OASIS treatment model across domains of recovery while expanding the growing literature regarding predictors and correlates of the early treatment course.

Despite the benefits of the study's naturalistic prospective design, the lack of a control sample is one of the study's chief limitations. While we have made efforts to assess the representativeness of the OASIS sample within its immediate geographic surroundings

and to compare the clinical changes observed over the course of one year with those observed in other programs, without a direct control sample, we cannot confidently infer that outcome changes were due to the treatment offered at OASIS. A second caveat pertains to the short follow-up period examined in the present study. Mid- to long-term follow-up studies of cohorts receiving specialized early intervention services have thus far returned mixed evidence regarding the durability of treatment gains (Addington & Addington, 2008a; Bertelsen et al., 2008; Mihalopoulos et al., 2009). Longer follow-up periods are needed to better understand the more prolonged recovery trajectory. A central point of investigation for longer-term follow-up studies is determining rates of treatment “completion,” though this remains a complex determination that will vary from program to program based on treatment model. At OASIS, treatment is offered for five years (including maintenance medication management visits on a biannual basis), however other services have limited services to two (Malla et al., 2003; McGorry et al., 1996; Petersen et al., 2005b) to three years (Addington & Addington, 2001a) with varying protocols for maintenance medication management and follow-up.

Because study evaluations were conducted as part of routine care, full-time clinicians were charged with completing all rater-based study assessments. One consequence of this approach to data collection is that raters were not trained to reliability for the purpose of this study. Furthermore, because data was collected before or during sessions otherwise dedicated to case management, therapy, and medication management, the demands of clinical care may naturally have taken precedence over data collection and/or entry, thereby contributing to some of the missing data in this study. Given that the majority of missing data forms were self-report measures, it is also possible that there was some resistance on the part of patients

to filling out forms during visits. One solution to ensuring that data are more routinely collected in this type of setting is to increase the extent to which the data is incorporated directly into care and fed back to clients at each point in the service provision chain. Consistent outcome evaluation may represent an ongoing administrative challenge for programs with fewer resources.

Other limitations of this study include the lack of an adequate measure of DUP. Although information regarding the onset of symptoms was routinely collected during clinic intake assessments, calculations of DUP were discontinued within the first year of the clinic's operation due to concerns regarding the validity of client- and family-report during unstructured intake assessments. Other measurement issues include an inability to confirm whether or not symptom remission was sustained for a period of at least six months, given that assessments were only conducted at six month intervals. As mentioned previously, a strength of this study was a newly proposed definition of functional recovery, however this binary measure may not have been sensitive enough to detect meaningful differences.

Conclusions

Over the past 20 years, the multi-element treatment model has developed to fill a need for timely, comprehensive, phase-specific care in early psychosis. This study provides preliminary evidence for the efficacy of a US-based multi-element treatment center in addressing the clinical needs of an early psychosis population and improving short-term outcomes. Furthermore, this study provides novel insights regarding the impact of substance abuse and symptom remission on functional outcomes in early psychosis, and highlights the need for efforts to improve treatment engagement and retention in this population. Remaining challenges include tailoring interventions to address depression and experiences

of well-being, hope, self-efficacy and empowerment, given findings that dimensions of recovery may not improve concurrently with traditional symptom indices. Additionally, because rates of achieving functional benchmarks remain quite low within the first year of treatment, the potential benefits of vocational training should continue to be evaluated in this population (e.g. Killackey et al., 2008). Continued evaluation of a multi-element treatment model is a necessary component of ongoing efforts to identify best practice in intervention for early psychosis, and in providing widespread access to optimal, evidence-based care.

Table 1.

Schedule of study assessments.

	Intake	Baseline	6 months	1 Year	Discharge
Demographics	X		X	X	X
Health Insurance status	X		X	X	X
School/Vocational status	X		X	X	X
DSM-IV diagnosis		X	X	X	X
BPRS		X	X	X	X
GAF		X	X	X	X
AUS/DUS		X	X	X	X
OQ		X	X	X	X
RFS		X	X	X	X
RAS		X	X	X	X
Hospitalizations		X	X	X	X

Note. All assessments collected at the 6 month visit are collected at each 6 month interval thereafter (i.e. 12 months, 18 months, etc.) for the duration of the patient’s engagement with the clinic. Multiple discharges are possible if care is reinstated at OASIS after an initial discharge. Demographic information, health insurance status, and school/vocational status are first obtained at intake to the clinic, and then subsequently reviewed and updated at each subsequent visit. BPRS = Brief Psychiatric Rating Scale; GAF = Global Assessment of Functioning; AUS/DUS = Alcohol Use Scale/Drug Use Scale; OQ = Outcome Questionnaire; RFS = Role Functioning Scale; RAS = Recovery Assessment Scale.

Table 2.

Demographics for OASIS Study Cohort

	Male	Female	Total
Subjects, <i>n</i>	110	53	163
Age, <i>M (SD)</i>	22.7 (4.2)	24.0 (5.1)	23.1 (4.5)
Race, <i>n</i>			
White/Caucasian	81	26	107
African American/Black	23	21	44
Asian	5	3	8
Hispanic/Latino	0	3	3
Native American	1	0	1
Marital status, <i>n</i>			
Never been married	104	45	149
Married	4	4	8
Divorced	2	2	4
Separated	0	2	2
Living situation, <i>n</i>			
Private residence	100	49	149
Group home	9	2	11
Transitional housing	0	2	2
Support apartments	1	0	1

Table 3.

Baseline Characteristics of OASIS Subsample vs. NC-TOPPS Early Psychosis Sample

	OASIS (<i>N</i> = 22)	NC-TOPPS (<i>N</i> = 1439)
Ethnicity (%)		
African-American	41%	60%
White-Caucasian	55%	33%
Other	5%	7%
Sex (% male)	68%	69%
Living Situation (% private residence)	77%	75%
Marital Status (% never married)	91%	87%
Employment (% in labor force)	55%	51%
Under Correctional Supervision (%)	9%	9%
History of Arrest (%)	23%	32%
Substance Abuse Diagnosis (%)	14%	18%
Substance Dependence Diagnosis (%)	23%	14%
Global Functioning ^a <i>M</i> (<i>SD</i>), <i>Mdn</i> , range	51.09 (12.17), 50, 35-80	42.64 (8.52), 41, 15-85

Note. There were differences in the methods of ethnic categorization between the two datasets: within the OASIS database, “Hispanic/Latino/Spanish” was considered to be a distinct ethnic category, and within the NC-TOPPS database, “Hispanic/Latino/Spanish origin” was recorded independently from ‘Race/Ethnicity.’ Therefore, for the OASIS sample, the 5% of clients identified as Hispanic/Latino/Spanish are included in the ‘Other’ category in this table. Within the NC-TOPPS sample, the 4% of clients identified as being of Hispanic/Latino/Spanish origin may be represented within any of the racial/ethnic designations included in this table. Percentages for substance abuse and substance dependence included for the OASIS sample include those in either active or partial remission. Remission status was not specified within the NC-TOPPS data available for this study.

Global functioning was measured using the Global Assessment of Functioning (GAF); NC-TOPPS data available for *N* = 1419.

Table 4.

Service Utilization (Number of Contacts) By Intervention Type and Insurance Status

	Type of Insurance														
	Self-Pay (n = 35)			Medicaid/Medicare (n = 28)			Private (n = 96)			Medicaid/care + Private (n = 3)			All insurance types (N = 163)		
	M	(SD)	Mdn	M	(SD)	Mdn	M	(SD)	Mdn	M	(SD)	Mdn	M	(SD)	Mdn
Medication Management	8.77	(10.81)	5.00	10.64	(11.86)	6.50	7.29	(7.14)	6.00	26.67	(19.50)	27.00	8.54	(9.50)	6.00
Individual Therapy	7.97	(12.45)	1.00	2.43	(5.37)	0	5.55	(8.80)	1.00	7.67	(13.28)	0	5.54	(9.39)	1.00
Group Therapy	1.20	(3.71)	0	0.29	(0.71)	0	1.78	(4.38)	0	2.33	(4.04)	0	1.40	(3.84)	0
Family Therapy	1.43	(3.60)	0	1.64	(1.89)	1.00	1.45	(2.13)	1.00	5.33	(7.51)	1.00	1.54	(2.64)	1.00
Multi-Family Therapy	1.23	(3.80)	0	1.32	(3.87)	0	1.35	(2.81)	0	5.67	(8.96)	1.00	1.39	(3.39)	0
Initial Assessment	1.29	(0.79)	1.00	0.96	(0.88)	1.00	1.45	(0.77)	2.00	2.00	(0.00)	2.00	1.34	(0.80)	2.00
Phone Contact	0.31	(1.21)	0	0.00	(.00)	0	0.36	(1.56)	0	0.00	(0.00)	0	0.28	(1.32)	0
Community Support	0.11	(0.68)	0	1.14	(3.93)	0	0.01	(0.10)	0	2.67	(4.62)	0	0.28	(1.80)	0
Total # of contacts	22.31	(25.89)	11.00	18.43	(15.96)	12.00	19.25	(16.82)	13.00	52.33	(56.13)	31.00	20.31	(20.24)	13.00

Table 5.

Correlations between Service Utilization and One-Year Outcomes

	<i>Type of Service</i>						Total Hours
	Medication Management	Individual Therapy	Group Therapy	Family Therapy	Multi-family Therapy	Community Support	
<i>Outcome Measure</i>							
BPRS (Total)	.21	.13	-.06	.19	-.05	.12	.19
Positive	.17	.03	-.03	-.04	0	.12	.12
Activation	.14	.03	-.12	.21	-.09	0	.10
Negative	-.03	.02	.04	.03	.03	-.05	.01
Depression/ Anxiety	.16	.23*	-.13	.10	-.11	0	.15
GAF	-.28*	0	-.04	-.17	-.12	-.25*	-.23*
OQ (Total)	.14	-.16	.36*	-.15	-.15	.09	.03
Symptom Distress	.18	-.13	.38*	-.16	-.12	.12	.09
Interpersonal Relationships	.14	-.08	.28	-.08	-.14	-.01	.05
Social Role	-.04	-.30*	.29*	-.21	-.21	.07	-.17
RFS (Total)	-.31*	-.05	-.09	-.20	-.10	-.36**	-.29*
Working Productivity	-.42*	-.09	-.12	-.20	-.17	-.40**	.38**
Independent Living	-.22	.09	0	-.19	0	-.39**	-.15
Immediate Social Network	-.13	-.04	-.05	-.13	-.04	-.23	-.15
Extended Social Network	-.27*	-.14	-.16	-.18	-.11	-.23	-.31*
RAS	.04	.07	-.19	.11	.05	-.24	.04

Note. Significant correlations are bolded, * $p < .05$, ** $p < .01$.

BPRS = Brief Psychiatric Rating Scale; GAF = Global Assessment of Functioning; AUS/DUS = Alcohol Use Scale/Drug Use Scale; OQ = Outcome Questionnaire; RFS = Role Functioning Scale; RAS = Recovery Assessment Scale.

Table 6.

Symptom and Functional Outcomes at Baseline and Over Course of One Year

	Total Sample			Paired Sample							
	Baseline			Baseline		1 Year		<i>t</i>	<i>p</i>	<i>d</i>	
	<i>N</i>	<i>M</i>	(<i>SD</i>)	<i>n</i>	<i>M</i>	(<i>SD</i>)	<i>M</i>				(<i>SD</i>)
BPRS (Total)	121	39.57	(10.86)	66	38.77	(10.65)	33.12	(8.50)	3.82	<.001**	0.47
Positive		7.35	(4.00)		6.92	(3.60)	5.64	(2.94)	2.50	.015*	0.31
Activation		5.48	(2.03)		5.35	(1.88)	4.64	(1.08)	2.95	.004**	0.36
Negative		5.11	(2.56)		5.41	(2.72)	4.52	(2.21)	2.55	.013*	0.31
Dep/Anx		7.36	(3.33)		7.08	(3.24)	6.32	(2.64)	1.71	.092	0.21
GAF	162	50.51	(11.42)	84	49.98	(10.62)	65.52	(15.23)	-9.56	<.001**	-1.04
OQ (Total)	94	64.20	(26.27)	28	57.43	(25.05)	45.61	(26.38)	2.94	.007**	0.56
Symptom Distress		37.02	(16.33)		33.71	(16.14)	25.46	(15.93)	2.99	.006**	0.56
Interpers. Relation.		14.72	(6.98)		12.36	(5.95)	11.75	(7.06)	0.71	.481	0.13
Social Role		12.46	(5.48)		11.36	(5.57)	8.39	(4.96)	3.17	.004**	0.60
RFS (Total)	121	17.14	(5.28)	55	16.75	(5.19)	20.36	(5.25)	-6.08	<.001**	-0.82
Working Productivity		3.48	(1.92)		3.29	(1.94)	4.62	(1.99)	-5.83	<.001**	-0.79
Independent Living		4.44	(1.58)		4.42	(1.65)	5.24	(1.50)	-3.82	<.001**	-0.52
Immediate Soc. Netwk		4.74	(1.37)		4.78	(1.26)	5.53	(1.12)	-4.77	<.001**	-0.64
Extended Soc. Netwk		4.48	(1.36)		4.25	(1.31)	4.98	(1.35)	-4.30	<.001**	-0.58
RAS (Total)	102	166.01	(21.52)	29	167.62	19.48	175.00	25.03	-1.54	0.134	-0.29

BPRS = Brief Psychiatric Rating Scale; GAF = Global Assessment of Functioning; AUS/DUS = Alcohol Use Scale/Drug Use Scale; OQ = Outcome Questionnaire; RFS = Role Functioning Scale; RAS = Recovery Assessment Scale. * $p < .05$, ** $p < .01$.

Table 7.

Occupational Status for Subsample with Paired Data at Baseline and One Year (N = 86)

Employment Status	Baseline				One Year			
	School Involvement			Total (%)	School Involvement			Total (%)
	None	< Half-time	≥ Half-time		None	< Half-time	≥ Half-time	
Unemployed	48.8%	10.5%	4.7%	64%	31.4%	20.9%	5.8%	58.1%
Working < Half-time	7.0%	4.7%	0%	11.6%	4.7%	7.0%	0%	11.6%
Working ≥ Half-time	23.3%	1.2%	0%	24.4%	27.9%	2.3%	0%	30.2%
Total (%)	79.1%	16.3%	4.7%	100%	64%	30.2%	5.8%	100%

Table 8.

Symptom and Functional Remission Status for Subsample with Paired Data at Baseline and One-Year

	Baseline	One Year
	<i>n</i> (%)	<i>n</i> (%)
<i>All available paired data</i>		
Symptom Remission (severity criterion only) (<i>N</i> = 66)	27 (41%)	45 (68%)
Functional Remission (<i>N</i> = 55)	2 (4%)	7 (13%)
<i>Only cases with both symptom and functional remission data (N = 43)</i>		
Symptom Remission (severity criterion only)	15 (35%)	27 (63%)
Functional Remission	1 (2%)	4 (9%)
Of those in symptom remission, % in functional remission	1 (7%)	3 (11%)
Of those in functional remission, % in symptom remission	1 (100%)	3 (75%)
% meeting both symptom and functional remission criteria	1 (2%)	3 (7%)

Note. All data in this table consider symptom remission as defined only by the severity (i.e. mild or less) criterion.

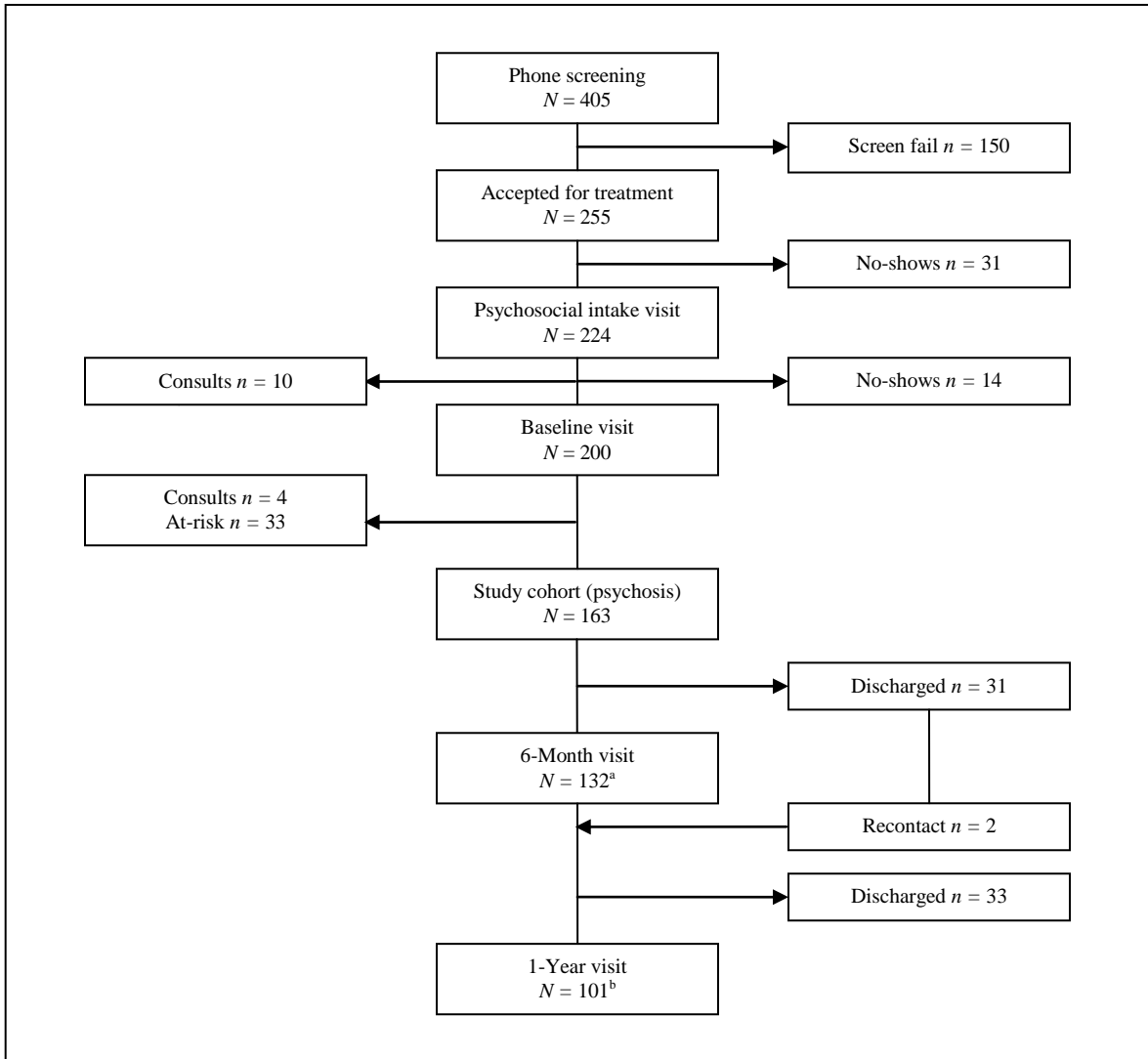
Table 9.

Correlations among GEE predictors and covariates

	Substance Abuse	Medication Nonadherence	Symptom Remission	Sex	Age
Substance Abuse	—	.12	-.11	-.20**	-.09
Medication Nonadherence		—	-.06	.11	-.09
Symptom Remission			—	-.01	.07
Sex				—	.14**
Age					—

** $p < .01$

Figure 1. OASIS treatment flow for the period June 1, 2005—June 1, 2009.



Note. ^aData available for $N = 116$; ^bData available for $N = 87$.

Figure 2. Cumulative OASIS enrollment during the first 18 months of operation.

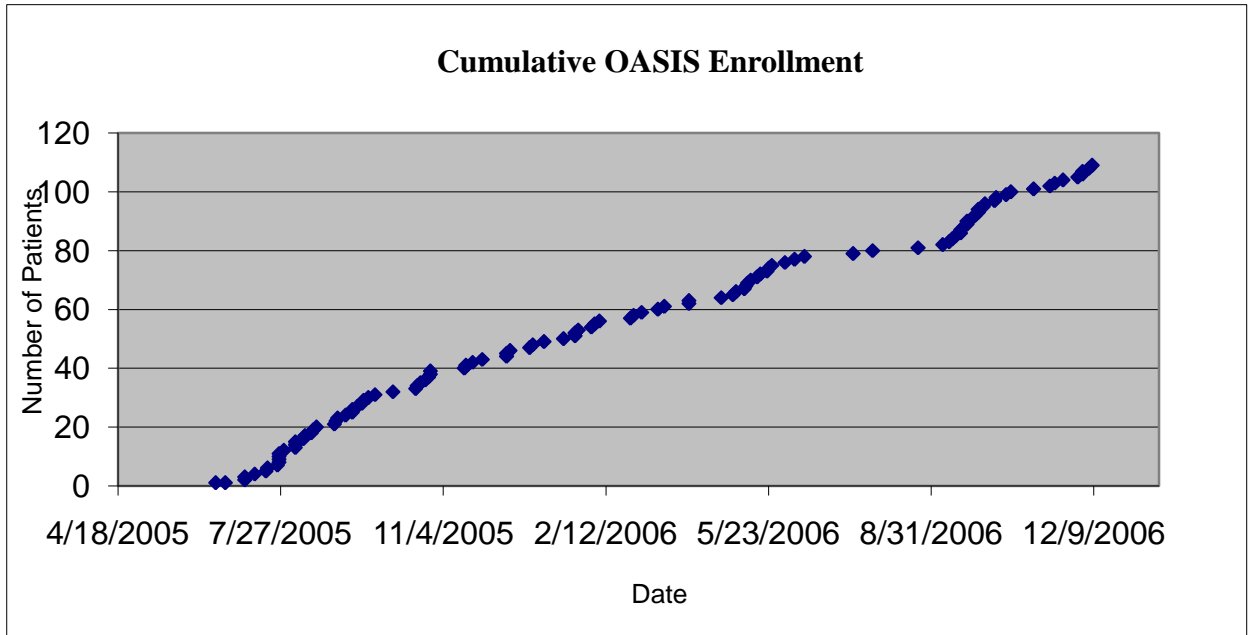
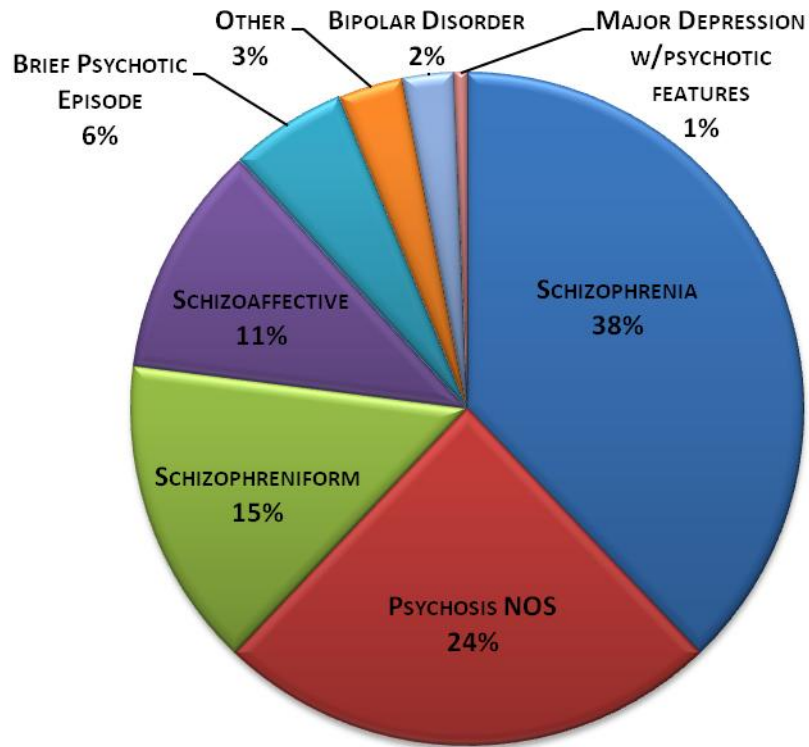


Figure 3. Primary diagnoses at baseline.



Note. Data available for $n = 161$

Figure 4. Interaction of substance abuse status by time in GEE model predicting RFS scores.

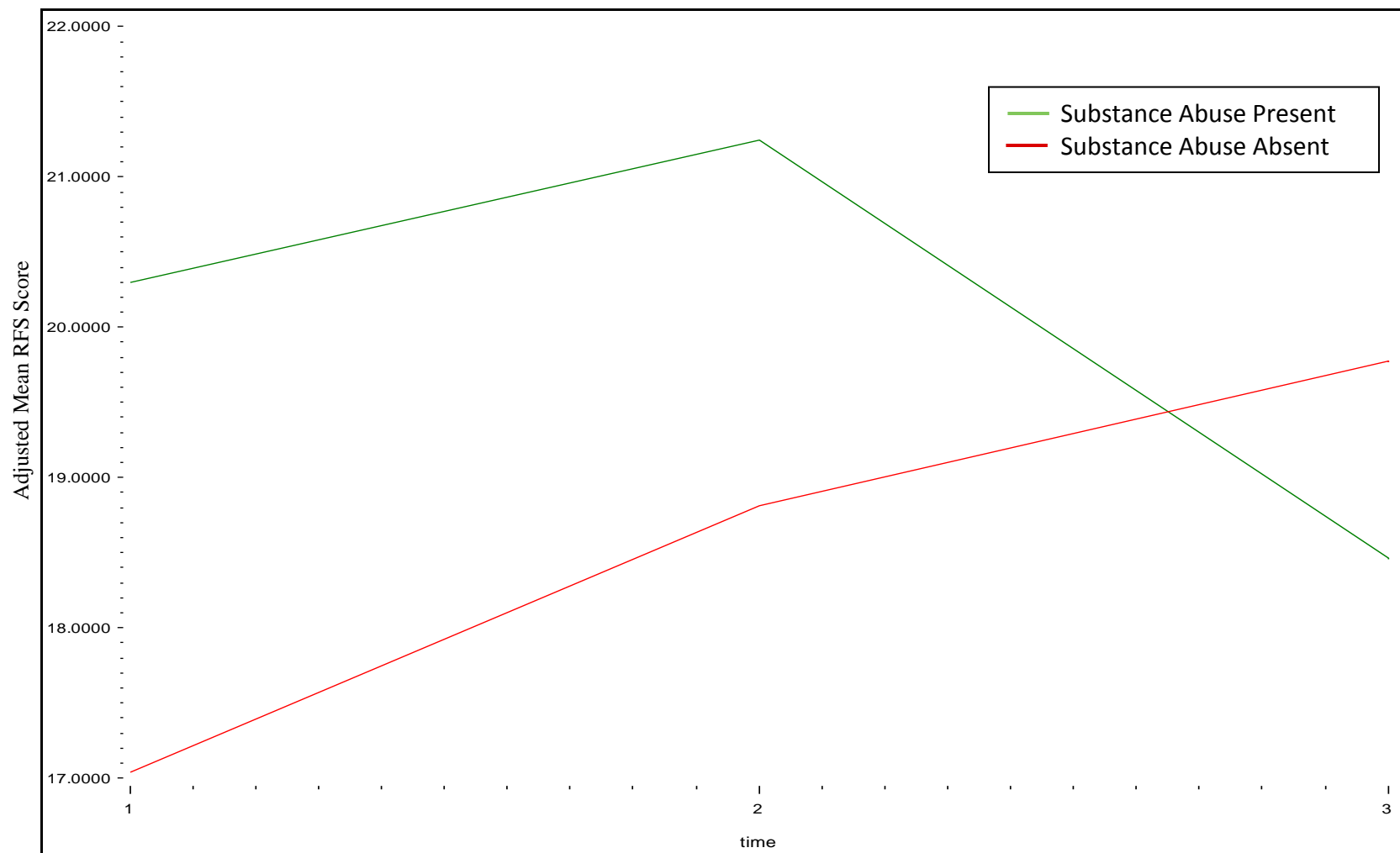
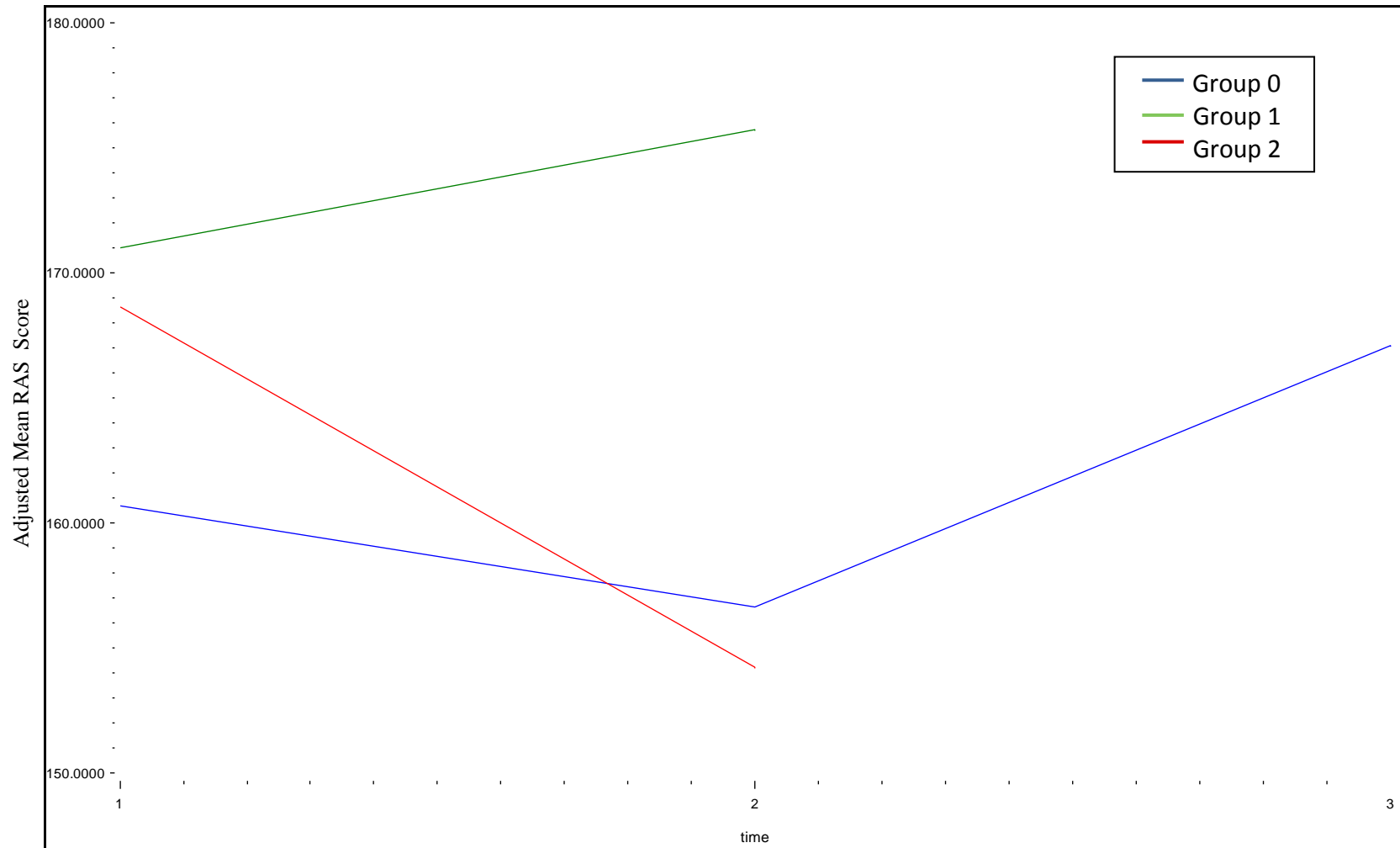


Figure 5. Interaction of missing data group by time in GEE model predicting RAS scores.



APPENDIX

Measures

Brief Psychiatric Rating Scale – Extended Versions (BPRS-E) (Lukoff, Liberman, & Nuechterlein, 1986)

Total scale ($\alpha = .80$)

- Item 1. Somatic concern
- Item 2. Anxiety
- Item 3. Depression
- Item 4. Suicidality
- Item 5. Guilt
- Item 6. Hostility
- Item 7. Elated Mood
- Item 8. Grandiosity
- Item 9. Suspiciousness
- Item 10. Hallucinations
- Item 11. Unusual thought content
- Item 12. Bizarre behavior
- Item 13. Self-neglect
- Item 14. Disorientation
- Item 15. Conceptual disorganization
- Item 16. Blunted affect
- Item 17. Emotional withdrawal
- Item 18. Motor retardation
- Item 19. Tension
- Item 20. Uncooperativeness
- Item 21. Excitement
- Item 22. Distractibility
- Item 23. Motor hyperactivity
- Item 24. Mannerisms and posturing

Items by Four-Factor Solution (Velligan et al., 2005)

***Positive symptoms* ($\alpha = .74$)**

- Item 10. Hallucinations
- Item 11. Unusual thought content
- Item 12. Bizarre behavior
- Item 15. Conceptual disorganization

***Activation* ($\alpha = .60$)**

- Item 19. Tension

- Item 21. Excitement
- Item 23. Motor hyperactivity
- Item 24. Mannerisms/Posturing

Negative Symptoms ($\alpha = .78$)

- Item 16. Blunted affect
- Item 17. Emotional withdrawal
- Item 18. Motor retardation

Depression/Anxiety ($\alpha = 0.76$)

- Item 2. Anxiety
- Item 3. Depression
- Item 4. Suicidality
- Item 5. Guilt

Outcome Questionnaire (OQ 45.2) (Lambert et al., 1996) – Items by subscale

Note. * indicates items that are reverse-scored.

Symptom Distress ($\alpha = .93$)

- 2. I tire quickly
- 3. I feel no interest in things
- 5. I blame myself for things
- 6. I feel irritated
- 8. I have thoughts of ending my life
- 9. I feel weak
- 10. I feel fearful
- 11. After heavy drinking, I need a drink the next morning to get going (If you do not drink, mark "never")
- 13.* I am a happy person
- 15. I feel worthless
- 22. I have difficulty concentrating
- 23. I feel hopeless about the future
- 24.* I like myself
- 25. Disturbing thoughts come into my mind that I cannot get rid of
- 27. I have an upset stomach
- 29. My heart pounds too much
- 31.* I am satisfied with my life
- 33. I feel that something bad is going to happen
- 34. I have sore muscles
- 35. I feel afraid of open spaces, driving, or being on buses, subways, and so forth
- 36. I feel nervous
- 40. I feel something is wrong with my mind
- 41. I have trouble falling asleep or staying asleep

42. I feel blue
45. I have headaches

Interpersonal Relations ($\alpha = .79$)

1. I get along well with others
7. I feel unhappy in my marriage/significant relationship
16. I am concerned about family troubles
17. I have an unfulfilling sex life
18. I feel lonely
19. I have frequent arguments
- 20.* I feel loved and wanted
26. I feel annoyed by people who criticize my drinking (or drug use) (if not applicable, mark "never")
30. I have trouble getting along with friends and close acquaintances
- 37.* I feel my love relationships are full and complete
- 43.* I am satisfied with my relationship with others

Social Role ($\alpha = .72$)

4. I feel stressed at work/school
- 12.* I find my work/school satisfying
14. I work/study too much
- 21.* I enjoy my spare time
28. I am not working/studying as well as I used to
32. I have trouble at work/school because of my drinking or drug abuse (if not applicable, mark "never")
38. I feel that I am not doing well at work/school
39. I have too many disagreements at work/school
44. I feel angry enough at work/school to do something I might regret

Total Score ($\alpha = .95$)

Recovery Assessment Scale (Giffort et al., 1995)

Total score ($\alpha = .96$)

1. I have desire to succeed
2. I have goals in life that I want to reach
3. I believe I can meet my current personal goals
4. I have a purpose in life.
5. I like myself
6. I have an idea of who I want to become
7. I'm hopeful about my future
8. I continue to have new interests
9. It is important to have fun

10. Being able to work is important to me
11. It is important to have healthy habits
12. It is important to have a variety of friends
13. Even when I don't care about myself, other people do
14. I know when to ask for help
15. I am willing to ask for help
16. I ask for help, when I need it
17. I have people I can count on
18. If people really knew me, they would like me
19. Even when I don't believe in myself, other people do
20. I can handle what happens in my life
21. Things happen for a good reason
22. Something good will eventually happen
23. I am the person most responsible for my own improvement
24. I can learn from my mistakes
25. I can handle stress
26. I have my own plan for how to stay or become well
27. I understand how to control the symptoms of my mental illness
28. I can handle it if I get sick again
29. I can identify what triggers the symptoms of my mental illness
30. I can help myself become better
31. Fear doesn't stop me from living the way I want to
32. I know that there are mental health services that do help me
33. There are things that I can do that help me deal with unwanted symptoms
34. I am a better person than before my experience with mental illness
35. Although my symptoms may get worse, I know I can handle it
36. If I keep trying, I will continue to get better
37. Coping with my mental illness is no longer the main focus of my life
38. My symptoms interfere less and less with my life
39. My symptoms seem to be a problem for shorter periods of time each time they occur
40. I can identify the early warning signs of becoming sick
41. I know what helps me get better

Role Functioning Scale (Goodman et al., 1993)

Total score ($\alpha = .86$)

Score:	Working Productivity Rate the client primarily in the most appropriate expected role (i.e. homemaker, student, wage earner).	Independent Living, Self Care (Management of household, eating, sleeping, hygiene care)	Immediate Social Network Relationships (Close friends, Spouse, Family)	Extended Social Network Relationships (Neighborhood, community church, clubs, agencies, recreational activities).
1	Productivity severely limited; often unable to work or adapt to school or homemaking; virtually no skills or attempts to be productive.	Lacking self-care skills approaching life endangering threat; often involves multiple and lengthy hospital services; not physically able to participate in running a household.	Severely deviant behaviors within immediate social networks (i.e. often with imminent physical aggression or abuse to others or severely withdrawn from close friends, spouse, family; often rejected by immediate social network).	Severely deviant behaviors within extended social networks (i.e. overtly disruptive, often leading to rejection by extended social networks).
2	Occasional attempt at productivity unsuccessfully; productive only with constant supervision in sheltered work, home or special classes.	Marked limitations in self-care/ independent living; often involving constant supervision in or out of protective environment (e.g. frequent utilization of crisis services).	Marked limitations in immediate interpersonal relationships (e.g. excessive dependency or destructive communication or behaviors).	Often totally isolated from extended social networks, refusing community involvement or belligerent to helpers, neighbors, etc.
3	Limited productivity; often with restricted skills/abilities for homemaking, school, independent employment (e.g. requires highly structured routine).	Limited self-care/independent living skills; often relying on mental/physical health care; limited participation in running household.	Limited interpersonally; often no significant participation/ communication with immediate social network.	Limited range of successful and appropriate interactions in extended social networks (i.e. often restricts community involvement to minimal survival level interactions).
4	Marginal productivity (e.g. productive in sheltered work or minimally productive in independent work; fluctuates at home, school, in school; frequent job changes.)	Marginally self sufficient; often uses REGULAR assistance to maintain self-care/independent functioning; minimally participates in running household.	Marginal functioning with immediate social network (i.e. relationships are often minimal and fluctuate in quality).	Marginally effective interactions; often in a structured environment; may receive multiple public system support in accord with multiple needs.
5	Moderately functional in independent employment, at home or school. (Consider very spotty work history or fluctuations in home, in school with extended periods of success).	Moderately self-sufficient; i.e. living independently with ROUTINE assistance (e.g. home visits by nurses, other helping persons, in private or self-help residences).	Moderately affective continuing and close relationship with at least one other person.	Moderately affective and independent in community interactions; may receive some public support in accord with need.
6	Adequate functioning in independent employment, home or school; often not applying all available skills/abilities.	Adequate independent living & self care with MINIMAL support (e.g. some transportation, shopping assistance with neighbors, friends, other helping persons).	Adequate personal relationship with one or more immediate member of social network (e.g. friend or family).	Adequately interacts in neighborhood or with at least one community or other organization or recreational activity.
7	Optimally performs homemaking, school tasks or employment-related functions with ease and efficiency.	Optimal care of health/hygiene; independently manages to meet personal needs and household tasks.	Positive relationships with spouse or family and friends; assertively contributes to these relationships.	Positively interacts in community; church or clubs, recreational activities, hobbies or personal interests, often with other participants.

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