IDENTIFYING LATENT GROUPS OF INDIVIDUALS WITH FIRST EPISODE PSYCHOSIS BASED ON SOCIAL RELATIONSHIPS: A RECONSIDERATION OF SOCIAL FUNCTIONING

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ABSTRACT

Emily C. Gagen: Identifying Latent Groups of Individuals With First Episode Psychosis Based on Social Relationships: A Reconsideration of Social Functioning
(Under the direction of David L. Penn)

First episode psychosis (FEP) occurs at an important developmental time for adolescents and young adults when social relationships are of particular importance. The concept of social functioning in psychosis has frequently utilized concepts from the chronic serious mental illness (SMI) literature and as such, can lack emphasis on these relationships as being critical components of an individual's illness and recovery. Ascertaining potential patterns of social functioning in FEP individuals can help guide treatment and identify important ways in which individuals differ in this area. The current study used latent class analysis (LCA) to identify subgroups of FEP individuals presenting for treatment at three coordinated specialty care clinics (n=134). Groups were identified based on satisfaction with social relationships and frequency of in-person and electronic communication with peers, family, and significant others. Groups were further characterized using demographic and clinical features. Linear and multinomial logistic regression models were utilized to determine the potential predictive relationships between duration of untreated psychosis (DUP), class membership, and for a subset of the sample, 6-month outcomes. Treatment goals set at baseline were also examined for their potential relationship to 6-month outcomes. LCA resulted in three classes: Class 1 (Dissatisfied) demonstrated the least satisfaction with their social relationships, reported the least frequent contact with others and greatest degree of symptom severity, particularly with regard to depression and avolition. Class 2 (Satisfied) reported the greatest degree of satisfaction

and reported frequent contact with peers and family, as well as the lowest degree of symptom severity. Class 3 (In-Between) reported mixed satisfaction and dissatisfaction as well as some contact with peers and family and moderate levels of symptoms. DUP was not found to be a significant predictor of class membership or of 6-month outcomes. Neither class membership nor treatment goals were predictive of 6-month outcomes. Results are consistent with previous efforts in this area, and they extend the findings of other studies that have based classification on premorbid adjustment. Nuanced approaches to defining social functioning in FEP are indicated, as are varied approaches to treatment based on objective and subjective indicators of social interactions and social relationships.

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FEP	First episode psychosis
SMI	Serious mental illness
DUP	Duration of untreated psychosis
LCA	Latent class analysis

INTRODUCTION

Psychotic disorders are among the most disabling of all mental illnesses; schizophrenia accounts for the largest expenditure for mental health in the United States, with an annual cost of $32.5 billion dollars (Thieda, Beard, Richter, & Kane, 2003), much of which is largely due to both repeat hospitalizations and lost wages. In an effort to mitigate the economic and emotional burden associated with chronic psychosis, research over the past 15 to 20 years has focused on specialized treatment for first episode psychosis (FEP) in particular. Importantly, FEP occurs during a critical time in adolescent and young adult development and can have a long-lasting impact on multiple aspects of an individual's life.

Research has struggled to reach consensus on a definition of "functioning" in the schizophrenia literature more broadly, and these issues have bled into FEP research. The focus of functioning is often on objective indicators such as vocational and educational status. While these aspects are clearly important, social relationships are also a key feature of functioning, particularly for young people. Additionally, researchers have often favored informant report over self-report, due to concerns about individuals with chronic schizophrenia being able to accurately report on themselves. While it is important to obtain a comprehensive picture of an individual's functioning, it is particularly important to understand an individual's subjective report of his or her experience in a first episode population. Particularly, an individual's level of life satisfaction is predictive of recovery from serious mental illness (Markowitz, 2001). Subjective experiences of recovery from FEP are complex and not always directly associated with symptom remission. Additionally, adolescent self-report can be divergent from parent and other informant report and

provides important information about the adolescent's experience that can be important and relevant for treatment. Having a clearer understanding of patterns of FEP individuals' experiences of social relationships and their satisfaction with them can provide guidance for clinicians when engaging clients in treatment, which in turn may lead to better engagement and better treatment outcomes.

The introduction will provide an overview of the most relevant background information concerning first episode psychosis and its overlap with important developmental milestones in late adolescence and early adulthood. This will lead to a discussion of the importance of social relationships in FEP, the ways in which they can be disrupted due to illness, and the long-term impact this can have on outcomes. The resulting importance of early intervention and the duration of untreated psychosis will be examined. Following this, a review of the varying ways in which recovery has been defined in schizophrenia and in FEP more specifically will be provided, including the ways in which current definitions from the chronic mental illness literature are lacking necessary components that are critically relevant to the FEP population. The importance of self-report of an individual's functioning will also be reviewed. Finally, there will be a brief discussion of the importance of identifying subgroups of individuals with psychosis, the ways in which this has been done thus far, and the gaps in knowledge that the present study can address. The introduction will end with elaboration of the present study, aims, and hypotheses.

Overview of First Episode Psychosis

Psychosis is generally characterized by a loss of contact with reality, which can include delusions (strong beliefs that are unlikely to be true and may seem irrational or illogical), and hallucinations (seeing, hearing, or otherwise sensing things that are not there). A psychotic

episode can also be marked by other significant symptoms like disorganization of thoughts, behavior, and speech, paranoia, and negative symptoms, such as avolition (loss of motivation), anhedonia (loss of pleasure or interest), and flat affect (McGorry, Edwards, Mihalopoulos, Harrigan, & Jackson, 1996).

In an effort to mitigate the economic and emotional burden associated with chronic psychosis, recent research has focused on first episode psychosis, in order to learn more about possible prevention and early intervention. There is currently no expert consensus on what defines first episode psychosis. Additionally, there is significant diagnostic heterogeneity among FEP individuals. Psychosis and, in turn, FEP, is not a diagnosis in itself, but is instead a symptom of a number of later mental illnesses, including brief psychotic disorder, major depression with psychotic features, schizophrenia, schizoaffective disorder, delusional disorder, and psychotic disorder not otherwise specified, among others. That said, predicting the ultimate diagnosis in those with FEP is considered less important than initiating treatment for current symptomatology as soon as possible. Despite initial symptom reduction, individuals with first episode psychosis often experience poor functional recovery, which includes general social functioning, quality of life, and occupational functioning (Penn, Waldheter, Perkins, Mueser, & Lieberman, 2005).

Developmental Relevance

Researchers and scholars have found it difficult to agree on a precise definition of adolescence, but it is generally thought to be between the ages of 12 to 24 (Newman & Newman, 2012). Adolescence has been characterized as "a period of turmoil and discontinuity" (Bandura, 2006, p. 6) and as a time of "storm and stress" (Harrop & Trower, 2001, p. 243). Significant biological, neurological, cognitive, emotional, and social changes take place during this time

(Cicchetti & Rogosch, 2002; Spear, 2000), making it both immensely important as well as difficult to navigate, especially given that most of these changes occur concurrently. It is a time of experimentation, comparisons, and interactions with one's environment when social and occupational skills are acquired and maintained (Chovil, 2005). While these changes take place on an individual level, most of them are also dependent to some degree on one's interactions with peers. Some have defined them as rites of passage (Delaney, 1995), citing three transition "tasks" that must be completed: from school to work, from family of origin to family of destination, and from living with parents to living apart from them (Coles, 2005). Others have argued that there are two basic psychological needs during adolescence: developing autonomy and individuation from family, and forging peer relationships (Harrop & Trower, 2001).

Broadly, social relationships are considered critical for mental health. Both social support and one's social network have been positively associated with both physical and mental health (Andrews, Gravin, Begley, & Brodie, 2003), mainly by protecting people from the negative effects of stress, often referred to as the stress buffering effect (Cohen & Willis, 1985). This occurs both through belonging and companionship, as well as perceived support from others (Thoits, 2011). While social relationships can comprise both family and peer relationships, friendships are of particular importance when considering contributors to social isolation and loneliness (Andrews et al., 2003). There is also an important distinction to be made between the two – social isolation is defined as the absence of a social network, which people may or may not find distressing, whereas loneliness is a lack of close relationships or attachment to another when those are desired aspects of one's existence (Perese & Wolf, 2005), otherwise known as a discrepancy between the social relationships one has and those one wishes to have (Asher & Paquette, 2003). Friendships are necessary to meet people's needs for attachment and emotional

support, and to relieve loneliness and promote a sense of well-being (Boydell, Gladstone, & Crawford , 2002). Social support and relationships have also been shown to be a robust predictor of outcomes in mental illness, including depression (e.g., Ezquiaga, Garcia, Pallares, & Bravo, 1999; George, Blazer, Hughes, & Fowler, 1989), bipolar disorder (e.g., Johnson, Lundström, Åberg-Wistedt, & Mathé, 2003), posttraumatic stress disorder (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003) and mental health and illness measured broadly (De Silva, McKenzie, Harpham, & Huttly, 2005; Tew et al., 2012).

Social relationships, specifically with one's peers, are also of particular importance to adolescents and young adults. An individual's ability to form, navigate, and maintain social relationships is arguably one of the most important skills developed and honed during this period. Close and meaningful friendships are integral to adolescent development, both as a means to explore and expand one's identity and independence as well as a major influence on close relationships in adulthood (Brown & Larson, 2009; La Greca & Harrison 2005). Intimate relationships formed in early adulthood also contribute to life satisfaction in later adulthood (Stein & Newcomb, 1999). Adolescent peer relationships also promote emotional and cognitive development and are protective against stressful life events and the development of anxiety and depression (Bukowski & Adams, 2005; La Greca & Harrison, 2005).

Adolescents report that social support, friendship development, and facilitation of social interaction are all benefits of affiliating oneself with a peer group (Brown, Eicher, & Petrie, 1986; Wiesner & Windle, 2004; Wight, Botticello, & Aneshensel, 2006). Lack of affiliation and connection with one's peers and the subsequent lack of a meaningful reference group and meaningful friendships at this critical juncture can lead to difficulties with personal health, work, increased vulnerability to stress, and the formation of intimate bonds (La Greca, Davila, &

Siegel, 2009). In particular, a supportive social network is a critical component of an individual's ability to accurately appraise and cope with stressful situations (Gunnar & Hostinar, 2015; Lazarus & Folkman, 1984). Problems with peer relationships in adolescence are stronger predictors of emotional dysfunction than are family problems (Nelson, Leibenluft, McClure, & Pine, 2005).

Generally, initial psychotic episodes rarely occur before the age of 14, but increase markedly in prevalence between the ages of 15 and 17 (Thomsen, 1996), and the median age of onset for psychotic disorders is the late teens through the early twenties (Kessler et al., 2007). Research has suggested that the majority of clinical and psychosocial deterioration occurs within the first 3-5 years after a first psychotic episode (Birchwood, Todd, & Jackson, 1998; Crumlish et al., 2009; Lieberman et al., 2001; Penn et al., 2005); the reasons for this can at least in part be attributed to the time in one's life when this event occurs. Experiencing such a disruptive and traumatic event at an already tumultuous time in an individual's life can cause significant derailment of important developmental processes, which can in turn have long-lasting effects into adulthood.

The developmental milestones most directly affected are largely consistent with the wider developmental literature (McGorry et al., 1996). These can include: disruption of the development and modification of attachments to both family and peers; one's family structure can become overly stressed and developmentally-appropriate individuation may be stunted; formation of one's identity may be undermined and confused; connecting to and bonding with a peer group may be inhibited, or one's peer group may move on, both developmentally and possibly geographically, leaving the individual without strong emotional connections outside of one's family; one's educational and vocational aspirations may be halted (Edwards & McGorry,

2002). Critical psychosocial influences on recovery develop within the first few years as well; families determine how they will respond to this event, relationships with mental health providers are formed, and the narrative of the individual's experience of this event is created (Birchwood et al., 1998). Multiple relapses due to suboptimal treatment leads to incomplete or unsustained remission, which in turn leads to chronic illness (Andreasen et al., 2005).

Perhaps most importantly, the onset of an initial psychotic episode is characterized by a "social network crisis" (Horan, Subotnik, Snyder, & Nuechterlein, 2006; Perry & Pescosolido, 2015), which is often not ameliorated by first episode services. Specifically, individuals early in psychosis have smaller social networks and fewer people to turn to during crises (Gayer-Anderson & Morgan, 2013; Macdonald, Hayes, & Baglioni, 2000), are more likely than controls to have no one they consider a "confidant" in their life (Morgan et al., 2008), and have significant periods of time per week without meaningful contact with others (Sündermann, Onwumere, Kane, Morgan, & Kuipers, 2014). Social networks can decrease in size over time, rather than increase as they do with individuals without serious mental illness (Perry & Pescosolido, 2012). These smaller networks and resulting low perceived social support are mainly due to having fewer friends rather than fewer family members (Sündermann et al., 2014). The nature of social relationships in individuals with serious mental illness (SMI) will be examined in greater detail next.

Social Relationships in SMI & FEP

Individuals with SMI often experience social isolation and loneliness, and frequently report greater exclusion in terms of intimate relationships as compared to people with chronic physical diseases (Richter, Eikelmann, & Reker, 2006). Loneliness has been identified as a fundamental problem in psychosis; a recent meta-analysis demonstrated a positive relationship

between the two (Michalska da Rocha, Rhodes, Vasilopoulou, & Hutton, 2017) and loneliness has been associated with poor social competence, more severe psychiatric symptoms, and lower life satisfaction (Heinrich & Gullone, 2006). Little other research has been done in this area, particularly with FEP individuals (Sündermann et al., 2014). A recent review of loneliness in individuals with psychosis identified only 10 studies where this was examined; in this review, loneliness was found to be associated with poor perceived social support, internalized stigma, and perceived discrimination (Lim, Gleeson, Jimenez, & Penn, in press). Individuals with schizophrenia report experiencing negative discrimination with regard to intimate and sexual relationships, and also anticipate discrimination when seeking such a relationship (Thornicroft et al., 2009). When examining the self-reported needs of individuals with SMI, interactions with others and intimate relationships often emerge as major themes, and greater need in these areas is associated with poorer subjective quality of life (Bengtsson-Tops & Hansson, 1999).

Indeed, social support and social interaction have been identified as critical components of recovery from SMI (Topor et al., 2006). People conceptualize their recovery as a social process, where having social relationships aids with maintaining a sense of continuity and being able to exert influence and control over one's life (Schön, Denjoy, & Topor, 2009). In a recent conceptualization of a framework for recovery from SMI based on qualitative analysis of interviews, the authors identified connectedness, which includes personal and family relationships as well as wider aspects of social inclusion, as a main process involved in successful recovery (Tew et al., 2011). In a similar qualitative analysis of interviews conducted with individuals with FEP, having feelings of connectedness and belonging was identified as a major component of subjective well-being (Lal et al., 2013).

The degree of social isolation and difficulty that individuals with schizophrenia experience with social relationships and social functioning can be hypothesized to be due to many different causes. Deficits in neurocognition were long thought to be the primary predictor of poor social functioning (e.g., Green, Kern, Braff, & Mintz, 2000). More recent research has demonstrated that social cognition is more strongly associated with functional outcomes than is neurocognition (Fett, Viechtbauer, Penn, van Os, & Krabbendam, 2011). Given the important period during which the onset of psychosis generally occurs, another important potential source of these impairments may be the disrupted (or absence of) close relationships during adolescence and young adulthood. Individuals with FEP report increasing isolation from peers and feelings of inequity, rejection, and instability in peer relationships (Mackrell & Lavender, 2004). FEP individuals also frequently report feeling lonely and lacking close friends or confidants in comparison to controls (Morgan et al., 2008; Sündermann et al., 2014). An individual's social network is considered crucial in the early stages of an illness as new challenges arise (Abbott, Bettger, Hanlon, Hirschman, 2012; Perry & Pescosolido, 2015). In FEP, social support from non-family members (i.e., peers) predicted outcome at 5-year follow up when support from family members did not (Erickson, Beiser, & Iacono, 1998). Yet family members often comprise most of the social network for individuals with schizophrenia (Erickson, Beiser, Iacono, Fleming, & Lin, 1989; Horan et al., 2006). This may be another consequence of individuals missing out on the opportunity to form significant close relationships with peers during adolescence and young adulthood, which underscores the importance of understanding the nature of social interactions in this population.

FEP individuals also perceive their social support to be lower than that of the general population (Song et al., 2011), and greater perceived social support is associated with fewer

psychiatric symptoms and improved quality of life and psychological well being in this population (Uzenoff, et al., 2010). Social support has also been shown to be a protective factor against relapse in first episode psychosis (Norman et al., 2005). It has even been suggested that disruptions in friendships can be conceptualized as both a causal factor and a maintenance factor in psychotic symptoms, such that peer rejection and isolation precipitate the onset of psychosis, which in turn lead to a further decline in an individual's social network, thus reinforcing the cycle of isolation (Harrop, Ellett, Brand, & Lobban, 2015).

Satisfaction with one's relationships is of particular importance when considering the impact that problems in these areas can have on one's functioning. General life satisfaction is negatively associated with numerous problematic behaviors in adolescence and young adulthood including substance use (Desousa, Murphy, Roberts, & Anderson, 2008) and aggressive or violent behaviors (MacDonald, Piquero, Valois, & Zullig, 2005), and is positively associated with measures of positive youth development (Sun & Shek, 2010). Life satisfaction also partially mediated the relationship between stressful life events and problem behaviors in a sample of adolescents (McKnight, Huebner, & Suldo, 2002). The majority of individuals with schizophrenia express strong interest in and unmet needs related to intimate and/or sexual relationships (McCann, 2010), and many report discrimination and discouragement with regard to seeking these relationships (Thornicroft et al., 2009). Other research has indicated that individuals with first episode psychosis may overestimate their proficiency in social interactions, and a lack of general social skills may impede their ability to develop intimacy with potential partners (Pillay, Lecomte, & Abdel-Baki, in press).

Marital relationship satisfaction also plays a significant role in psychological well-being, physical health, and longevity (Kiecolt-Glaser & Newton, 2001) and has been found to moderate

the adverse effects of emotional strain, and partner relationship dissatisfaction is strongly associated with emotional distress (Røsand, Slinning, Eberhard-Gran, Røysamb, & Tambs, 2012). Indeed, romantic relationships are also a significant component of the development of intimate connections with one's peers. For adolescents, being in a romantic relationship is central to a sense of belonging to one's peer group, and is indicative of social status (Collins, 2003; Connolly, Craig, Goldberg, & Pepler, 1999). Having a meaningful romantic relationship has also been shown to be associated with positive feelings of self-worth and self-esteem (Furman & Shaffer, 2003; Kuttler, La Greca, & Prinstein, 1999), and feeling competent in one's romantic relationship is a significant component of feelings of general competence in adulthood (Masten et al., 1995). College students in committed romantic relationships experienced fewer mental health problems than their single peers (Braithwaite, Delevi, & Fincham, 2010). Some have also speculated about the positive link between adolescent romantic relationships and identity formation, as well (Furman & Shaffer, 2003). Individuals with first episode psychosis report that they value romantic relationships and view them as a means by which they can return to "normality" and reduce social isolation. However, they also consider romantic relationships to be incompatible with psychosis and feel ill equipped to become involved in them (Redmond, Larkin, & Harrop, 2010).

As has been discussed, the time during which the onset of psychosis occurs is a critically important one in terms of normative social development. As such, this warrants early intervention and treatment so that the potential deleterious effects can be mediated. This will be explored next.

Importance of Early Intervention

Early intervention in psychosis is particularly important in light of the "critical period" hypothesis (Birchwood et al., 1998). Deterioration due to psychosis generally occurs rapidly within the first 2-3 years of onset; this includes severity of psychotic symptoms as well as social and occupational functioning (Ballon, Kaur, Marks, & Cadenhead, 2007; Melle et al., 2005). After this period of time, there is a "plateau effect," whereby deterioration slows and individuals generally demonstrate stabilization of the illness. At this time, the progression of morbidity slows or stops altogether, and the level of disability (or recovery) attained at that time endures in the long term (Crumlish et al., 2009). As such, the critical period hypothesis suggests that interventions that are provided in the first few years after onset of psychosis (which includes the duration of untreated psychosis) have a disproportionate impact relative to the effect of interventions that aren't received until later in the course of the illness. This underlines the necessity of intervening early and efficiently after the onset of psychotic symptoms, so as to maximize the likelihood of recovery and minimize the degree of disability sustained.

The critical period hypothesis is further supported by findings that demonstrate that short-term treatment response is an excellent predictor of long-term outcomes (Emsley, Chiliza, & Schoeman, 2008). In two long-term studies of FEP individuals (2-4 years), short-term response to antipsychotic medication (at 6 weeks) was a significant predictor of remission, and predicted remission more strongly than several demographic variables (Emsley et al., 2006; Emsley, Rabinowitz, & Medori, 2007). The same holds true when adopting a longer definition of short-term outcome; course of illness in the two years immediately after psychosis onset was the strongest predictor of outcome in a 15-year longitudinal study of FEP individuals (Harrison et al., 2001). Additionally, risk of relapse is greatest in the period immediately following a first

episode of psychosis, further underlining the possibility that the first few years are the most volatile and critical. Up to 80% of FEP individuals will experience a relapse of psychosis within the first five years of remission from the initial episode (Robinson et al., 1999; Wiersma, Nienhuis, Sloof, & Giel, 1998). In a recent meta-analysis examining rates and predictors of relapse in FEP, the pooled cumulative risk for relapse of positive symptoms was found to be up to 54% at 1-3 year follow-up, and the risk for hospital readmission was up to 83% at 1-7.5 year follow-up (Álvarez-Jiménez et al., 2012). The danger of relapse is particularly salient for adolescents and young adults; additional episodes of psychosis can mean more extensive distancing and disconnection from peer groups, as well as greater difficulty re-engaging with work or school, thus negatively affecting long-term psychosocial development (Penn et al., 2005).

Duration of Untreated Psychosis

Some of the most convincing evidence for the critical period hypothesis comes from the research regarding duration of untreated psychosis, or DUP. Many studies have suggested that the longer a first psychotic episode goes untreated, the poorer symptomatic and functional outcomes an individual has later in life. These associations between DUP and outcomes are generally not evident at first presentation to treatment, but instead emerge during and after treatment (Marshall et al., 2005). Several meta-analyses and systematic reviews have revealed that a shorter duration of psychotic symptoms prior to treatment has been associated with greater response to antipsychotic treatment, indexed by severity of positive and negative symptoms as well as functional outcomes (Perkins et al., 2005), and less severe negative symptoms as baseline as well as at short (1-2 year) and long (5-8 year) follow-up (Boonstra et al., 2012). Longer DUP has been significantly associated with worse outcomes at 6 month and 1 year follow up in terms

of symptoms (i.e., positive and negative symptoms as well as depression and anxiety) and both overall and social functioning, as well as quality of life (Marshall et al., 2005). More recently, a meta-analysis of 33 studies found that longer DUP was significantly associated with greater severity of positive and negative symptoms, lesser likelihood of remission, and poor social functioning (Penttilä, Jääskelainen, Hirvonen, Isohanni, & Miettunen, 2014). DUP has also been demonstrated to be a moderator of treatment response, such that individuals with shorter DUP benefit more from treatment than did individuals with longer DUP (Kane et al., 2015a).

However, the associations between DUP and these various outcomes have often been modest and at times, unclear, and the findings of meta-analyses have been somewhat conflicting on which outcomes in particular are impacted. For example, Perkins et al. (2005) found that longer DUP was associated with severity of negative, but not positive and general, symptomatology, and that the associations between DUP and relapse risk, as well as DUP and functioning, are mixed. Marshall and colleagues (2005) found associations between more outcomes than did Perkins et al. but the strength of associations varied between the two studies considerably. The most recent meta-analysis (Penttilä et al., 2014) did not find any associations between DUP and quality of life. The authors also noted that while the correlations they observed were significant, they were quite small.

It should also be noted that three important American studies found no significant associations between DUP and outcome. Ho and colleagues (2000) demonstrated that DUP was not associated with poor functional outcome or with symptom severity. Another study found that while DUP was associated with time to remission and level of remission, it was not a significant predictor of relapse (Loebel et al., 1992). Finally, Craig et al. (2000) found no significant differences between long and short DUP (defined as 4-52 weeks and less than 4 weeks,

respectively) at 24-month follow up. So while there is evidence that DUP has a negative impact, these mixed results have contributed to a lack of clarity regarding the specific potential impact of DUP and how best to intervene.

The mechanism through which DUP impacts these outcomes also remains unclear. The "neurotoxic effect" is the suggestion that active and untreated psychosis exerts a toxic effect on the brain (possibly via dopamine dysregulation: Crespo-Facorro et al., 2007; Keshavan et al., 1998), such that the longer it goes untreated, the greater negative impact it has on outcomes and likelihood of relapse, as well as longer time to treatment response (Sheitman & Lieberman, 1998; Wyatt, 1991). Other mechanisms have been suggested, such as prolonged activation of the hypothalamic-pituitary adrenal axis (Keshavan et al., 1998), among others. Several neuroimaging studies have also demonstrated structural brain abnormalities in FEP individuals (e.g., Chan, Di, McAlonan, & Gong, 2011; Fusar-Poli, Radua, McGuire, & Borgwardt., 2012). However, more recent research utilizing neuroimaging methods and neuropsychological perspectives have not substantiated these hypotheses (Anderson et al., 2015; Rund, 2014).

There is also a great deal of heterogeneity in the literature regarding the definition of DUP. Generally, it is operationalized as the time between the onset of positive psychotic symptoms and initiation of treatment (Marshall, Harrigan, & Lewis, 2009). However, there is significant disagreement over what should be defined as onset, likely due to the lack of identification of any specific marker of emergent psychosis having been identified (Perkins et al., 2005). Some have used the emergence of any positive psychotic symptom (e.g., Gumley et al., 2014; Perkins et al., 2000; Singh et al., 2005), while others have required that positive symptoms must have been present at least a moderate severity level for at least several days or several weeks (e.g., Addington, van Mastrigt, & Addington, 2004; Birchwood et al., 2013; Haahr et al.,

in press). The endpoint of DUP has also been variably defined. Some define it as initiation of treatment with an antipsychotic medication (e.g., Marshall et al., 2009), but have used varying definitions of adequate medication exposure (e.g., Birchwood et al., 2013; Gumley et al., 2014). Still others define treatment more broadly, including hospitalization (e.g., Ücok, Polat, Genc, Cakir, & Turan,, 2004), initiation of outpatient treatment for psychosis (Browne et al., 2000), or date of enrollment in a treatment study (e.g., Haahr et al., 2016; Jeppesen et al., 2008).

Researchers have also chosen to use varying methods to analyze the influence of DUP on outcomes. This has made the results of meta-analyses and systematic reviews more difficult to interpret (Marshall et al., 2009). Some studies have examined DUP as a continuous variable, while many other studies have categorized individuals into groups. Some have dichotomized DUP simply into short and long (e.g., Addington et al., 2015), whereas others have used more specific categories (e.g., Schimmelmann et al., 2008: short, medium, and long). The groups themselves have also been variably defined; for example, one study used a median split to define the short and long groups as less than or greater than 74 weeks (Addington et al., 2015), while another study defined their short, medium, and long groups as less than 1 month, 1-12 months, and longer than 12 months, respectively (Crumlish et al., 2009).

Regardless of how the groups have been defined, their use in outcome research has been strongly suggested in order to facilitate clinical and statistical interpretability (Harrigan, McGorry, & Krstev, 2003) and to aid in identifying any clinically important cutoff points (Hill et al., 2012). Indeed, no definitive critical period of DUP has been established (Birchwood et al., 2013). Some have suggested that DUP as short as one month can have clear negative influences on outcomes, stating that reducing DUP from 6 months to 1 month is comparable to reducing it from 6 years to 1 year (Drake, Haley, Akhtar, & Lewis, 2000). Others have agreed that the

greatest reduction in symptoms and greatest increased likelihood of recovery is achieved if DUP is reduced to 1-3 months (Boonstra et al., 2012; Tang et al., 2014).

The impetus behind much of the research on DUP is the notion that it is a potentially modifiable prognostic construct (Perkins et al., 2005). Though a great deal of research has been done on the impact that DUP can have on outcomes, the results have been somewhat mixed, and at times conflicting. It is clear that reducing DUP will likely have a positive impact, but decisions regarding how much reduction is enough to impact outcomes, as well as how best to intervene on which symptoms so as to achieve said reduction, are all still unclear. In particular, having a clearer critical period during which it is imperative to intervene would have important treatment implications for the nature of FEP interventions. As such, it is evident that additional information is needed to continue to examine and refine our knowledge of the optimal time for intervention.

FEP Treatment Programs

First episode psychosis treatment programs are a relatively new phenomenon in the world of serious mental illness. Researchers and clinicians have known for a long time that schizophrenia and other psychotic disorders often present for the first time between middle to late adolescence and early adulthood. But for much of the 20th century, this knowledge did not directly translate into targeted treatment programs to address this phenomenon. Beginning in the 1980s, there was a stronger initiative to develop more specialized programs aimed specifically at the unique population of those that are experiencing early psychosis (Edwards & McGorry, 2002). As was previously mentioned, the initial 5 years of illness following the first psychotic episode are when the majority of clinical and psychosocial deterioration occur. Early detection and treatment can prevent some of the most severe and devastating symptoms of psychosis (Ballon et al., 2007; Melle et al., 2005). McGorry (2002) identified three key elements of early

psychosis treatment: early recognition and assistance, initial assessment and treatment, and promoting recovery.

Coordinated specialty care (CSC) has become the predominant approach to first episode treatment. This is a team-based, multi-element, recovery-oriented approach that emphasizes collaboration among team members, which include the client and several treatment team members (Heinssen, Goldstein, & Azrin, 2014). CSC is specifically designed for clients ages 15-30, and is intended to bridge the gap between child/adolescent and adult mental health services. Team members generally consist of 4-6 clinicians; psychologists, social workers, and/or counselors provide case management, individual and family therapy, and supportive employment or education services, while a psychiatrist and/or a nurse practitioner work with primary healthcare providers to deliver pharmacotherapy and general medical care. A team leader is always designated in order to efficiently coordinate amongst the providers on the team, and provides ongoing consultation to team members.

Generally, the aims of FEP treatment are as follows: reduce clinical/psychosocial deterioration, reduce distress and traumatic experiences, encourage symptom remission and relapse prevention, and maximize social and functional recovery. There are several core functions of CSC for first episode psychosis. Importantly, the clinicians on the treatment team must have specialized training in first episode psychosis so as to provide specialized and targeted care for this population. There must also be community outreach and engagement, as well as provision of services in a variety of locations (clinic, community, homes) as needed, so as to address and overcome common barriers to entering and remaining in the treatment program. Additionally, there must be acute care available for those in the midst of or following a psychiatric crisis, as well as the use of a recovery framework to step-down an individual's care

as needed, based on the level of symptomatic and functional recovery achieved, with possible eventual discharge to regular community providers. Finally, the fidelity of clinicians to the CSC model must be continually monitored and assessed to as to assure that the best care is being provided. Edwards and McGorry (2002) suggest that training and education are key components of the implementation of any early psychosis program, and highlight the importance of sharing with clinicians the philosophical basis of the preventive approach and the rationale for early intervention. Staff training and service restructuring have been shown to improve clinical outcomes, specifically at the outset of treatment (Nash et al., 2004).

Specialty FEP treatment programs following the CSC model have been shown to be more effective than treatment as usual in preventing relapse (Álvarez-Jiménez, Parker, Hetrick, McGorry, & Gleeson, 2011; Correll et al., in press; Craig et al., 2004). Programs have been implemented in several countries around the world, most notably in Australia (EPPIC; McGorry & Edwards, 1998), England (EIS; Spencer, Birchwood, & McGovern, 2001), and Canada (PEPP; Malla et al., 2002, and EPP; Addington & Addington, 2001), and have demonstrated improvements in both positive and negative symptoms and quality of life (Carbone, Harrigan, McGorry, Curry, & Elkins, 1999; Malla, Norman, McLean, & McIntosh, 2001; Malla et al., 2002) as well as vocational and social recovery (Henry et al., 2010). A recent meta-analysis of trials where early intervention services for psychosis (EIS) were compared to treatment as usual (TAU) revealed that EIS services were superior to TAU for all types of symptomatology (i.e., positive, negative, general, depressive), global functioning, vocational and educational involvement, and quality of life (Correll et al., in press).

Notably, each program mentioned exists in a country in which these programs have proliferated and been successful provides universal healthcare to their citizens. In contrast, the

evaluation and dissemination of evidence-based mental health care in the United States has been difficult and has encountered significant barriers (McHugh & Barlow, 2010), and research has suggested notably low levels of successful dissemination to clinical practice settings (Stewart & Chambless, 2007). Epidemiological studies have demonstrated that in the United States, less than half of individuals with mental illness receive treatment (Wang et al., 2005b). Additionally, treatment rates for those with severe mental illness have been worsening since 2000 (Glied & Frank, 2009), and that there continue to be longer delays between illness onset and initiation of treatment (Wang et al. 2005a). It has been suggested that part of this is due to the structure of the healthcare system in the US (Srihari et al., 2009), which is the only high-income country without nearly universal healthcare coverage. Endeavors to create consensus on treatment approaches can succeed more easily on a nationwide basis when national healthcare is in place. Here in the United States, the fragmentation of both delivery of and payment for mental health services makes instituting a coherent approach to FEP treatment quite difficult to implement (Srihari et al., 2009).

In 2009, the National Institute of Mental Health (NIMH) launched the Recovery After an Initial Schizophrenia Episode, or RAISE research initiative (Heinssen et al., 2014). The purpose of this initiative was to explore different approaches to the implementation of coordinated specialty care for first episode psychosis in the United States. Two programs were funded, the RAISE – Early Treatment Program (ETP), or NAVIGATE (Kane et al., 2015a; Kane et al., 2015b) and the RAISE Connection Program (Dixon et al., 2015). These were the first major multisite efforts in the United States to implement and evaluate a first episode psychosis treatment program, and truly a seminal moment in the development and dissemination of evidence-based coordinated specialty care for FEP in this country.

The RAISE Connection program (Dixon et al., 2015) was implemented at 2 sites (New York City and Baltimore) and examined the symptomatic and functional outcomes of 65 individuals with FEP over two years of treatment in an open trial format. The treatment teams consisted of a team leader, an individual placement and support worker, a part-time recovery coach, and a part-time psychiatrist. Results indicated that individuals significantly improved over time on psychiatric symptoms (i.e., decreased in severity), indicators of social and occupational functioning (Dixon et al., 2015), and quality of life as measured by a semi-structured interview with a clinician (Marino et al., 2015). Treatment fidelity, engagement, and family involvement were also identified as mediators of improvement in social and occupational functioning (Marino et al., 2015).

The RAISE-ETP study was instituted on a much larger scale than RAISE Connection; 404 individuals were enrolled across 34 community mental health centers in 21 states. Sites were randomized to provide either usual community care (control), or to provide the NAVIGATE intervention, which involved four core components: personalized medication management, family psychoeducation, resilience-focused individual psychotherapy, and supported employment and education. Results indicated that individuals in the NAVIGATE arm of treatment experienced significant improvements in quality of life and psychopathology, and experienced greater involvement in school and work compared with individuals in the usual community care arm (Kane et al, 2015). Additionally, individuals with shorter DUP derived greater benefit from NAVIGATE than did individuals with longer DUP (Addington et al., 2015; Kane et al., 2015). NAVIGATE was also shown to be more cost-effective, demonstrating greater benefits in comparison to the costs of the program, even though NAVIGATE was more expensive than community care (Rosenheck et al., 2016).

The RAISE initiative was a major step forward in determining which are the most important elements of first episode psychosis programs. Several of the leading programs operate under the same general principles and guidelines most recommend: prescribing low-dose antipsychotic medications, increasing therapeutic engagement, and targeting earliest intervention and assessment. However, the specifics of how these recommendations are implemented can be difficult to standardize, and the operationalization of some of these ideas can vary from site to site. Some question the utility of any specialized services, suggesting that intervening too early may lead to overmedication (Pelosi & Birchwood, 2003).

Importantly, some programs also incorporate peer support programs in order to provide clients with the opportunity to interact with a person who has been in their position and who is at a similar stage of development, but not all programs have instituted this component of treatment. A recently developed adjunctive treatment to standard early intervention services, social recovery therapy, encourages engagement in social activities and interaction with peers using a combination of CBT and assertive community outreach approaches (Barton et al., 2009). When combined with early intervention services, this therapy was found to improve social recovery in comparison to early intervention services only (Fowler et al., 2018). It appears that it would be beneficial to incorporate this approach and emphasis on social relationships more directly into early intervention services.

Additionally, psychiatrists, psychologists, and other treatment providers are traditionally trained to work primarily with adults or with children and adolescents. Those trained to work with adults often receive training in psychosis, but have less familiarity with important developmental concerns; those that are trained to work with children and adolescents have this training, but often lack exposure to treatment for psychosis. While FEP programs require that

providers receive training in the treatment FEP, it can be difficult to grasp the other area with which they have less familiarity. There is also debate over whether it is more beneficial for interventions for first episode psychosis to exist within larger psychiatric services, or whether it is best for these programs to exist on their own (Rosenheck, 2006). Some suggest that in order for services to be easily accessed, services should be situated within larger clinics; others argue that placing early intervention services in close proximity to services for individuals with chronic SMI could send a message to FEP individuals that they may be facing a life time of psychiatric care and chronic mental illness, rather than one of hope and the possibility of recovery.

Indeed, the motivation behind the implementation of early intervention services has largely been that the acknowledgement of the unique developmental stage at which individuals are should drive the conceptualization of these treatments. For the reasons mentioned above, this has proven to be a difficult and ever-evolving effort. Additionally, the field of FEP research has often been heavily influenced by models of recovery from the chronic SMI literature, a field that itself has struggled with how best to conceptualize this concept. The next section will review these issues and the ways in which they play a role in the development of recovery-focused treatment in FEP.

Functioning and Recovery in SMI & FEP

A limitation of research in FEP has been how functioning and quality of life have been measured, and how "recovery" can be defined. Indeed, the broader schizophrenia literature has been plagued by questions of how best to define and measure functioning, quality of life, and recovery from psychosis, and consensus has been difficult to reach (Harvey & Bellack, 2009). The concept of quality of life was originally equated with subjective well-being and life satisfaction (Heinrichs, Hanlon, & Carpenter 1984); in more recent years, it has been expanded

to include the assessment of daily life functioning and availability of resources, both material and social support (Ho et al., 2000; Katschnig, 2000; Malla et al., 2004; Melle et al., 2005). For the purposes of this discussion, the latter definition will be adopted, with the assumption that satisfaction, well-being, and functioning fall under the same general domain.

Clinical remission was long considered the primary treatment goal, but in more recent years, there has been widespread interest from researchers, clinicians, and consumers in targeting functional recovery as well (Álvarez-Jiménez et al., 2016). Even after positive symptoms have abated due to successful treatment (generally with medication), individuals still experience significant deficits in functioning and quality of life in their daily lives, preventing them from participating in and completing normative activities such as holding a job, attaining gainful employment, and forming and maintaining meaningful relationships with others. Indeed, functional deficits and poor quality of life are generally uncorrelated with clinical symptoms and can persist long after clinical symptoms have remitted (Birchwood et al., 1998), are the cause of much of the disability experienced by individuals with schizophrenia and other psychotic disorders (Palmer et al., 2002; Robinson, Woerner, McMeniman, Mendelowitz, & Bilder, 2004), and are considered a defining feature of schizophrenia (Bellack, Morrison, Wixted, & Muser, 1990).

However, there is currently no clear definition of functional recovery from psychosis among researchers, clients, and clinicians (Beck et al., 2012). Researchers have suggested that to achieve functional recovery is to be functioning properly in the areas of residential status, vocational status, and interpersonal relationships (Wunderink, Sytema, Neinhuis, & Wiersma, 2009). Harvey and Bellack (2009) also suggested that the three major domains of functional remission should be social functioning, productive activities, and independent living. Two recent

systematic reviews and meta-analyses of predictors of functional recovery in FEP examined 129 studies and found that functioning was defined using a wide range of indicators, including global indicators (e.g., GAF), social connectedness measures (e.g., Social Functioning Scale), quality of life measures (e.g., QoL), and also measures of individual areas including vocational functioning and independence (Lally et al., 2017; Santesteban-Echarri et al., 2017). Thus, there is limited consensus about how best to use these terms and how to define them accurately. Occupational functioning has generally comprised vocational/educational status and residential status, which tend to be examined most often in studies looking at levels and determinants of functional recovery. This approach is due, at least in part, to these indicators being objectively and easily measurable, as well as being reasonable indices of functioning successfully in society. Generally, existing measures have a strong emphasis on the attainment of paid work, which represents an important, but not the only, marker of improvement (Hodgekins et al., 2015b).

Social functioning is another key component of functional recovery that has proven more difficult to define and measure. It generally refers to one's ability to form and maintain meaningful interpersonal relationships, and to have successful social interactions with others. Impairment in social functioning has also been defined as the inability to meet societally-defined roles, as well as an individual's satisfaction with their ability to meet these roles, their ability to care for themselves, and the degree to which they participate in recreational activities (Mueser & Tarrier, 1998). However, these aspects are less amenable to objective measurement, as the definition of what one's societal roles are and should be is subjective and dependent on one's circumstances and one's culture (Burns & Patrick, 2007). While the same may be said for one's vocational or residential status, these indicators at least have clear measurable components (employed/not employed; living independently/assisted living facility/with family; etc.).

Many instruments have been developed to assess varying types of functioning, quality of life, and recovery, which have resulted in some heterogeneity in this area of research. A review of 301 studies examined "social functioning" as an outcome measure (Burns & Patrick, 2007). The authors defined the term broadly as work/academic functioning, interpersonal relations, and self-care; this again points to the significant conceptual and measurement overlap in this domain. They concluded that there were 87 different instruments used to measure this construct (Burns & Patrick, 2007). The VALERO study (Harvey et al., 2011; Leifker, Patterson, Heaton, & Harvey, 2011) aimed to review and evaluate the various measures of real-world functioning in order to develop a consensus on what instruments are most appropriate and most effective for measuring social, vocational, and residential outcomes. The study found that generally, the instruments they reviewed were not strongly related to the functional abilities that are generally used as outcomes in treatment studies.

None of these measures was developed in the context of a first episode psychosis population. Much of the research on functioning and recovery has been done with older adults with chronic schizophrenia. The instrument identified by the VALERO study as the best measure of functioning, The Specific Levels of Functioning scale (SLOF; Schneider & Struenig, 1983), was developed and normed on a chronic schizophrenia population. Another popular and widely-used instrument, the Quality of Life Scale (QLS; Heinrichs et al., 1984), was developed in the same way. Individuals with FEP often develop a variety of diagnoses, including, but certainly not limited to, schizophrenia. Some are able to fully recover and do not continue to experience psychosis at all. Additionally, individuals with chronic schizophrenia are generally of a completely different age range and developmental stage than individuals experiencing a first episode of psychosis. The initial validation study for a widely used role-play test to measure

community functioning (UPSA; UCSD Performance-based Skills Assessment) was conducted solely on middle-aged and older outpatients with schizophrenia (Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001). In the VALERO study, the mean ages of participants at each of the three sites involved were 36, 47, and 47 (Harvey et al., 2011). No information was provided on the number of psychotic episodes individuals had experienced prior to entering the study, but given the mean ages, it is reasonable to assume that many of the participants were not experiencing their first episode of psychosis. Regarding the functional capacity role-play assessments, most tasks individuals are asked to do are generally irrelevant to what an adolescent or young adult would be doing on a daily basis. For example, in the UPSA participants are asked to write a check to pay an electric bill (Patterson et al., 2001). In the current age of electronic billing, it seems unlikely that this particular skill would be a useful indicator of a young person's overall functioning and capacity for recovery.

As such, definitions of functioning and recovery have been based on studies that are not utilizing FEP samples. The conclusions drawn from these studies are not comprehensive enough to encompass the unique and complicated concerns that adolescents and young adults with FEP face. Healthy real-world functioning is also developmentally-based; expectations for adolescents and young adults are qualitatively different than those for middle to late adulthood (Harvey & Bellack, 2009). The definition of healthy functioning, and thus of functional recovery, is dynamic and contingent on developmental phase. For example, gauging a young adult's level of recovery based in part on whether he or she has a job, when he or she may have minimal or no prior work experience (as may be expected and developmentally appropriate) is not necessarily a useful indicator. Wunderink and colleagues (2009) admit that social role functioning in first

episode psychosis must be "measured against normative expectations in a certain cultural context" (p. 363), but do not discuss what this might look like in a developmental context.

Several studies have attempted to assess functional recovery in first episode psychosis, generally using many different and varied terms to operationally define this construct (Lally et al., 2017; Santesteban-Echarri et al., 2017). Malla and Payne (2005) conducted a review of studies examining this construct through 2005, and concluded that though short-term functional outcomes improve after treatment, longer-term outcomes remain poor for many patients. They also observed that most functional outcome studies in first episode psychosis lack rigorous and reliable operational definitions and consensus on choice of instruments for measurement. Some studies have suggested using typical indicators such as appropriate role functioning, performing daily tasks, and social interactions with peers (e.g., Álvarez-Jiménez et al., 2012; Robinson et al., 2004). Another defined functional recovery as vocational and residential status having returned to at least baseline levels at 6 months, but made no mention of interpersonal relationships (Tohen et al., 2000).

As has been discussed, the importance of social relationships in adolescence and early adulthood cannot be understated. However, given the influence of the chronic SMI literature on the conceptualization of functioning and recovery, deficits in this area can sometimes be overlooked. Deficits in interpersonal relationship functioning are likely contributors to level of social competence, or an individual's ability to generally get along well with others, which has been suggested to be the strongest predictor of outcome in schizophrenia (Mueser, Bellack, Morrison, & Wixted, 1990). Social support from non-family members has been shown to predict adaptive functioning in a first-episode psychosis group diagnosed with schizophrenia, where support from family did not predict the same outcome (Erickson et al., 1998).

Yet the influence of the chronic SMI literature as well as fact that vocational and educational status are easily observable indicators likely also impacts the frequency with which they are used as indicators of functioning and recovery. Educational attainment or vocational experience are also significantly more difficult to attain if one has missed out on the opportunity to develop and practice the ability to interact and connect with others during the pivotal time of adolescence. An emphasis by a treatment team on whether or not the client has returned to work or school may be fruitless if, once the client has a job or is taking classes again, they are unable to successfully interact and form relationships with those around them.

Though it might seem intuitive that the provision of treatment to adolescents and young adults would involve the inclusion of developmental theory and research, historically this has not been the case (Toth & Cicchetti, 1999). Generally, classification of mental illnesses have been derived from research with adults, and then applied directly to the formulation of diagnoses for children and adolescents as well. Subsequently, definitions of recovery and treatment have also adopted this "adevelopmental" approach (Cicchetti & Rogosch, 2002), perpetuating the "developmental uniformity myth" (Kendall, Lerner, & Craighead, 1984). As such, there is no uniform definition of functional recovery in FEP, and there continues to be heterogeneity in the terminology and indicators used to assess it. As has been discussed, given the age range and developmental stage of FEP individuals, it is of particular importance to consider the role and impact of social relationships in our conceptualizations of recovery, quality of life and functioning. Additionally, while objective indicators of recovery are valuable, it may be the case that returning to this "normalcy" may not coincide with clients feeling "recovered" themselves. Particularly for this population, it is critical to obtain a broader understanding of their quality of

life, well-being, and life satisfaction, which must include their own report on their internal state, as well as their perception of their functioning.

Many measures of functioning and quality of life in individuals with SMI omit the individual's perspective on his or her functioning and do not address levels of satisfaction with one's current situation. Some research has found little relationship between clinical measures and recovery measures as defined by clients, suggesting that measures of symptoms, medication compliance, service utilization, and skills generally exclude any assessment of intrapersonal processes and individual perspectives (Andresen, Caputi, & Oades, 2010), and that changes in objective aspects of recovery are not synonymous with changes in subjective aspects (San, Ciudad, Alverez, Bobes, & Gilaberte, 2007). Others have demonstrated no direct correlations between observer ratings of symptoms and subjective self-report of recovery (Roe, Maschiach-Eizenberg, & Lysaker, 2011). The outcome of these internal processes of understanding and adjusting to one's illness can have a significant impact on how an individual reacts to their illness, which can in turn impact the future course and outcome (Tait, Birchwood, & Trower, 2003).

Researchers have also examined the difference between "clinical recovery" and "personal recovery." The notion of clinical recovery has generally comprised the amelioration or disappearance of psychotic symptoms accompanied by various indicators of functional improvement (social, cognitive, vocational); in other words, returning to a state of former health (Cavelti et al., 2012). The development of the concept of personal recovery was driven by consumers of mental health services, and suggests that individuals can "recover" in the continued presence of psychiatric symptoms, and that the focus should be on an individual process of development, adaptation, and formation of an identity beyond the illness (Ralph, 2007). Indeed,

research has indicated that psychiatric symptom reduction does not necessarily lead to psychological recovery (Resnick, Rosenheck, & Lehman, 2004), and is often unrelated to occupational functioning (Harding, Zubin, & Strauss, 1987; Strauss & Carpenter, 1977).

Many commonly used instruments are often rated by others, either a clinician or informant (e.g., close friend or family member). One of the most popular instruments, the Quality of Life Scale (Heinrichs et al., 1984), measures constructs including purpose, motivation, emotional and social interactions, role functioning, and engagement in regular activities. This is ostensibly a useful and comprehensive measure of several key components of an individual's overall functioning and quality of life. However, it is important to note that this instrument is rated by a trained rater or clinician based on a semi-structured interview with the client,. The SLOF, chosen by the VALERO study as the best measure of functioning in schizophrenia, is also generally used as an informant rated measure; a close family member or friend completes the ratings based on their perception of the client.

Subjective report of an individual's experience can reveal significantly different information about functioning and recovery than if those judgments were based solely on objective report. For example, researchers have noted a paradigm shift in pediatric clinical trials towards patient-reported outcomes as critical indicators of the efficacy of interventions (Varni, Limbers, & Burwinkle, 2007). Patient-reported outcomes have been identified as important components of healthcare, and it has been suggested that they can drive changes in how healthcare is organized and delivered (Black, 2013). However, Becker and Diamond (1997) suggested that there has been a trend in schizophrenia research towards preferring information gathered from clinical interviews or rated by informants, due to the assumption that individuals with schizophrenia will be unreliable in their report. More recent research on functioning and

quality of life in schizophrenia has corroborated this assertion (Bellack et al., 2007). This is a result of a number of factors, including the possibility of psychiatric symptoms having an impact on an individual's ability to accurately report on his or her state (Atkinson, Zibin, & Chuang, 1997). Others have expressed concern that poor insight in schizophrenia could contribute to inaccurate representations of one's own functioning (Bell, Fiszdon, Richardson, Lysaker, & Bryson, 2007). Finally, many individuals with schizophrenia experience cognitive impairment, which could also complicate this as well.

However, objective and subjective report do not always overlap, and objective indicators can incorrectly estimate patients' physical and psychological quality of life (Becchi, Rucci, Placentino, Neri, & de Girolamo, 2004). In a study comparing objective and subjective quality of life of individuals with FEP and chronic schizophrenia (Priebe, Roeder-Wanner, & Kaiser, 2000), FEP patients had more favorable objective indicators of quality of life in comparison to chronic patients. However, the FEP group also endorsed lower subjective quality of life than did the chronic schizophrenia group. The authors suggest that this may be indicative of the fact that FEP individuals have not had sufficient time to adapt to their changed life circumstances. Were we to only rely on objective indicators of these constructs, we may miss this type of important clinical phenomenology specific to FEP. Uzenoff and colleagues (2010) assessed both objective quality of life and subjective psychological well-being in an FEP sample, and found that the two constructs were associated but distinct, suggesting that both should be assessed separately. Similar results were demonstrated in a sample of individuals with schizophrenia, where the correlation between objective and subjective quality of life was low, which led the authors to suggest that they were separable constructs that should be assessed independently (Narvaez, Twamley, McKibbin, Heaton, & Patterson, 2008). Still other research has found that on

measures of quality of life more broadly, patient and clinician report were correlated (Whitty et al., 2004). As such, objective and subjective reports of recovery and functioning should be viewed as complementary, rather than incompatible (Silverstein & Bellack, 2008).

The closer the relationship the informant has with the patient, the more agreement is found between the two reports (Sabbag et al., 2011). For FEP individuals, this is often a parent or other close family member, which would fit well with the need for accurate reporting. However, given the developmental stage of FEP individuals (adolescence and young adulthood), their family relationships are often particularly fraught with distress and are strained, both related and unrelated to the individual's illness. This could impact the utility of informant report in several ways. If an individual's developmentally-appropriate individuation from his or her family has been stunted or otherwise negatively impacted by the onset of psychosis, he or she may feel resentment towards family. Indeed, in a meta-analysis evaluating the agreement between parent informant report and child self-report on quality of life, the authors found that parent and child demonstrated good agreement on some outcomes, but had poor agreement on emotional and social quality of life (Eiser & Morse, 2001). Expressed emotion (specifically critical comments and emotional over-involvement) can often be prevalent in families of individuals with FEP (McNab & Linszen, 2009). These factors, in addition to typical adolescent angst with regard to family intimacy, may make it less likely for them to share significant details of their internal experiences and their feelings about their illness with loved ones. Additionally, family members' perceptions of illness, as well as the burden of caregiving, may also contribute to the report they are able to provide (Raune, Kuipers, & Bebbington, 2004). More generally, adolescent report of their physical, emotional, mental and social health and well-being is more likely to be sensitive

to mental health problems than the report of their parents (Waters, Stewart-Brown, & Fitzpatrick, 2003).

Another option for informant report of functioning has been to ask health care providers to complete these ratings; many assessments of these domains are constructed from the perspective of clinicians (Chen, Tam, Wong, Law, & Chiu, 2005). This is often the psychiatrist, therapist, or social worker that an individual has regular contact with. This can be useful if the client regularly meets with the clinician for appointments. In individuals with chronic schizophrenia, agreement between client and clinician has often been low, possibly due to clients' overestimation of their abilities; this has been attributed to poor insight, poor social cognition, and diminished cognitive capacity (Bowie et al., 2007; Hasson-Ohayon, Roe, Kravetz, Levy-Frank, & Meir, 2011). However, this discrepancy has also been suggested to be due to the possibly stereotyped view of the client by the clinician, who may assume that the client has a diminished quality of life due to their illness (Ofir-Eyal, Hasson-Ohayon, Bar-Kalifa, Kravetz, & Lysaker, 2017).

Clients have also complained that their treatment goals and those of the clinicians or their families do not match (Deegan, 1988); as such, what a client deems "improvement" may not match with what a clinician or other informant might label as such (Kravetz, Faust, & Dasberg, 2002). Clinicians may tend to focus on an individual's ability to overcome difficulties and disability, whereas clients may be more focused on the formation of a new identity post-illness onset and how they can live the lives they want in this new reality (Angermeyer, Holzinger, Kilian, & Matschinger, 2001). Alternately, some researchers have also questioned the use of therapist ratings to determine how and if a patient has improved, suggesting that therapists may be more likely to view their patients as improved over the course of therapy (Cukrowicz et al.,

2011). Given that adolescents and young adults (Kim, Munson, & McKay, 2012), as well as FEP individuals in particular (Lecomte et al., 2008) can be difficult to engage in treatment, clinicians that are asked to assess the functioning and quality of life of their clients may not be getting "the whole story" in terms of how a client is doing, particularly early on in treatment. The client may be reluctant to share intimate details about their illness experience and their concerns about recovery.

Another approach to examining functioning in FEP individuals has been to consider the amount of time spent in structured activity. Time spent in structured activities such as leisure activities with others, work (paid and volunteer), and education, particularly in interactions with others, has been associated with increased psychological well being (Fletcher, Nickerson, & Wright, 2003) and with a reduced risk of emotional and behavioral problems (Kantomaa, Tammelin, Ebeling, & Taanila, 2008). Engagement in activities, specifically with others, enhances social competence, autonomy, and relatedness (Ryan & Deci, 2000), all of which are critical skills developed during adolescence and young adulthood. Hodgekins et al. (2015b) measured time spent in structured activities in individuals with FEP and found that they spent significantly less time in these activities than did non-clinical controls. The authors suggest that examining this domain may be a useful and straightforward alternative to measuring social functioning, particularly in the FEP population, due to the specific importance of social relationships.

Characterization of Social Functioning Deficits in FEP

As was discussed earlier, social relationships and connection with a peer group is a critical component of adolescence and generally sets the stage for later functioning in a variety of areas. For individuals that later develop schizophrenia, it is likely that the social deficits they

experience are the result of the social status attained and social experiences that one has had prior to the onset of psychosis (Häfner, Nowotny, Loffler, an der Heiden, & Maurer, 1995). Extensive research on the pre-psychotic phase has revealed that a significant decline in social functioning often precedes psychosis (Malla & Payne, 2005; Melle et al., 2005). Finding connection and meaningful relationships with one's peers is particularly difficult for those that are already experiencing deficits in social functioning. However, there is conflicting evidence about the onset of social impairment. Some evidence suggests that individuals that later develop schizophrenia have poorer premorbid functioning in childhood peer relationships (e.g., Dworkin, Lewis, Cornblatt, & Erlenmeyer-Kimling, 1994) and have had fewer and less satisfactory social relationships in comparison to healthy controls (Erickson et al., 1989). Other evidence has suggested that these deficits develop during the pre-psychotic phase and that acute psychosis leads to further social decline. There are also individuals for whom the onset of psychosis was quite sudden and a significant change from their previous functioning (Erickson et al., 1998).

Several studies have found that individuals with FEP or schizophrenia fit into one of three clusters: "stable-good", "stable-poor", and "deteriorating", indicating that there are varying ways in which individuals function prior to the onset of psychosis (Cole, Apud, Weinberger, & Dickinson, 2012; Haas & Sweeney, 1992; Horton, Tarbox, Olino, & Haas, 2015; Rabinowitz, De Smedt, Harvey, & Davidson, 2002). These categorizations appear to represent trajectories that individuals follow once a first episode of psychosis occurs. The two "stable" categories indicate that one's pre-psychotic functioning has been either good or bad since early on in one's development, and has remained this way; "deteriorating" indicates that an individual at one time functioned normatively, but has experienced decline as he or she has approached and entered adolescence (Horton et al., 2015). It is likely that those with an early and persistent course of

social and functional deficits may require markedly different treatment to encourage functional recovery than those that generally functioned well until the onset of psychosis.

From a developmental psychopathology perspective, it can be argued that this information should also be utilized prospectively, meaning that the assessments of an individual's pre-psychotic functioning may be used to guide the type and course of psychosocial treatment provided. For example, being characterized as "stable-poor," as discussed above, suggests that they have likely missed out on important childhood milestones regarding social interactions, and have likely always had trouble interacting with peers. Individuals in the "stable-good" subgroup may have been able to interact with their peers in a normative way and progress through those important milestones relatively successfully. To assume that individuals in both of these groups should receive similar treatment with regard to social interactions would be erroneous. For the stable-poor group, it would be useful to focus on basic components of social interactions, practicing the skills repeatedly and providing the opportunity to do this in a group setting. For the stable-good group, it is likely that the psychotic episode has been a more marked change from their typical functioning. It may be less useful to focus on basic social skills because they may already have mastered these earlier in their development. Instead, it may be more useful to practice the skills they already have in order to discuss and process how to make sense of this event, and how to talk with friends and family about it in a sensitive and truthful way. In a sense, this approach may be conceived of as "rebuilding" one's social network, whereas for the stable-poor group, it may be a matter of instead "building" one's social network.

Part of this effort would necessarily include understanding patterns of social interaction and functioning when individuals present for treatment. In doing this, we would have a clearer sense of the ways in which these prodromal trajectories lead to the initial onset of psychosis and

what FEP individuals' social interactions look like at that time. Identifying these patterns may also provide additional information regarding the ways in which social interactions lead to treatment-seeking behaviors. It can also help identify those who are at greatest risk for losing social ties, and as such, interventions can be targeted and delivered more effectively (Perry & Pescosolido, 2012). Subgroup research has been implemented in other areas of early psychosis research, both to identify individuals at clinical high risk for conversion to psychosis (Healey et al., 2018; Valmaggia et al., 2013), as well as to identify and classify psychosis-like experiences in the general population as a means to characterize the continuum on which experiences like this can occur and what might be associated with the development of clinically significant psychosis (Gale, Wells, McGee, & Browne, 2011; Shevlin, Murphy, Dorahy, & Adamson, 2007). While social relationships in FEP have been studied to some extent, we have yet to examine these types of patterns and the possible relationship between the identified prodromal trajectories and social relationships at onset.

The Current Study

The current study used latent class analysis (LCA) to explore the potential presence of latent groups based on social functioning and social relationships among individuals presenting to three coordinated specialty care clinics for first episode psychosis in the southeastern United States. The study sought to characterize the sample based on patterns of social interaction and satisfaction with social relationships with peers. Additionally, we sought to determine whether an individual's duration of untreated psychosis (DUP) was predictive of membership of a particular latent group at baseline, such that longer DUP might be associated with poorer social functioning. Finally, we examined two exploratory aims for the subset of the sample for which 6-month outcomes were available. First, we explored the potential relationships between DUP,

class membership, and symptom and functional outcome after 6 months of treatment. Second, we explored the potential relationship between goals set for treatment at baseline and symptom and functional outcome at 6 months.

Aims & Hypotheses

Aim 1. To characterize the sample of FEP individuals receiving treatment at coordinated specialty care clinics based on their social functioning at baseline and identify latent groups. Latent class analysis (LCA) was used to characterize the sample of FEP individuals upon entry into treatment based on their self-reported frequency of social interaction and satisfaction with their social relationships. For the purposes of this study, these indices comprised the construct of "social functioning." Given that groups of prodromal individuals have been identified based on functioning defined broadly (e.g., Horton et al., 2015), it is likely that similar subgroups of individuals are present when individuals begin treatment. Given that the current study is a data-driven statistical model, the number of classes were not known or hypothesized *a priori* (Collins & Lanza, 2010).

Hypothesis: It was hypothesized that the exploratory LCA would identify homogenous subgroups from the full sample based on patterns of social interaction. Specific types of subgroups were not hypothesized.

Aim 2. To determine whether duration of untreated psychosis (DUP) predicts membership in these groups. DUP was examined both as a continuous predictor and as a categorical predictor by categorizing it using three groups: short (>3 months), medium (3-12 months) and long (>12 months), similar to the protocol utilized by Schimmelmann et al. (2008). Linear and logistic regression (respectively) were used to determine whether length of DUP predicts membership in the groups obtained from the analyses described in Aim 1. We also conducted a

ROC analysis to determine if there is a particular cut point in DUP such that individuals are more likely to be members of the group(s) with poorer social functioning.

Hypothesis: Longer DUP will be associated with poorer social functioning, as evidenced by membership in the group (or groups) characterized by less frequent social contact and less satisfaction with their social relationships.

Exploratory Aim 1. To explore the relationship between DUP length, group membership at baseline, and 6-month outcomes. We investigated whether there is a relationship between length of DUP, patterns of social relationships and interactions upon entry into an FEP treatment program, and symptom and functional outcomes at 6-month follow up. Given that follow-up data were available for only a subset of participants, this was considered an exploratory aim. We aimed to expand on the analyses described in Aim 2 to determine whether DUP and group membership may be related to symptom ratings and vocational and educational status at 6 months. We utilized a series of binary logistic regression analyses to examine these relationships.

Exploratory Aim 2. To explore the relationship between goal-setting and 6-month outcomes. We examined whether there is a relationship between the goals that a client identifies as important and valuable to him/her at baseline and symptom and functional outcomes at 6 months. We utilized a series of binary logistic regression analyses to assess the possibility that goals identified at initiation of treatment predicted these outcomes after 6 months of treatment.

METHOD

Participants

The sample consisted of 134 FEP individuals treated at the Outreach and Support Intervention Services (OASIS) FEP clinics at two locations in North Carolina (Carrboro and Raleigh), and at the Supporting Hope Opportunities Recovery and Empowerment (SHORE) program at the Regional Health Authority (RHA) location in Wilmington, NC. Data collection occurred between June of 2015 and January 2017. Admission criteria for the OASIS and SHORE clinics were as follows: 1) age 15-36; 2) less than 3 years since onset of psychotic symptoms; 3) diagnosis of schizophrenia spectrum illness or other psychotic disorder. Exclusion criteria are: 1) presence of pervasive developmental disorder; 2) IQ less than 70; 3) organic brain disorder causing psychosis; 4) substance-induced psychosis.

Procedures

These data were collected as part of a clinical quality assurance program. The baseline evaluation was included as part of the client's initial intake appointment, and a follow-up evaluation was conducted approximately six months later. The only identifier in the dataset was date of admission to the clinic; no other individual identifying characteristics were included. As such, consent was not required and not obtained. Access to the data collected at the Raleigh OASIS clinic and the SHORE program was approved by North Carolina state officials; access to the data collected at the Carrboro OASIS clinic was granted by the medical director of that clinic, who is also one of the co-authors (D. Perkins).

Referrals to the OASIS and SHORE clinics came from inpatient and emergency treatment services, community mental health providers, college counseling centers, and family members. Upon referral to OASIS or SHORE, the clinic director contacts the client (if the client is under 18, the parent) to obtain basic demographic information, evaluate the presence or absence of inclusion and exclusion criteria, and to ascertain the nature of the presenting concerns. If the director determines that the client is an appropriate referral, they are scheduled for an intake appointment. At intake, a therapist meets with the client for 90 minutes to gather details about the evolution of their symptoms, information about their family, and begin building rapport. At this intake appointment, the client completes the baseline evaluation. The clinical data manager contacts the client 6 months later to complete the follow up assessment.

Given the difficulty with engagement of FEP clients in treatment (Lecomte et al., 2008), there was a limited amount of continuous data from baseline to 6 months. As such, the investigation of treatment outcome was considered an exploratory aim, as these data were available for only a small subset of those individuals that are included in the main analyses.

Measures

Admission & Demographics Form

The clinic director completes this document upon initial referral to the clinic. Data collected includes age, race and ethnicity, parental level of education, the date of onset of psychotic symptoms, and history of developmental disorders and traumatic brain injury. Duration of untreated psychosis was calculated as the date of admission to the program as recorded by the clinic director minus the date of onset of psychotic symptoms as reported by the client and/or the family during the initial assessment.

Client Subjective Report

At baseline and 6 months, clients were asked to complete a self-report questionnaire (Appendix A). Questions were developed by OASIS staff based on their clinical experiences with this population, and based on known literature regarding the key components of recovery from FEP. Items from this questionnaire included in the present study addressed satisfaction with life and relationships, psychiatric symptoms (e.g., psychosis, depression, anxiety), substance use, treatment goals, and frequency of social interactions.

Social Functioning. Items comprising the construct of social functioning were as follows: general life satisfaction (clients were asked to indicate how much the agree with the statement, "I am satisfied with my life" on a 7-item scale from "Strongly Agree" to Strongly Disagree"), satisfaction with peer, family, and romantic relationships (rated as "Completely Dissatisfied," "Somewhat Dissatisfied," "Somewhat Satisfied," and "Completely Dissatisfied"), frequency of in-person interactions with family, peers, and romantic partner, and frequency of electronic communication (i.e., text, phone) with family, peers, and romantic partner (both frequency items asked clients to state on how many days in the past week these interactions occurred). Participants were asked to rate all items as they occurred over the previous week. Social support has been conceptualized as being comprised of structural support (number of contacts) and functional support (how helpful these contacts are, as reported by the individual) (Smith & Christakis, 2008). Additionally, social isolation is defined as the absence of a social network, which people may or may not find distressing, whereas loneliness is a lack of close relationships or attachment to another when those are desired aspects of one's existence (Perese & Wolf, 2005). Using both frequency and satisfaction as indicators of one's social functioning permits us to address both of these aspects in the latent class analysis.

Symptomatology. Symptoms of psychosis were measured using self-report items that clients completed as part of the baseline assessment. Questions were as follows: "For the past week, select how bothered you have been by the following experiences: hearing, seeing, or sensing things that others don't (Hallucinations); feeling suspicious or that people are paying special attention to you (Suspiciousness); having thoughts that others find strange (Thought Content); having problems with confused thinking (Confusion); feeling unmotivated (Avolition)." Clients were also asked to rate how bothered they were by the following symptoms in the past week: anxiety, depression, irritability, embarrassment, and guilt. Clients rated these items on a 5-point scale, ranging from "Not at all bothered" to "Extremely bothered."

Treatment Goals. Clients were asked to assess the importance of a number of common treatment goals on a 5-point scale, ranging from "Not at all important" to "Extremely important." Goals included items such as "Reducing my symptoms" and "Improving my social life." Goal-setting has been identified as a significant contributor to subjective well-being and has been shown to be associated with improvement in symptoms of illness (King, 2001). In FEP, setting and attaining goals has been associated with treatment completion as well, a particularly important concern when considering difficulty with treatment engagement at large in this population (Penn et al., 2011). Identifying goals is a critical component of a recovery-oriented approach, particularly for this age group, and FEP individuals have readily identified numerous life and treatment goals when surveyed (Ramsay et al., 2011).

DATA ANALYSIS

Data analyses were performed using SPSS version 24 and MPlus version 7 (Muthén & Muthén, 2012). Statistical significance was defined as $p < .05$ unless otherwise specified.

Latent Class Analysis

Latent class analysis is a useful method to statistically identify latent homogenous groups (classes) of individuals from categorical and continuous multivariate data based on probabilistic models of subgroup membership. The latent class model is analogous to the factor analysis model in that both make the assumption that there is an underlying latent variable that is measured by observed variables (Collins & Lanza, 2010). However, latent class analysis is subject-based rather than variable-based, and as such is more readily reflective of reality and can have more direct clinical applicability. It aims to capture the latent structure of cases (individuals) rather than the latent structure of variables. Additionally, in LCA, the latent variable is categorical, whereas in factor analysis, it is continuous and normally distributed. In comparison to other descriptive or cluster analytic approaches, it is not necessary to specify subgroups a priori (Tsai & Rosenheck, 2013) and instead permits an objective approach based on goodness of fit (Magidson & Vermunt, 2002). Additionally, it does not rely on finding clusters with distance measures that are theoretical or arbitrary (Hagenaars & McCutcheon, 2002), and yields a smaller misclassification rate as a result (Fraley & Raferty, 2002).

Importantly, the conceptual approach to LCA suggests that the latent variable is what affects the indicators. In the present study, then, the latent variable of social functioning is what affects the ratings of satisfaction and frequency of social interactions. When considering an

individual subject, there are two influences on that individual's observed response to each item: their latent class membership and error. As error variance decreases, the probability that an individual's response is in fact indicative of their latent class membership increases. A significant advantage of latent class models like LCA is that it estimates and adjusts for measurement error (Collins & Lanza, 2010).

In the present study, LCA has several advantages over other statistical approaches. It is able to identify discrete groups even if there is overlap between subjects. LCA modeling is also easily able to incorporate cases with missing data, a particularly useful advantage when working with data collected in the community where missing data can be unfortunately common. Additionally, LCA and other mixture modeling approaches do not assume normal distribution of data, linearity, or homogeneity of variances; instead, it assumes that there are *k* normal distributions (i.e., classes) within the greater population. These assumptions are made by other statistical approaches (i.e., regression), and if latent classes do exist within FEP individuals, these assumptions would be violated. (Collins & Lanza, 2010).

Aims & Hypotheses

Hypothesis 1: It was hypothesized that LCA methods will reveal subgroups of FEP individuals based on patterns of their self-reported frequency of social interaction and satisfaction with their social relationships at baseline, which will comprise the construct of "social functioning." To evaluate the first hypothesis, an exploratory LCA was conducted on the full sample (N=134). The following indicators were entered into the LCA model: self-reported frequency of both in-person interaction and electronic communication with family members, friends, and romantic partners; self-reported satisfaction with family, peer, and romantic relationships as well as general life satisfaction.

The number of classes were not hypothesized *a priori*, but were determined from an examination of model fit statistics. Consistent with previous work in this area (e.g., Shevlin, Murphy, Dorahy, & Adamson, 2007; Tsai & Rosenheck, 2013), the model of best fit (i.e., number of classes) was determined from examinations of all of the following criteria: (1) Akaike's Information Criteria (AIC; Akaike, 1987), Bayesian Information Criteria (BIC; Schwarz, 1978), and sample size-adjusted BIC (ssa BIC, Sclove, 1987), where lower values are indicative of the model of best fit; (2) likelihood chi-square tests, bootstrapped likelihood ratio tests (BLRT; McLachlan, 1987; Nylund, Asparouhov, & Muthén, 1997) and Lo-Mendell-Rubin tests (LMR; Lo, Mendell, & Rubin, 2001), where *n* and *n* -1 number of classes are compared, (3) mean estimated posterior probabilities of individual cases belonging to each class, and (4) entropy indices, or probability statistics between 0 and 1, where 0 is indicative of no predictive power and 1 suggests perfect predictive power. Regarding (3), adequate-fitting models are ones where each individual has a high probability of class membership for only one class. Consistency with previous research, theoretical and clinical applicability, and parsimony of the models were also considered in model selection.

Several demographic and clinical covariates were also examined to determine the extent to which these variables differ among groups. The following indices were examined: age at referral, sex, race, level of educational attainment, self-reported psychiatric symptoms, duration of untreated psychosis (DUP), substance use, educational and vocational status, and site at which treatment was sought. A series of univariate analyses of variance (ANOVAs) and chi-square tests were used to examine these group differences. When appropriate, pairwise comparisons were conducted using Bonferroni correction for multiple comparisons.

Hypothesis 2: Longer DUP will be associated with poorer social functioning, as evidenced by membership in the group (or groups) characterized by less frequent social contact and less satisfaction with their social relationships. To examine this hypothesis, DUP was examined as both as a continuous predictor and as a categorical predictor by categorizing it using three groups: short (>3 months), medium (3-12 months) and long (>12 months), similar to the protocol utilized by Schimmelmann et al. (2008). Multinomial logistic regression was used to determine whether length of DUP predicts membership in the groups obtained from the analyses described in Aim 1. *B* values and odds ratios were examined to determine whether a longer DUP affected the likelihood of belonging to the group(s) with poorer social functioning.

We also conducted a ROC analysis to determine if there is a particular cut point in DUP such that individuals are more likely to be members of the group(s) with poorer social functioning. ROC curves are plots of the true positive rate against the false positive rate for the different possible cutpoints of a diagnostic test. It can demonstrate the tradeoff between sensitivity (the ability to correctly identify individuals in a particular group) and specificity (the ability to correctly identify individuals that do not belong to that particular group) of a particular test, and identify a cutoff point at which both the specificity and sensitivity are maximized. The area under the curve (AUC) is a measure of how well a given parameter can distinguish between the two identified groups. Values for the AUC range from 1.0 (perfect discrimination between the two groups in question) and 0.5 (no discrimination or apparent differences). ROC curves are valued for their simplicity in presentation and ability to be quickly understood, and for the comprehensive representation of the accuracy of a particular test or cutoff point to discriminate between groups (Zweig & Campbell, 1993).

Exploratory Aim 1. To explore the relationship between DUP length, group membership at baseline, and 6-month outcomes. We wished to determine whether there is a relationship between length of DUP, patterns of social relationships and interactions upon entry into an FEP treatment program, and symptom and functional outcomes at 6-month follow up. Given that follow-up data was only available for a subset of participants, this was considered an exploratory aim. We aimed to expand on the analyses described in Aim 2 to determine whether group membership may mediate the relationship between DUP and 6-month treatment outcomes, and had planned to utilize a path analysis to examine these relationships. However, the relationship between DUP and class membership was found to be nonsignificant (see Results section) and as such, it was not possible to conduct a path analysis as no significant mediating relationship would have been found.

Instead, we explored the potential predictive relationship between DUP and 6-month outcomes as well as between class membership and 6-month outcomes using a series of binary logistic regressions. Given the small sample size for individuals with usable 6-month data, we also performed chi-square tests to determine the presence of any significant association between DUP and 6-month status as well as class membership and 6-month status. Z-square cell comparison tests with Bonferroni correction were used to probe significant omnibus chi-square tests and determine which groups were significantly different from one another (Sharpe, 2015).

Exploratory Aim 2. To explore the relationship between goal-setting and 6-month outcomes. We wished to determine whether there is a relationship between the goals that a client identifies as important and valuable to him/her at baseline and symptomatic and functional outcomes at 6 months. Given the small sample size, we dichotomized the symptom ratings such that they were rated as present or absent. We then utilized a series of binary logistic regressions

to assess the possibility that goals identified at initiation of treatment predict these outcomes after 6 months of treatment.

RESULTS

Primary Analyses

Latent class analysis (LCA)

LCA model selection. LCA analyses were conducted using Mplus version 7 (Muthén & Muthén, 2012) and SPSS version 24. Due to sparseness in the covariance matrix, the variable measuring general life satisfaction was reduced from seven to three item response options (Dissatisfied, Neutral, and Satisfied), and the frequency of electronic and in-person communication items were dichotomized to Low (0-3 days) and High (4-7 days).

Table 1 provides the fit indices from the estimated LCA models. Five models were estimated specifying between 1 and 5 latent classes. For k=3, k=4, and k=5 classes, 100 random starts were specified to address nonconvergence issues, as is suggested by Jung and Wickrama (2008). The AIC and ssaBIC values decreased with each successive class addition and thus did not readily discriminate a model of best fit. Entropy values were high for most models (k=3-5), and decreased slightly for the k=5 model, also not clearly discriminating a model of best fit. Lo-Mendell-Rubin (LMR) likelihood ratio tests were significant for the k=2 model, and nonsignificant for classes k=3-5 (though notably, for the k=3 model, p=0.13, whereas p=0.99 for the k=4 model). Bootstrapped likelihood ratio tests (BLRT) remained significant (p<0.0001) with each successive class addition to the model. Likelihood ratio chi square tests were also examined; the difference between the k=2 and k=3 models was significant (p<0.0001), whereas the difference between the k=3 and k=4 models was not (p=0.99). This is an indication that there was a significant improvement in model fit from the 2-class to the 3-class model, but that there

was no significant improvement from the 3-class to the 4-class model. Across all indices, fit measures suggested that the 3-class model was an acceptable model with good fit. When considering model interpretability, consistency with the extant literature, and parsimony, this model was found to be a good fit as well. As will be discussed subsequently, the three classes appear to map on well to the classes identified in the literature based on premorbid adjustment (e.g., Horton et al., 2015).

Table 2 provides the estimated posterior probabilities and most likely class membership for the 3-class solution. Individuals were assigned to classes based on the highest posterior probability values, which resulted in the following: Class 1 (Dissatisfied), with 42 individuals (31.3%); Class 2 (Satisfied) with 29 individuals (21.6%), and Class 3 (In-Between), the largest class with 63 individuals (47%). Average latent class probabilities were 0.933, 0.946, and 0.949 for Classes 1-3, respectively.

Characteristics of the 3-class solution. Estimated probabilities and standard errors for each of the indicators included in the LCA are shown by class in Tables 3-5. Table 6 provides the count (*n*) and percentage for the responses on each item by class. Figure 1 provides a graphical representation of the predicted probabilities of individuals in each class answering each of the satisfaction items.

Class 1 (Dissatisfied) indicated overwhelming dissatisfaction with life in general, and was less likely than Class 3 to say they were satisfied with their family relationships, and also spent the least amount of time with family among all three classes. They were the most dissatisfied with their peer relationships out of all three classes – 71% indicated they were somewhat dissatisfied with them and the other 29% indicated that they were completely dissatisfied. Additionally, 100% of them indicated that they spent between 0 and 3 days with

peers in the previous week, and over three quarters of them reported communicating electronically with peers with the same frequency. With regard to romantic relationships, they indicated almost complete dissatisfaction (93% reporting being somewhat or completely dissatisfied) , and reported spending little time in person or electronically communicating with a romantic partner.

Class 2 (Satisfied) indicated the most satisfaction across all domains in comparison to other classes. The vast majority (90%) indicated that they experienced general life satisfaction, and a similar majority reported being somewhat or completely satisfied with their family, romantic, and peer relationships. Notably, only 14% of individuals reported any dissatisfaction with peer relationships. They also reported the greatest frequency of electronic communication with peers. While they still reported spending relatively few days with peers, the probability that they'd be classified in the "Low" group was lower than that of Class 1. They also spent much more time with family and communicated with family significantly more than either Class 1 or Class 3. With regard to interactions with romantic partners, Class 2 had the highest percentage of individuals reporting 4-7 days of time spent with a romantic partner, as well as 4-7 days spent electronically communicating with one and were least likely to endorse little time spent with one.

Class 3 (In-Between) indicated general satisfaction with life, but was much less likely to endorse this than Class 2. They indicated a mixed amount of satisfaction and dissatisfaction with their family, peer, and romantic relationships – no person indicated they were "completely dissatisfied" with their peer or romantic relationships, but Class 3 had a much greater proportion of individuals responding that they were "somewhat satisfied" with these relationships rather than completely so than did Class 1. Their satisfaction with family relationships was also more mixed than Class 2, and skewed slightly more positively than Class 1. They reported spending

more time with family than did Class 1, and reported spending the most time with peers out of all three classes. Notably, they reported the least amount of time spent with romantic partners but less dissatisfaction with romantic relationships than did Class 1. With regard to electronic communication, the likelihood of reporting low versus high frequency of communicating with family and peers was fairly evenly split between the two categories, though their reported frequency of communication with peers skewed much more towards "High" than did Class 1.

Demographic and clinical covariates. A series of univariate analyses of variance (ANOVAs) were utilized to examine differences among classes on several demographic and clinical covariates. Classes did not significantly differ with regard to age, sex, or race (Table 7); each class had an average age of approximately 21-22, were almost 75% male, and were around 50% Caucasian. Classes also did not significantly differ with regard to use of alcohol and marijuana, or with regard to the percentage of individuals reporting that they were currently in school. Educational attainment did not differ significantly among the classes; the highest percentage in each group was those individuals reporting having completed some college. The difference in the percentage of individuals reporting that they were currently working approached statistical significance (p=0.058), with Class 3 having a smaller percentage (15.9%) than Class 1 (31%) and Class 2 (34.5%). Site at which treatment was sought did not differ significantly among the classes – the proportion from each of the three sites among the three classes was generally similar.

Self-reported psychiatric symptoms differed among classes in several ways. With regard to symptoms of psychosis, there were several significant differences (Table 8). Groups were significantly different on ratings of odd thought content, confusion, and avolition. Post-hoc analyses revealed that Class 1 reported greater distress related to thought content and confusion

than Class 2; Classes 1 and 3 were not significantly different on these indices. Class 1 reported greater distress related to avolition than both Class 2 and Class 3. Classes were not significantly different with regard to distress associated with hallucinations and suspiciousness. Classes 2 and 3 were not significantly different on any of the five psychosis items.

With regard to other psychiatric symptoms (depression, anxiety, embarrassment, and irritability), Class 1 reported the greatest symptom severity and was significantly different than Class 2 on all indicators except irritability (where there were no significant differences for any class), and also reported significantly more depression than Class 3. Class 3 reported significantly greater severity than Class 2 with regard to depression and embarrassment, as well. Guilt was not included in the analyses as less than half of clients (n=66) had completed this item due to it being added to the questionnaire at a later date.

Class 1 (Dissatisfied) thus appears to be characterized by marked dissatisfaction with their social relationships, as well as significant experiences of depression, anxiety, and avolition and little interaction with others. Class 2 (Satisfied) reported the lowest severity of all symptoms and the highest degree of satisfaction and frequency of interaction with others. As the name indicates, Class 3 (In-Between) seemed to fall in between Class 1 and Class 2 with regard to symptoms as well as their satisfaction and frequency of interaction with others. What differentiates Class 1 from Class 3 appears to be primarily distress related to depression and avolition, such that Class 1 reports a much greater severity of these symptoms than Class 3. It is likely that the significant levels of avolition and depression that individuals in Class 1 experience contribute to the low frequency of interaction with others, as well as their dissatisfaction with their relationships. Class 3 (In-Between) differed significantly from Class 2 on experiences of depression and embarrassment only. Individuals in Class 3 experience depression at a greater

severity than Class 2 and less than Class 1; the concurrent levels of feelings of embarrassment may be due to the fact that they interact more frequently with others and thus have more opportunities to have positive experiences (and thus, lower depression than Class 1) but also to have experiences they may find embarrassing (i.e., talking about their illness). As such, Class 1 may be characterized as withdrawn, depressed, and avolitional, while Class 3 may be characterized as depressed but with the motivation to continue to make attempts to interact with others, though these interactions appear to not always be satisfactory. The characteristics of these classes as well as important treatment implications and potential further directions for research will be explored in greater detail in the Discussion section.

Duration of Untreated Psychosis

The duration of untreated psychosis (DUP) was available for a subset of the participants (N=84). This value was calculated using the date of initiation of treatment at the clinic and date of onset of symptoms as reported by the patient and/or the patient's caregivers. Classes did not differ significantly with regard to DUP (Table 8; $F(2, 81)=1.517$, *ns*). A logarithmic transformation of DUP was also performed due to the highly skewed distribution of DUP in this sample. Classes also did not differ in the length of log DUP ($F(2, 81)=0.869$, *ns*).

Predictor of class membership. DUP was examined as both a continuous and a categorical predictor of class membership (Table 9). The categories created were based on previous research (Schimmelmann et al., 2008) and were as follows: short (>3 months), medium (3-12 months) and long (>12 months). Multinomial logistic regression was utilized to examine whether DUP was a significant predictor of membership in the three classes described above (Dissatisfied, Satisfied, In-Between). The estimated multinomial logistic regression coefficient (*B*) can be interpreted such that, for one unit change in the independent variable (in this case,

DUP), the logit of the outcome associated with the reference group (Class 2 - Satisfied) is expected to change by the parameter estimate *B*. The closer a logistic coefficient is to zero, the less influence the independent variable had in predicting the logit. Positive *B* values indicate that the probability of belonging to the reference group (Class 2) decreases, and negative *B* values indicated increased probability of belonging to the reference group (Class 2).

When DUP was included as a continuous independent variable in the model, it was not found to be a significant predictor of class membership. In Class 1, the *B* value associated with DUP is -0.002; this means that if an individual's DUP was to increase by one unit (in this case, day), the log-odds of being classified in Class 1 instead of Class 2 would be expected to decrease by -0.002 units. In Class 3, the *B* value associated with DUP is 0.001. Both values are almost zero, indicating that DUP had essentially no influence on predicting class membership when examined as a continuous predictor.

Odds ratio values represent the logistic regression odds associated with each predictor variable. Odds ratios greater than one indicate that as the independent variable increases, the individual is *x* (OR value) times more likely to fall in the comparison group (Class 1 or 3) than the referent group (Class 2). For Class 1, the odds ratio value associated with DUP is 0.998, and for Class 3, the odds ratio value is 1.0; individuals were equally as likely to be classified into Class 1 or Class 3 as they were Class 2, regardless of their DUP.

The three DUP groups were then examined as categorical predictors of class membership (Table 9). None of the parameter estimates, representing differences between categories of DUP in the log-odds of being in particular classes compared to others, reached statistical significance, indicating again that length of DUP is not related to class membership.

ROC Curve. Next, a receiver operating characteristic (ROC) curve was calculated to determine whether there was a particular cutoff in DUP such that above that threshold, individuals would likely be classified in the Dissatisfied or In-Between classes (i.e., be characterized by poorer social functioning). Given the relationship between longer DUP and poorer social functioning, we hypothesized that we might be able to identify such a cutoff in this data. However, the AUC was not significant (AUC=0.562, *ns*), indicating that DUP was not a reliable predictor of whether individuals were in the Satisfied class versus the Dissatisfied or In-Between classes.

Exploratory Analyses

DUP, Class Membership, and 6-Month Outcomes

As was mentioned above, DUP was not found to be a significant predictor of class membership when examined as a both a continuous and categorical variable. Given this, we were unable to conduct a path analysis to determine whether class membership acted as a mediator between DUP and 6-month outcomes (symptoms, work/school status) because it would be necessary for DUP to be significantly related to class membership. As an alternative, we examined the relationship between both DUP and 6-month outcomes directly, as well as the relationship between class membership and 6-month outcomes.

The sample size for whom 6-month symptom levels and functional status was available was small (*n*=27) and the proportion of those individuals for whom DUP information was also available was smaller (*n*=17). Upon examination of the 6-month outcome data, it was determined that there were not enough data in each cell for each response option of the symptom ratings to conduct a statistically sound regression (i.e., the majority of individuals rated "Not Bothered," while there were only a few individuals in each of the other rating categories). As such, symptom

ratings were dichotomized into “Not Bothered At All” and “Bothered.” Educational and vocational status were binary indicators (answered as “yes/no”). A series of binary logistic regressions were performed to determine the potential predictive power of both DUP and class membership on 6-month symptom and functional outcomes.

DUP and 6-Month Outcomes. Given the small sample size, DUP was only examined as a continuous predictor, as the small cell size for each DUP category precluded them from being useful predictors. A series of binary logistic regressions were performed with DUP as the independent variable and dichotomous symptom ratings at 6 months as the dependent variable. *B* values and other associated values can be found in Table 10. DUP was not found to be a significant predictor of any symptom variable. The same procedure was utilized to examine work and school status at 6 months, and DUP was not found to be a significant predictor in either case. Given the small cell sizes for each analysis, chi-square tests were also performed to determine if there were any significant associations between class membership and the aforementioned indicators (Table 10). One significant association was found between class membership and school status at 6 months ($\chi 2=6.19$, $p=0.045$).

Class Membership and 6-Month Outcomes. A series of binary logistic regressions were performed with class membership as the independent variable and dichotomous symptom ratings and school/work status at 6 months as the dependent variable. *B* values and other associated values can be found in Table 11. Class membership was not found to be a significant predictor of any symptom variable. The same procedure was utilized to examine work and school status at 6 months, and class membership was not found to be a significant predictor in either case. Again, chi-square tests were also performed to determine if there were any significant associations between class membership and the aforementioned indicators (Table 11). One significant

association was found between class membership and work status at 6 months ($\chi 2=7.813$, $p=0.02$). Z-square cell comparison tests with Bonferroni correction revealed that the number of individuals reporting they were working was significantly different than those reporting they were not working for both the Satisfied (not working, $n=0$; working, $n=3$) and In-Between (not working, $n=8$; working, $n=1$) groups at the 0.05 level.

Goals and 6-Month Outcomes

Goals were rated on a 5-point scale from "Not at all important" to "Extremely important." The means and standard deviations for these ratings by class are found in Table 12. Classes did not significantly differ on their ratings for any of the goal items, indicating that individuals in all three classes rated treatment goals to be of similar importance to them, with no class rating any goal as a particular priority compared to others (Table 12). Notably, reducing substance use was the lowest rated goal in each of the three classes.

A series of binary logistic regressions were utilized to examine the potential predictive power of treatment goals rated as important at baseline in determining 6-month symptom and functional outcome (Table 13); class membership was not incorporated into these analyses and instead, the sample was examined as a whole. As was stated above, symptom ratings were dichotomized and vocational and educational functioning existed as binary indicators (yes/no).

Two significant results were found in the unexpected direction. Higher ratings of both the importance of improving significant relationships and of making healthy lifestyle changes as treatment goals were associated with a 0.158 and 0.388 increase (respectively) in the likelihood that individuals would report not being in school at 6 months. No other significant associations were found between treatment goals set at baseline and symptoms and work/school status at 6 months.

DISCUSSION

The central aim of the present study was to investigate whether a sample of heterogeneous FEP individuals presenting for treatment comprised different subgroups with varying patterns of social functioning. Our hypothesis was supported, as meaningful and distinct subgroups emerged from the latent class analysis. A three-class model demonstrated good fit according to several fit indices and was the best fit conceptually. Consistent with the literature based on premorbid adjustment (e.g., Horton et al., 2015), individuals at baseline appeared to belong to one of three groups: Class 1 (Dissatisfied) endorsed low satisfaction with all of their social relationships, reported rarely communicating with peers or significant others, and spent the most time interacting with their family, though they were generally dissatisfied with their familial relationships as well. Conversely, Class 2 (Satisfied) reported significantly greater satisfaction with their relationships. Though they still did not report spending very much time with peers and significant others and spent a majority of their week with family, they reported communicating with peers more frequently than the other two classes. While Class 2 appears to be the highest functioning of the three, it is interesting to consider previous research that suggests individuals with psychosis do not report dissatisfaction with their social relationships despite also reporting fewer meaningful relationships with others (Lim, Gleeson, Jackson, & Fernandez, 2014). While this may apply to individuals in Class 2, they were also the least symptomatic of the three classes, which may point to better overall functioning.

Class 3 (In-Between) generally appeared to be more similar to Class 2 (Satisfied) than Class 1 (Dissatisfied), reporting similar amounts of time spent with family and peers and similar

levels of satisfaction with their peer relationships. Conversely, Class 1 and Class 3 were significantly different on every item except amount of time spent communicating with family. Groups did not differ with regard to age, sex, or race, suggesting that social functioning deficits are not a result of demographic characteristics in this sample. Previous efforts to classify individuals in similar ways have had mixed findings with regard to demographics: some also found no differences (Cole et al., 2012); others found male gender to be closely associated with greater severity of negative symptoms (Haas & Sweeney, 1992), while female gender and lack of belonging to an ethnic minority group were associated with better social recovery (Hodgekins et al., 2015a).

Examining clinical characteristics revealed additional information about the differences between the classes. No classes reported significantly different levels of distress related to hallucinations or suspiciousness, suggesting that positive symptoms may be unrelated to social functioning as defined in this study. Class 1 (Dissatisfied) differed from Class 2 (Satisfied) on all other symptom ratings. Class 2 and 3 (In-Between) were fairly similar symptomatically, only differing on ratings of depression and embarrassment, both of which were higher in Class 3. This is consistent with Class 3's report of lower levels of satisfaction yet relatively similar levels of time spent communicating and interacting in-person with peers. Class 3 may represent a group of individuals that previously functioned well socially, but in the time leading up to the onset of psychosis, they experienced a decline. As such, they may feel embarrassed and less well-equipped to talk with their peers about this, and may feel isolated and depressed as a result.

Several previous studies have attempted to parse symptomatic and functional heterogeneity among individuals with schizophrenia (Carpenter, Arango, Buchanan, & Kirkpatrick, 1999; Cole et al., 2012), FEP individuals (Haas & Sweeney, 1992; Hodgekins et al.,

2015; Horton et al., 2015; Rabinowitz et al., 2002), and individuals at clinical high risk (Healey et al., 2018; Valmaggia et al., 2013). Similar to the present study, these studies have provided evidence that rather than a spectrum of severity, discrete subgroups may exist, at least with regard to some aspects of symptomatology and functioning.

The most common approach to classifying FEP individuals and those with schizophrenia has been based on premorbid adjustment rather than current social functioning. Across these studies, generally three subgroups have been identified: one characterized by consistently poor functioning (often referred to as "stable-poor", another by consistently good functioning ("stable-good"), and a third that demonstrates a pattern of decline in functioning ("deteriorating"). The present study suggests that similar patterns can be identified when basing classification on social functioning at or near the onset of psychosis as well.

The Satisfied group may bear similarities to individuals in the "stable-good" group. Other studies that have identified this group have found them to be characterized by adequate to good premorbid social and academic adjustment (Cole et al., 2012; Horton et al., 2015), later age of onset (Haas & Sweeney, 1992), better global functioning and cognitive performance (Cole et al., 2012), and mild levels of negative symptoms (Gee et al., 2016). In the present study, the Satisfied group also demonstrated good social functioning (i.e., relatively high levels of satisfaction and interactions with others) and low levels of symptomatology. This pattern has been suggested to be indicative of better prognosis (Gee et al., 2016). However, this group may also be similar to the "high-decreasing" group of FEP individuals identified by Hodgekins et al. (2015a). This group demonstrated low levels of social disability at baseline, but significant decline in their social functioning over the course of the study. This may be due to difficulty adjusting to their identity as an individual with psychosis. As such, it may be important to

determine how best to encourage the "rebuilding" of a social network for individuals in the Satisfied group, even though it may appear counterintuitive given the relatively good levels of functioning with which they present at treatment initiation.

It may be the case that the In-Between group in the present study bears similarities to the deteriorating premorbid adjustment groups (Haas & Sweeney, 1992; Horton et al., 2015; Rabinowitz et al., 2002), such that some degree of their previous levels of functioning is retained, but social relationships and interest in social interactions are declining. The In-Between group was proportionately larger than the deteriorating groups of other studies. While this may simply be due to the variations in the basis for classification, it is possible that this group of individuals gets larger as individuals experience their first episode of psychosis. In other words, the deteriorating adjustment group continues to deteriorate such that more individuals enter this "in-between" phase between good and poor functioning as the onset of psychosis occurs.

The In-Between group may also be similar to the "moderate increasing social recovery trajectory group" of FEP individuals (Hodgekins et al., 2015a), which evidenced moderate social disability at baseline, but improved into the non-clinical range by the end of the study. Likewise, individuals in the In-Between group may have experienced a decline in functioning and an increase in symptomatology as the onset of psychosis has occurred, but may possess the ability for greater improvement in social functioning. If this is the case, it is likely strongly dependent on appropriate and efficient psychosocial interventions that capitalize on their pre-existing levels of adjustment and social skill.

Individuals in the Dissatisfied group were characterized by low mood, high anxiety, high levels of avolition, and lack of close connection with others. They may represent those in the

low-stable FEP group (Hodgekins et al., 2015a) or the stable-poor premorbid adjustment group found in other studies (Haas & Sweeney, 1992; Horton et al., 2015; Rabinowitz et al., 2002). These groups were generally characterized by higher levels of negative symptoms and poor prognosis; indeed, Cole and colleagues (2012) identified them as "poor-worsening," suggesting that their functioning only worsened upon psychosis onset. They may also be similar to the deficit syndrome, a well-defined subtype of schizophrenia characterized by a chronic course, prominent and persistent negative symptoms, and marked neurocognitive and social cognitive impairment (Kirkpatrick, Buchanan, Ross, & Carpenter, 2001). Individuals with these characteristics appear to have had deficits in functioning since childhood and as such, may have never had the opportunity or the skills to make meaningful connections with others. A lack of previous positive experiences may contribute to a lack of interest in engaging in potentially pleasurable experiences in the present, which can thus present as amotivation and anhedonia (Buck & Lysaker, 2013; Strauss & Gold, 2012).

Motivational deficits have been identified as a core feature of the dysfunction observed in schizophrenia (Barch 2005; Barch, Yodkovik, Sypher-Locke, & Hanewinkel, 2008) and have been shown to predict functional impairment above and beyond the contribution of other symptom domains in FEP indivdiuals (Chang et al., in press). Factor analytic studies of commonly used negative symptom scales have determined that avolition and anhedonia load on the same factor (Blanchard & Cohen, 2005; Garcia-Portilla et al., 2015). Together, they form the construct of social amotivation, or a lack of motivation to engage in social activities, which has strong associations with self-reported symptoms and quality of life (Liemburg et al., 2013).

It has also been suggested that a cognitive aspect of motivation is anticipatory pleasure (Gard et al., 2009). Deficits in anhedonia have been examined in the context of anticipatory

versus consummatory pleasure, where anticipatory pleasure involves motivated behavior and desire for a future outcome, while consummatory pleasure is the positive emotion experienced at the moment of the action or event (Klein, 1987). Individuals with schizophrenia have been found to experience deficits in anticipatory, but not consummatory pleasure (Chan et al., 2010; Gard, Kring, Gard, Horan, & Green, 2007), and these deficits have been linked to significant impairment in social functioning (Cohen et al., 2005) as well as concurrent and prospective levels of emotional discomfort and interpersonal functioning (Buck & Lysaker, 2013).

Anhedonia may precede avolition, such that a lack of presumed pleasure from a particular action or experience (i.e., social interaction) would lead to less motivation and goal-directed activity (Strauss, Wilbur, Warren, August, & Gold, 2011). In FEP individuals, avolition is present right after the first episode of psychosis, and appears to be potentially due to a defective translation of emotional salience into motivated behavior (Lui et al., 2016). This means that, like individuals with schizophrenia, some FEP individuals may demonstrate intact emotion "in the moment" but this emotion is significantly less predictive of effort expended, which may lead to fewer social interactions. This may explain the high levels of self-reported avolition and lower levels of in-person interactions and communication that were observed in individuals in the Dissatisfied class.

Duration of Untreated Psychosis

Hypotheses regarding associations between longer DUP and poor social functioning were not supported. Duration of untreated psychosis did not differ among classes and was not found to be a significant predictor of class membership or of 6-month outcomes. We were also unable to identify a specific length of DUP that predicted an individual's membership in the Dissatisfied class rather than the other two. These were unexpected findings, given the strong associations

between DUP and numerous negative outcomes (e.g., Addington et al., 2015; Boonstra et al., 2012), though the evidence has at times been mixed (Craig et al., 2000; Ho et al., 2005). A recent systematic review and meta-analysis of the relationship between DUP and long-term outcomes also found no association between length of DUP and employment or quality of life, but did find small correlations between longer DUP and poor social functioning (Penttilä et al., 2014).

Previous attempts to identify a cut point or threshold in DUP from which better or worse outcomes can be predicted have found varying results, with little consistency among them; additionally, most results have demonstrated evidence for this in regard to cognitive, not social, functioning (Amminger, Edwards, Brewer, Harrigan, & McGorry, 2002; Gaynor, Dooley, Lawlor, Lawoyin, & O'Callaghan, 2009). A recent review indicates tentative support for there being a threshold value for a toxic effect of psychosis though some studies in the review demonstrated mixed results (Rund, 2014), and other studies have suggested that attenuated synaptic plasticity may better explain the mechanism by which deficits are caused (McGlashan, 2006). While the consensus is that longer DUP is associated with worse symptomatic and functional outcomes, the fact that the present study did not find associations between DUP and functioning may not be surprising. Additional research is needed to determine how best to define and characterize DUP and its specific associations with outcomes.

It may be that the evidence of DUP's effect on social functioning outcomes does not manifest until later, and that DUP has less of a direct impact on the level of social functioning present at the beginning of treatment or after only 6 months of treatment. DUP was also found to have differential relationships with negative symptoms in FEP individuals such that long DUP was associated with more severe negative symptoms for some, fewer negative symptoms for others, and over half the sample demonstrated no relationship; yet the length of DUP did not

differ among the three groups identified (Schmitz, Malla, Norman, Archie, & Zipursky, 2007). Other attempts to identify subgroups within heterogeneous FEP samples have also found no differences in DUP among groups (Haas & Sweeney et al., 1992; Hodgekins et al., 2015a).

While we did not find that DUP was associated with class membership, the findings regarding the potential presence of a negative syndrome class and the known associations between DUP and negative symptoms (Boonstra et al., 2012) suggest that future research should continue to explore the possibility that DUP has differential effects on homogenous subgroups of FEP individuals. Further elucidation of this possible relationship may shed light on the mechanism by which DUP might cause functional deficits for some individuals and not others.

Symptom and Functional Outcomes

The present study also examined the association between class membership and functional status at baseline and aimed to determine whether class membership predicted these indicators at 6 months. Class membership was not predictive of symptomatology at 6 months; this may be due to the small sample for which outcome data was available, though other efforts to identify homogenous subgroups of FEP individuals found that meaningful clinical differences did not emerge until 1 year following the acute phase (Horton et al., 2015). More research is needed to better elucidate the nature of symptom outcomes and patterns of social functioning.

No relationship was found between class membership and vocational and educational status, both at baseline and at 6-month follow-up, though the differences among classes with regard to work status at baseline approached statistical significance. The small percentages of vocational involvement across all three groups are consistent with other research that indicates while FEP individuals generally want to be working, they face many psychological and social challenges that make achieving this goal difficult (Rinaldi et al., 2010).

Importantly, the item that assessed employment in the present study asked participants if they were currently employed *and making greater than minimum wage*. This makes endorsement of this item less likely given the frequency with which adolescents and young adults often hold minimum wage jobs. For this same reason, it is unreasonable to gauge vocational attainment based on this higher level of employment. Future research should investigate the varying proportions of individuals holding any significant employment and examine the potential relationships this might have to one's social relationships and interactions.

Treatment Goals

An additional exploratory aim of the present study was to examine the treatment goals set at baseline and the potential association between goals and symptom and functional status at 6 months. Treatment goals set at baseline did not differ among classes, suggesting that individuals identified similar interest in various goals across the sample and this was not impacted by class membership. An examination of the means within each class suggests varying priorities among the classes; consistent with previous research (Ramsay et al., 2011), each class identified reducing symptoms as being important, but Class 1 also rated stress management highly, while Class 3 appeared more concerned with work and school functioning. This is consistent with Class 3 reporting less involvement in work in comparison to the other two classes. Future research should explore the ways in which treatment goals might vary within homogenous subgroups of FEP individuals so as to better ascertain varying prioritization of particular goals.

Goals were also not associated with symptomatic and functional outcome at six months. Elsewhere, goal setting and attainment have been identified as important in treatment completion in FEP individuals (Penn et al., 2011). It may be that six months is not a long enough timeframe for there to be a clear relationship between goals and outcomes; alternately, our sample may have

been too small to detect an effect. Additionally, treatment adherence and session attendance was not available in the present study. Given the difficulty of engaging FEP individuals in treatment (Lecomte et al., 2008), this should be taken into consideration when considering this relationship.

Clinical Implications

The results of the present study have several potential clinical implications. As has been suggested by others (Cole et al., 2012), it is as yet unclear whether efforts such as those in the present study identify discrete classes or a spectrum of social functioning and the varying places that FEP individuals fall along that spectrum. It may be the case that the classes observed in the present study represent different stages of deterioration in social functioning. This is consistent with the clinical staging model of psychosis suggested by McGorry (2007), which differs from conventional diagnostic practice. This concept is commonly accepted and practiced in other areas of medicine, where clinical stages are defined by the extent to which the illness has progressed and the impact it has had on the individual, which in turn is associated with prognosis (McGorry, Killackey, & Yung, 2008). Defining such stages of an illness can thus create a prevention-oriented framework for both understanding pathogenesis as well as evaluating the utility and applicability of specific interventions (McGorry, 2007).

Psychiatry has been slow to accept this model (Fava & Kellner, 1993), even as the field of early psychosis and clinical high-risk research has rapidly expanded.. The identification of patterns of varying social functioning abilities is desirable in large part because it would permit the personalization of treatment trajectories based on this knowledge. Regardless of whether they are discrete classes or stages of decline, efforts such as this underline the heterogeneity and multidimensionality of psychosis and the need for more extensive research to determine how

best to meet the treatment needs of these varying groups (Horton et al., 2015; Raballo & Larøi, 2009).

Indeed, common psychosocial interventions may have clear applications to some groups but may be less appropriate for others. For example, popular and commonly used skills-based interventions (e.g., social skills training; Bellack, Mueser, Gingerich, & Agresta, 2013 and social cognition training; Roberts, Penn, & Combs, 2015) likely have important implications for individuals in the Dissatisfied group, and perhaps in the In-Between group as well, where basic skills may be lacking. They may be less applicable to those in the Satisfied group, who may have access to both higher levels of skills and more substantial and robust social networks. Additionally, these types of interventions do not generally target critical aspects of FEP individuals' social experiences, including loneliness (Lim et al., in press; Trémeau, Antonius, Malaspina, Goff, & Javitt, 2016). Newer interventions, such as Social Recovery Cognitive Behavioral Therapy (SRCBT; Fowler et al., 2009, 2018) that target social functioning and social recovery directly, may be a useful alternative for some groups of FEP individuals.

Social media use is another critical area of research to consider when examining how to address social relationships in an adolescent and young adult population. In the present study, every class reported relatively more time spent interacting with peers electronically than they did in-person. Targeting a medium that may already be second-nature for individuals to engage with may provide a means to encourage and increase social interactions more directly. FEP individuals report valuing the opportunity to seek support and information about mental health online (Lal, Nguyen, & Theriault, in press). A recent review examined digital interventions for psychotic disorders and results indicated that individuals engaged in peer-to-peer interactions demonstrated improvements in perceived social support (Biagianti, Quraishi, & Schlosser, in

press). The EPPIC program in Australia developed HORYZONS, an online platform that integrates peer to peer social networking and individualized psychosocial interventions and has been shown to improve empowerment and social connectedness in FEP individuals (Álvarez-Jiménez et al., 2014). Another new intervention, the PRIME mobile app, aims to improve motivation and reward processing deficits in FEP individuals, which in turn may improve quality of life; the pilot trial demonstrated both feasibility and acceptability (Schlosser et al., 2016). More research is needed to determine how best to harness the power of technology and social media so as to more effectively target FEP individuals' social relationships and social functioning.

Limitations & Future Directions

This study had a number of limitations. As latent variable analyses are influenced by subtle differences in samples, the findings of the present study must be replicated several times and by larger and varied samples to ensure the validity of the findings. The longitudinal stability and predictive power of the classes identified should also be examined with a much larger sample. It may be less important to come to an absolute conclusion on whether these efforts identify discrete groups or a spectrum of severity, and more important to determine whether the classes identified have predictive power (Jablensky, 2006), which was not possible in the very small sample of 6-month outcome data in the present study.

Given the significant associations between groups of premorbid adjustment and functioning and neurocognitive ability in other studies, it will be important to determine the relative cognitive functioning of the three groups identified in this study. The groups identified by Haas and Sweeney (1992) were found to be associated with the relative severity of several cognitive domains as well as global cognitive impairment (Bechard-Evans, Iyer, Lepage, Joober,

& Malla, 2010). It is possible that individuals in the Dissatisfied group experience greater cognitive deficits than individuals in the In-Between group and the Satisfied group, and this knowledge would be important in order to further characterize what treatment might be best for individuals in this group.

The role of pharmacological treatment should also be considered. It is possible that classes differed with regard to medications taken at baseline (i.e., some may have been prescribed antipsychotics in the context of a recent hospitalization while others may be medication-naïve). Medications likely also had a significant impact on 6-month outcomes. Adherence may differ among groups such that individuals experiencing greater dissatisfaction may be more motivated to take medications in an attempt to ameliorate their symptoms; the opposite could also be true, such that those same individuals experience enough avolition and anhedonia that they have little interest in engaging in a medication regimen (Tattan & Creed, 2001). Future studies should examine the relationship between classification of FEP individuals based on social functioning and medication, as it is possible that this may have a differential impact on individuals in different classes.

It is a strength of the present study that self-report symptom and functioning measures were utilized, given the previously discussed difficulties with informant and provider report and the lack of consensus between the two. However, it would benefit future studies to utilize established objective measures of symptomatology, particularly of negative symptoms (e.g., SANS, CAINS) in addition to self-report. Additionally, future research should consider more nuanced approaches to operationally defining social functioning. The present study was a first attempt at addressing multiple aspects of one's social experience by assessing both one's perception of and feelings about their relationships (satisfaction) as well as the activity of one's

social network (frequency of interactions). Future studies should incorporate measures of loneliness and other subjective indicators as well as more commonly used measures of time spent in structured activity to further elucidate the nature of the social lives of FEP individuals.

CONCLUSION

The results of this study point to a continued need to re-examine and potentially recalibrate the definition of social functioning, both for the field of SMI more broadly as well as for FEP specifically. Conceptualizations of this term have been beleaguered by disparate approaches to measurement and disagreement with regard to the culturally, socially, and developmentally appropriate indicators of what constitutes "normal" functioning for a given population. Given the critical importance of social relationships in adolescents and young adults and the differentiation of FEP individuals based on their social experiences, it is clear that this should play a significant role in how providers and researchers conceptualize functioning and recovery in this population. Recovery is also often treated as a homogenous construct in FEP, where individuals are compared with non-clinical samples or studies simply use group means to examine measures of functioning (Hodgekins et al., 2015a). This and other studies' attempts to parse the heterogeneity of characteristics of individuals at the onset of psychosis is a step towards discarding this "one size fits all approach" to FEP individuals and instead acknowledging the diverse experiences and levels of deficit and recovery with which individuals present.

Table 1. *Fit indices and class sizes for the latent class analysis of satisfaction and frequency of social relationships.*

# Classes	Loglikelihood	Free Parameters	Likelihood ratio chi-square	*df*	AIC	BIC	ssa BIC	Entropy	Class size
1	-1045.128	17	533.967	12237	2124.26	2173.52	2119.74	n/a	134
2	-978.718	35	522.785*	12230	2027.43	2128.86	2018.15	0.79	66/68
3	-952.152	53	441.929*	12210	2010.30	2163.89	1996.24	0.866	42/29/63
4	-927.005	71	438.634	12195	1996.01	2201.75	1977.17	0.91	21/44/37/32
5	-906.814	89	413.094	12179	1991.63	2249.54	1968.01	0.902	24/16/23/34/34

Likelihood ratio chi-square test, to compare n with $n - 1$ classes (significant LRT indicates the n-class solution is better than an $(n - 1)$-class solution, * indicates significance at 0.05 level; AIC: Akaike's Information Criteria (smaller number suggests a better model); BIC: Bayesian Information Criteria (smaller number suggests a better model); ssa BIC: sample size-adjusted Bayesian Information Criteria (smaller number suggests a better model); Entropy, an overall measure of how well a model predicts class membership, ranging from 0 (no predictive power) to 1 (perfect prediction) (above .80 indicates adequate predictive power); Class size, estimated class size based on most likely class membership.

Table 2. *Latent class membership based upon estimated posterior probabilities.*

Class	Based on estimated posterior probability *n* (%)	Based on most likely class membership *n* (%)	Class 1 Dissatisfied	Class 2 Satisfied	Class 3 In-Between
1	40.51 (30.2)	42 (31.3)	0.933	0.001	0.066
2	29.55 (22.1)	29 (21.6)	0.007	0.946	0.048
3	64.94 (47.7)	63 (47.0)	0.018	0.033	0.949

The first column indicates class membership based on the mean estimated posterior probability. The second column shows the classification of subjects in each class based on their highest posterior probability (most likely class membership). Columns Class 1-Class 3 indicate the average latent class probabilities for most likely latent class membership (row) by latent class (column). This means that individuals classified into class 1 had an average posterior probability for membership in class 1 of 93.3%. Individuals classified in class 1 had average posterior probabilities of belonging to class 2 of 0.1% and class 3 of 6.6%.

Table 3. *Results in probability scale for Class 1 (Dissatisfied).*

	Estimate	S.E.	Est./S.E.	*p*-value
Life Satisfaction				
Dissatisfied	0.703	0.084	8.394	0.000
Neutral	0.187	0.071	2.640	0.008
Satisfied	0.110	0.057	1.923	0.054
Family Satisfaction				
Completely Dissatisfied	0.172	0.063	2.728	0.006
Somewhat Dissatisfied	0.329	0.078	4.222	0.000
Somewhat Satisfied	0.399	0.083	4.819	0.000
Completely Satisfied	0.100	0.055	1.796	0.072
Romantic Satisfaction				
Completely Dissatisfied	0.411	0.086	4.749	0.000
Somewhat Dissatisfied	0.524	0.086	6.120	0.000
Somewhat Satisfied	0.040	0.038	1.041	0.298
Completely Satisfied	0.025	0.027	0.924	0.355
Peer Satisfaction				
Completely Dissatisfied	0.301	0.078	3.850	0.000
Somewhat Dissatisfied	0.699	0.078	8.942	0.000
Somewhat Satisfied	0.000	0.000	0.000	1.000
Completely Satisfied	0.000	0.000	0.000	1.000
Family Time				
Low	0.427	0.088	4.880	0.000
High	0.573	0.088	6.545	0.000
Peers Time				
Low	1.000	0.000	0.000	1.000
High	0.000	0.000	0.000	1.000
Romantic Time				
Low	0.846	0.061	13.969	0.000
High	0.154	0.061	2.538	0.011
Family Communication				
Low	0.577	0.095	6.076	0.000
High	0.423	0.095	4.450	0.000
Peers Communication				
Low	0.846	0.074	11.466	0.000
High	0.154	0.074	2.085	0.037
Romantic Communication				
Low	0.974	0.026	37.072	0.000
High	0.026	0.026	1.008	0.313

Family/Peers/Romantic Time=number of days you interacted with respective people in last week, Low=0-3 days, High=4-7; Family/Peers/Romantic Communication=number of days you electronically communicated with respective people in last week, Low=0-3 days, High=4-7.

Table 4. *Results in probability scale for Class 2 (Satisfied).*

	Estimate	S.E.	Est./S.E.	*p*-value
Life Satisfaction				
Dissatisfied	0.038	0.037	1.022	0.307
Neutral	0.085	0.062	1.359	0.174
Satisfied	0.877	0.070	12.457	0.000
Family Satisfaction				
Completely Dissatisfied	0.035	0.035	0.997	0.319
Somewhat Dissatisfied	0.000	0.000	0.000	1.000
Somewhat Satisfied	0.116	0.081	1.436	0.151
Completely Satisfied	0.849	0.083	10.247	0.000
Romantic Satisfaction				
Completely Dissatisfied	0.000	0.000	0.000	1.000
Somewhat Dissatisfied	0.000	0.000	0.000	1.000
Somewhat Satisfied	0.331	0.122	2.708	0.007
Completely Satisfied	0.669	0.122	5.480	0.000
Peer Satisfaction				
Completely Dissatisfied	0.133	0.066	1.994	0.046
Somewhat Dissatisfied	0.020	0.080	0.247	0.805
Somewhat Satisfied	0.109	0.091	1.200	0.230
Completely Satisfied	0.738	0.114	6.469	0.000
Family Time				
Low	0.116	0.083	1.403	0.161
High	0.884	0.083	10.707	0.000
Peers Time				
Low	0.768	0.105	7.330	0.000
High	0.232	0.105	2.212	0.027
Romantic Time				
Low	0.788	0.083	9.474	0.000
High	0.212	0.083	2.550	0.011
Family Communication				
Low	0.212	0.095	2.241	0.025
High	0.788	0.095	8.307	0.000
Peer Communication				
Low	0.436	0.109	3.985	0.000
High	0.564	0.109	5.148	0.000
Romantic Communication				
Low	0.673	0.115	5.852	0.000
High	0.327	0.115	2.840	0.005

Family/Peers/Romantic Time=number of days you interacted with respective people in last week, Low=0-3 days, High=4-7; Family/Peers/Romantic Communication=number of days you electronically communicated with respective people in last week, Low=0-3 days, High=4-7.

Table 5. *Results in probability scale for Class 3 (In-Between).*

	Estimate	S.E.	Est./S.E.	*p*-value
Life Satisfaction				
Dissatisfied	0.265	0.063	4.232	0.000
Neutral	0.193	0.056	3.449	0.001
Satisfied	0.543	0.072	7.545	0.000
Family Satisfaction				
Completely Dissatisfied	0.000	0.000	0.000	1.000
Somewhat Dissatisfied	0.221	0.057	3.865	0.000
Somewhat Satisfied	0.491	0.073	6.746	0.000
Completely Satisfied	0.288	0.073	3.930	0.000
Romantic Satisfaction				
Completely Dissatisfied	0.128	0.047	2.742	0.006
Somewhat Dissatisfied	0.497	0.071	7.006	0.000
Somewhat Satisfied	0.262	0.068	3.872	0.000
Completely Satisfied	0.113	0.048	2.380	0.017
Peer Satisfaction				
Completely Dissatisfied	0.000	0.000	0.000	1.000
Somewhat Dissatisfied	0.159	0.072	2.201	0.028
Somewhat Satisfied	0.547	0.075	7.248	0.000
Completely Satisfied	0.294	0.063	4.665	0.000
Family Time				
Low	0.337	0.066	5.069	0.000
High	0.663	0.066	9.985	0.000
Peers Time				
Low	0.666	0.068	9.759	0.000
High	0.334	0.068	4.901	0.000
Romantic Time				
Low	1.000	0.000	0.000	1.000
High	0.000	0.000	0.000	1.000
Family Communication				
Low	0.551	0.080	6.872	0.000
High	0.449	0.080	5.609	0.000
Peer Communication				
Low	0.540	0.076	7.151	0.000
High	0.460	0.076	6.080	0.000
Romantic Communication				
Low	0.937	0.036	26.273	0.000
High	0.063	0.036	1.770	0.077

Family/Peers/Romantic Time=number of days you interacted with respective people in last week, Low=0-3 days, High=4-7; Family/Peers/Romantic Communication=number of days you electronically communicated with respective people in last week, Low=0-3 days, High=4-7.

Table 6. *Count (n) and percentage for latent class items by class.*

	Class 1 Dissatisfied	Class 2 Satisfied	Class 3 In-Between
Life Satisfaction			
Dissatisfied	30 (71.4)	1 (3.4)	15 (23.8)
Neutral	8 (19)	2 (6.9)	12 (19)
Satisfied	4 (9.5)	26 (89.7)	34 (54)
Family Satisfaction			
Completely Dissatisfied	7 (16.7)	1 (3.4)	0
Somewhat Dissatisfied	14 (33.3)	0	13 (20.6)
Somewhat Satisfied	17 (40.5)	3 (10.3)	30 (47.6)
Completely Satisfied	4 (9.5)	35 (86.2)	18 (28.6)
Romantic Satisfaction			
Completely Dissatisfied	17 (40.5)	0	7 (11.1)
Somewhat Dissatisfied	22 (52.4)	0	29 (46)
Somewhat Satisfied	1 (2.4)	9 (31.0)	17 (27)
Completely Satisfied	1 (2.4)	19 (65.5)	1 (11.1)
Peer Satisfaction			
Completely Dissatisfied	12 (28.6)	0	0
Somewhat Dissatisfied	30 (71.4)	4 (13.8)	9 (14.3)
Somewhat Satisfied	0	2 (6.9)	36 (57.1)
Completely Satisfied	0	22 (75.9)	18 (28.6)
Family Time			
Low	17 (40.5)	3 (10.3)	20 (31.7)
High	22 (52.4)	26 (89.7)	40 (63.5)
Peers Time			
Low	40 (100)	21 (72.4)	38 (60.3)
High	0	6 (20.7)	20 (31.7)
Romantic Time			
Low	34 (81)	22 (75.9)	58 (100)
High	6 (14.3)	6 (20.7)	0
Family Communication			
Low	23 (54.8)	6 (20.7)	32 (50.8)
High	17 (40.5)	23 (79.3)	26 (44.8)
Peer Communication			
Low	33 (78.6)	12 (41.4)	32 (50.8)
High	7 (16.7)	16 (55.2)	26 (44.8)
Romantic Communication			
Low	38 (90.1)	19 (65.5)	54 (85.7)
High	1 (2.4)	9 (31.0)	4 (6.3)

Family/Peers/Romantic Time=number of days you interacted with respective people in last week, Low=0-3 days, High=4-7; Family/Peers/Romantic Communication=number of days you electronically communicated with respective people in last week, Low=0-3 days, High=4-7.

Table 7. *Associations between latent classes and demographic characteristics at baseline.*

	Class 1 Dissatisfied *(n*=42)	**Class 2 Satisfied** *(n*=29)	**Class 3 In-Between** *(n*=63)	**Test**	***p*-value**
Age, mean (SD)					
	22.56 (4.32)	22.01 (3.46)	21.71 (3.56)	F (2,127)=0.6	0.55
Sex, % male within class					
	73.8	69	71.4	$\chi2$=0.049	0.976
Race, % White within class					
	54.8	41.4	52.4	$\chi2$=6.869	0.551
Level of Education, *n* (% within class)					
Some high school	7 (16.7)	3 (10.3)	6 (9.5)	$\chi2$=6.946	0.731
High school	6 (14.3)	7 (24.1)	11 (17.5)		
Some college	10 (23.8)	8 (27.6)	19 (30.2)		
College	2 (4.8)	2 (6.9)	8 (12.7)		
Graduate/Professional (any)	2 (4.8)	1 (3.4)	2 (3.2)		
Substance Use (% yes, used in past week within class)					
Cannabis	23.9	13.7	11.1	$\chi2$=3.587	0.166
Alcohol	23.8	24	19.1	$\chi2$=0.672	0.715
Work Status (% employed)					
	31	34.5	15.9	$\chi2$=5.707	0.058^{+}
School Status (% in school)					
	21.4	10.3	25.4	$\chi2$=2.794	0.247
Clinic, *n*, (% within class)					
Carrboro	17 (40.5)	16 (55.2)	29 (46.0)	$\chi2$=1.529	0.821
Raleigh	16 (38.1)	8 (27.6)	22 (34.9)		
Wilmington	9 (21.4)	5 (17.2)	12 (19.0)		

$^{+}$ *p*=-.058, approaching statistical significance.

Table 8. *Associations between latent classes and clinical characteristics*

	Class 1 Dissatisfied *(n*=42)	**Class 2 Satisfied** *(n*=29)	**Class 3 In-Between** *(n*=63)	**Test**	***p*-value**	**Post-hoc comparisons**
Distress related to (mean (SD)):						
Hallucinations	1.36 (1.22)	0.83 (0.81)	1 (1.1)	F(2, 129)=2.38	0.097	
Suspiciousness	1.53 (1.28)	1.00 (1.23)	1.13 (1.23)	F(2, 127)=1.81	0.168	
Thought Content	1.58 (1.34)	0.83 (0.89)	1.07 (1.3)	F(2, 127)=3.48	0.034**	1>2*
Confusion	1.88 (1.36)	0.93 (0.96)	1.26 (1.31)	F(2, 128)=5.25	0.006**	1>2**
Avolition	2.63 (1.37)	1.1 (1.21)	1.32 (1.32)	F(2,129)=15.97	<0.001***	1>2,3***
Anxiety	2.02 (1.32)	1.19 (1.15)	1.70 (1.32)	F(2, 129)=3.51	0.033**	1>2**
Depression	1.95 (1.15)	0.55 (0.91)	1.26 (1.20)	F(2,130)=13.46	<0.001***	1>2***,3**; 3>2**
Embarrassment	1.32 (1.21)	0.36 (0.62)	0.90 (1.12)	F(2, 127)=6.74	0.002**	1>2***; 3>2*
Irritability	1.31 (1.24)	0.79 (1.17)	1.08 (1.09)	F(2, 128)=1.74	0.18	
Duration of Untreated Psychosis (*n*=84*)*						
	(*n*=24)	(*n*=17)	(*n*=43)			
DUP (days, mean (SD))	201.08 (237.87)	418.06 (690.03)	365.47 (399.23)	F(2, 81)=1.517	0.23	
DUP categories, *n* (% within class)						
Short (<3 months)	11 (45.8)	5 (29.4)	17 (39.5)	$\chi 2$=4.705	0.319	
Medium (3-12 months)	9 (37.5)	4 (23.5)	11 (25.6)			
Long (>12 months)	4 (16.7)	8 (47.1)	15 (34.9)			

* p<0.05; **p<0.01; ***p<0.001. DUP=duration of untreated psychosis.

Table 9. *DUP as a continuous and categorical predictor of class membership: Logistic regression results.*

	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Class 1 (Dissatisfied)				
DUP (continuous)	-0.002 (0.001)	0.998	2.830	0.093
Short DUP	1.482 (0.816)	4.400	3.296	0.069
Medium DUP	1.504 (0.858)	4.500	3.073	0.080
Class 3 (In-Between)				
DUP (continuous)	0.001 (0.001)	1	0.140	0.708
Short DUP	0.595 (0.671)	1.813	0.786	0.375
Medium DUP	0.383 (0.750)	1.467	0.275	0.600

S.E.=standard error; OR=odds ratio. Class 2 (satisfied) was selected as the reference group; *B* values and odds ratio are in comparison to Long DUP.

	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Class 1 (Dissatisfied)				
DUP (continuous)	-0.002 (0.001)	0.998	2.830	0.093
Medium DUP	0.022 (0.807)	1.023	0.001	0.978
Long DUP	-1.482 (0.816)	0.227	3.296	0.069
Class 3 (In-Between)				
DUP (continuous)	0.001 (0.001)	1	0.140	0.708
Medium DUP	-0.212 (0.774)	0.809	0.075	0.784
Long DUP	-0.595 (0.671)	0.551	0.786	0.375

S.E.=standard error; OR=odds ratio. Class 2 (satisfied) was selected as the reference group; *B* values and odds ratio are in comparison to Short DUP.

Table 10. *Associations between duration of untreated psychosis and 6-month symptom and functional status.*

	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*	$\chi 2$	*p*
Anxiety	-0.003 (0.002)	1.003	2.478	0.115	4.385	0.112
Depression	0.002 (0.002)	1.002	1.285	0.257	2.845	0.241
Embarrassment	0.002 (0.002)	1.002	1.223	0.269	1.862	0.394
Irritability	0.003 (0.002)	1.003	2.240	0.134	3.238	0.198
Hallucinations	-0.002 (0.003)	0.998	0.461	0.497	0.527	0.768
Suspiciousness	0.006 (0.010)	0.994	0.351	0.553	1.778	0.411
Thought Content	-0.003 (0.003)	0.997	0.996	0.318	0.762	0.683
Confusion	0.002 (0.002)	1.002	0.996	0.318	1.815	0.404
Avolition	-0.002 (0.002)	0.998	1.019	0.313	4.216	0.121
Work Status	-0.001 (0.002)	0.999	0.289	0.591	2.222	0.329
School Status	-0.011 (0.016)	0.989	0.483	0.487	6.190	0.045*

*$p<0.05$. Logistic regressions utilized DUP as a continuous predictor, $\chi 2$ tests utilized DUP categories (i.e., Short, Medium, Long). S.E.=standard error; OR=odds ratio.

Table 11. *Associations between class membership and 6-month symptom and functional status.*

	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*	$\chi 2$	*p*
Class 1 (Dissatisfied)						
Anxiety	-1.099 (1.291)	0.333	0.724	0.395	1.784	0.410
Depression	-0.405 (1.307)	0.667	0.096	0.756	0.653	0.721
Embarrassment	0.511 (1.390)	1.667	0.135	0.713	0.139	0.933
Irritability	-0.405 (1.307)	0.667	0.096	0.756	0.170	0.918
Hallucinations	-0.539 (1.314)	0.583	0.168	0.682	0.287	0.866
Suspiciousness#	-	-	-	-	2.442	0.295
Thought Content	-0.539 (1.314)	0.583	0.168	0.682	0.287	0.866
Confusion	-0.539 (1.314)	0.583	0.168	0.682	0.287	0.866
Avolition	-1.281 (1.304)	0.278	0.965	0.326	1.325	0.516
Work Status#	-	-	-	-	7.813	0.020*
School Status	0.223 (1.483)	1.250	0.023	0.880	0.172	0.917
Class 3 (In-Between)						
Anxiety	-1.658 (1.314)	0.190	1.593	0.207		
Depression	-0.916 (1.304)	0.400	0.494	0.482		
Embarrassment	0.405 (1.394)	1.500	0.085	0.771		
Irritability	-0.539 (1.314)	0.583	0.168	0.682		
Hallucinations	-0.118 (1.339)	0.889	0.008	0.930		
Suspiciousness#	-	-	-	-		
Thought Content	-0.118 (1.339)	0.889	0.008	0.930		
Confusion	-0.118 (1.339)	0.889	0.008	0.930		
Avolition	-0.539 (1.314)	0.583	0.168	0.682		
Work Status#	-	-	-	-		
School Status	0.560 (1.464)	1.750	0.146	0.702		

*$p<0.05$. #Disproportionate number of individuals in certain categories and not others, error was too large. Class 2 (Satisfied) was selected as the reference class. S.E.=standard error; OR=odds ratio.

Table 12. *Group comparisons of treatment goals set at baseline.*

	Class 1 (Dissatisfied)	**Class 2 (Satisfied)**	**Class 3 (In-Between)**	**ANOVA**	***p***
Reduce symptoms	2.67 (1.29)	2.88 (1.58)	2.62 (1.16)	F(2, 66)=0.238	0.788
Stress management	2.66 (1.37)	2.39 (1.59)	2.52 (1.29)	F(2, 118)=0.286	0.752
Reduce substance use	1.18 (1.34)	1.22 (1.69)	0.88 (1.35)	F(2, 115)=0.735	0.482
Improve social life	2.26 (1.25)	1.93 (1.72)	2.33 (1.37)	F(2, 118)=0.763	0.469
Improve significant relationships	2.20 (1.53)	1.67 (1.71)	2.31 (1.49)	F(2, 117)=1.629	0.201
Improve work/school satisfaction	2.29 (1.36)	2.22 (1.74)	2.65 (1.44)	F(2, 114)=1.041	0.356
Healthy lifestyle changes	2.49 (1.31)	2.29 (1.72)	2.55 (1.44)	F(2, 118)=0.309	0.734

Goals were rated from 0 to 4, “Not at all important” to “Extremely Important.”

Table 13. *Associations between treatment goals set at baseline and 6-month symptom and functional status.*

	Reduce Symptoms				Improve social life			
	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*	*B* (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Anxiety	-0.095 (0.534)	0.909	0.032	0.858	0.112 (0.304)	1.118	0.136	0.713
Depression	0.157 (0.698)	1.170	0.051	0.822	0.435 (0.337)	1.545	1.67	0.196
Embarrassment#	-	-	-	-	0.506 (0.454)	1.658	1.243	0.265
Irritability	0.143 (0.944)	1.154	0.023	0.879	0.663 (0.406)	1.940	2.665	0.103
Hallucinations	-0.301 (0.674)	0.740	0.200	0.655	0.086 (0.346)	1.089	0.061	0.805
Suspiciousness	0.143 (0.944)	1.154	0.023	0.879	0.072 (0.451)	1.075	0.026	0.872
Thought Content	0.174 (0.599)	1.190	0.085	0.771	0.209 (0.358)	1.233	0.341	0.559
Confusion	0.757 (0.896)	2.132	0.714	0.398	0.209 (0.358)	1.233	0.341	0.559
Avolition	0.575 (0.681)	1.778	0.714	0.398	0.390 (0.348)	1.477	1.256	0.262
Work Status	0.169 (0.585)	1.184	0.084	0.772	-0.329 (0.380)	0.720	0.752	0.386
School Status	-0.112 (0.671)	0.894	0.028	0.867	-0.590 (0.423)	0.554	1.942	0.163

	Stress Management				Improve Significant Relationships			
	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*	*B* (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Anxiety	-0.014 (0.280)	0.986	0.002	0.961	0.119 (0.286)	1.126	0.172	0.679
Depression	0.288 (0.294)	1.334	0.963	0.326	0.303 (0.304)	1.354	0.991	0.320
Embarrassment	0.573 (0.422)	1.774	1.845	0.174	-0.412 (0.337)	0.662	1.495	0.221
Irritability	-0.153 (0.294)	0.858	0.272	0.602	0.032 (0.295)	0.969	0.012	0.914
Hallucinations	-0.293 (0.324)	0.746	0.816	0.366	0 (0.339)	1	0	1
Suspiciousness	-0.159 (0.410)	0.853	0.151	0.698	1.076 (0.967)	2.932	1.238	0.266
Thought Content	0.109 (0.319)	1.116	0.118	0.732	0.400 (0.407)	1.492	0.967	0.325
Confusion	0.579 (0.382)	1.784	2.297	0.130	0.119 (0.352)	1.126	0.114	0.735
Avolition	0.623 (0.350)	1.864	3.171	0.075	0.067 (0.319)	1.069	0.044	0.834
Work Status	0 (0.352)	1	0	1	0 (0.419)	1	0	1
School Status	-0.41 (0.403)	0.663	1.036	0.309	-1.843 (0.943)	0.158	3.82	0.051*

**p*=0.051; #Disproportionate number of individuals in certain categories and not others, impossible to do analysis, error was too large. S.E.=standard error; OR=odds ratio.

Table 13. *Associations between treatment goals set at baseline and 6-month symptom and functional status (continued).*

	Reduce Substance Use				Improve Work/School Satisfaction			
	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*	*B* (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Anxiety	-0.092 (0.290)	0.912	0.100	0.752	-0.074 (0.313)	0.928	0.056	0.812
Depression	-0.256 (0.308)	0.774	0.694	0.405	0.174 (0.318)	1.190	0.299	0.585
Embarrassment	-0.938 (0.739)	0.391	1.612	0.204	0.815 (0.560)	2.259	2.115	0.146
Irritability	-0.267 (0.331)	0.766	0.650	0.420	0.307 (0.346)	1.359	0.786	0.375
Hallucinations	-0.093 (0.335)	0.911	0.077	0.781	-0.345 (0.345)	0.708	1.003	0.316
Suspiciousness	0.405 (0.393)	1.500	1.065	0.302	0.098 (0.451)	1.103	0.048	0.827
Thought Content	-0.093 (0.335)	0.911	0.077	0.781	0.119 (0.349)	1.126	0.116	0.734
Confusion	-0.211 (0.354)	0.810	0.355	0.551	0.551 (0.425)	1.734	1.680	0.195
Avolition	-0.205 (0.320)	0.815	0.410	0.522	0.209 (0.331)	1.233	0.401	0.527
Work Status	0 (0.373)	1	0	1	-0.195 (0.414)	0.823	0.221	0.638
School Status	-0.322 (0.46)	0.725	0.488	0.485	-1.204 (0.697)	0.300	2.983	0.084

	Healthy Lifestyle Changes			
	B (S.E.)	OR (95% CI)	Wald $\chi 2$	*p*
Anxiety	0.091 (0.269)	1.095	0.114	0.736
Depression	0.326 (0.292)	1.386	1.246	0.264
Embarrassment	0.311 (0.377)	1.365	0.683	0.408
Irritability	0.094 (0.287)	1.099	0.109	0.742
Hallucinations	0.025 (0.303)	1.025	0.007	0.934
Suspiciousness	1.048 (0.927)	2.852	1.280	0.258
Thought Content	0.463 (0.378)	1.589	1.497	0.221
Confusion	0.625 (0.432)	1.869	2.096	0.148
Avolition	0.481 (0.338)	1.618	2.031	0.154
Work Status	-0.214 (0.328)	0.807	0.425	0.514
School Status	-0.948 (0.481)	0.388	3.877	0.049*

*$p<0.05$. S.E.=standard error; OR=odds ratio.

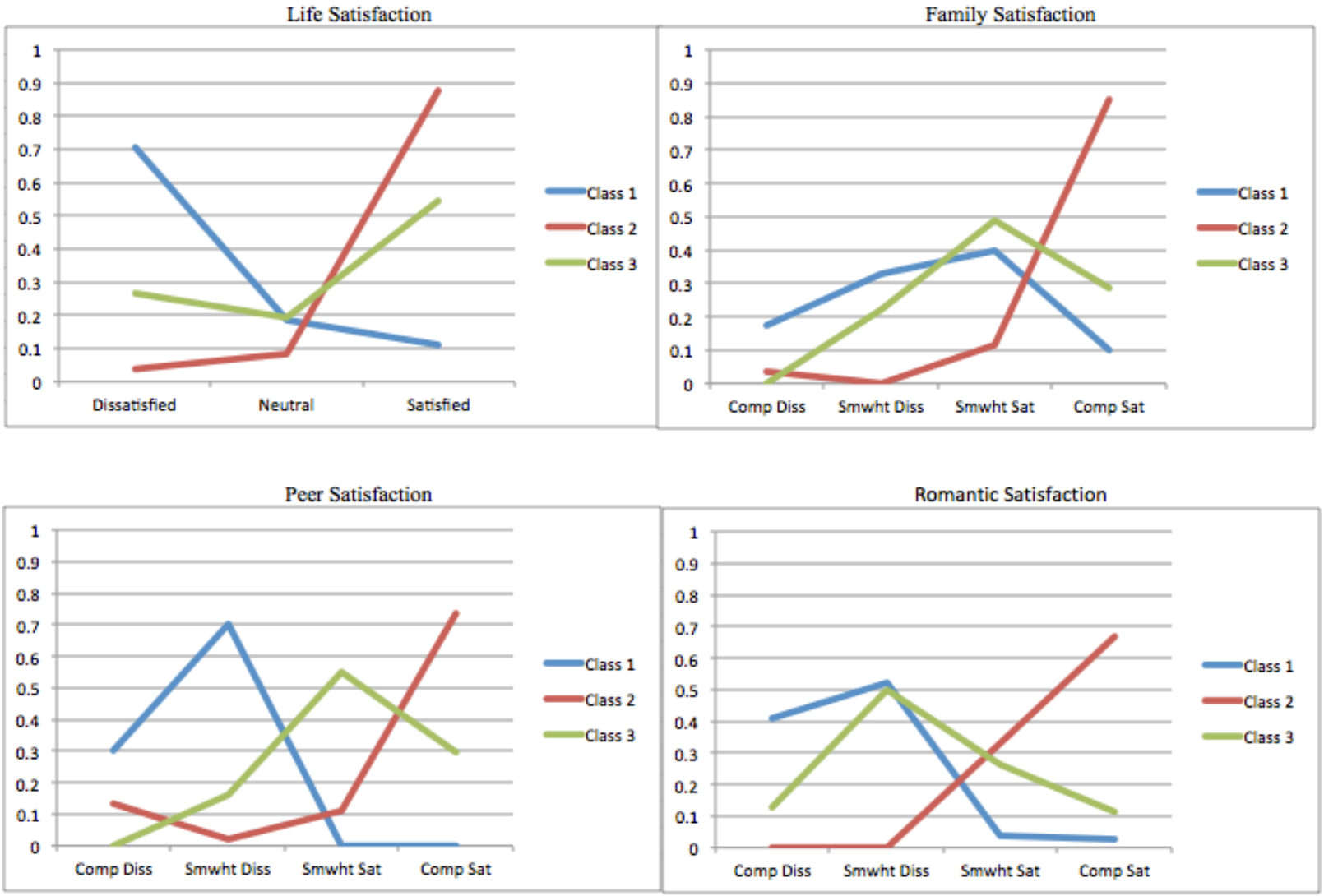

Figure 1. Plots of conditional probabilities for each satisfaction item by class. Class 1=Dissatisfied; Class 2=Satisfied; Class 3=In-Between. Comp Diss=Completely Dissatisfied; Smwht Diss=Somewhat Dissatisfied; Smwht Sat=Somewhat Satisfied; Comp Sat=Completely Satisfied.

APPENDIX: CLIENT SELF-REPORT

The following survey is to gather your input. This helps us better understand how you are doing, and how we can serve you better today. Please answer honestly and to the best of your ability. If you have any problems completing this, your provider will assist you in completing the survey.

Please provide us with your first and last name: _____

1. How much do you agree with the statement "I am satisfied with my life":

❍ Strongly Disagree ❍ Disagree ❍ Slightly Disagree ❍ Neutral ❍ Slightly Agree ❍ Agree ❍ Strongly Agree

2. Select how ***bothered*** you have been by the following feelings *this past week*:

	Not at all bothered	A little bothered	Bothered somewhat	Bothered a lot	Extremely bothered
Anxiety	❍	❍	❍	❍	❍
Depression	❍	❍	❍	❍	❍
Embarrassment	❍	❍	❍	❍	❍
Irritability	❍	❍	❍	❍	❍
Guilt	❍	❍	❍	❍	❍

3. Select how ***satisfied*** you are in each area *this past week*. Even if an area does not apply to you, tell us how satisfied you are with your status.

	Completely Dissatisfied	Somewhat Dissatisfied	Somewhat Satisfied	Completely Satisfied
Physical Health	❍	❍	❍	❍
Mental Health	❍	❍	❍	❍
Family Relationships	❍	❍	❍	❍
Peer Relationships	❍	❍	❍	❍
Romantic Relationships	❍	❍	❍	❍
School/Work	❍	❍	❍	❍
Medications	❍	❍	❍	❍

4. In *the past week*, select how many ***days*** you have experienced the following:

	0	1	2	3	4	5	6	7
Having thoughts or attempts to harm or kill yourself	❍	❍	❍	❍	❍	❍	❍	❍
Having thoughts or attempts to harm or kill other people	❍	❍	❍	❍	❍	❍	❍	❍

5. In *the past week*, select how ***often*** you have had the following experiences:

	Not at all	Less than half of the time	Half of the time	More than half of the time	All of the time
Feeling Happy	❍	❍	❍	❍	❍
Satisfaction with Use of Leisure Time	❍	❍	❍	❍	❍
Satisfaction with Use of Coping Skills	❍	❍	❍	❍	❍

6. For *the past week*, select how ***bothered*** you have been by the following experiences:

	Not at all bothered	Bothered a little	Bothered somewhat	Bothered a lot	Extremely bothered
Hearing, seeing, or sensing things that others don't	❍	❍	❍	❍	❍
Feeling suspicious or that people are paying special attention to you	❍	❍	❍	❍	❍
Having thoughts that others find strange	❍	❍	❍	❍	❍
Having problems with confused thinking	❍	❍	❍	❍	❍
Feeling unmotivated	❍	❍	❍	❍	❍

7. For *the past week*, select how often you have used any of the below substances:

	None	Once or twice	A few times	Once a day	Multiple times a day
Cannabis/Marijuana	❍	❍	❍	❍	❍
Alcohol	❍	❍	❍	❍	❍
Stimulants	❍	❍	❍	❍	❍
Cocaine/Crack	❍	❍	❍	❍	❍
Heroin or other Opiates	❍	❍	❍	❍	❍
Ecstasy or MDMA	❍	❍	❍	❍	❍
Synthetic weed	❍	❍	❍	❍	❍
Other Drugs	❍	❍	❍	❍	❍

8. For *the past week*, select ***how many days*** you have missed at least one dose of your medications:

	0	1	2	3	4	5	6	7	N/A
Antipsychotics	❍	❍	❍	❍	❍	❍	❍	❍	❍
All Others	❍	❍	❍	❍	❍	❍	❍	❍	❍

9. In *the past week*, how often has life felt overwhelming?

❍ Not at all ❍ A few times ❍ About half of the time ❍ Most of the time ❍ All of the time

10. In *the past week*, how often have you limited your activities to avoid stress?

❍ Not at all ❍ A few times ❍ About half of the time ❍ Most of the time ❍ All of the time

11. For *the past week*, rate how many days you participated in the following:

	0	1	2	3	4	5	6	7
In Person With:								
Family	❍	❍	❍	❍	❍	❍	❍	❍
Friends	❍	❍	❍	❍	❍	❍	❍	❍
Romantic partner	❍	❍	❍	❍	❍	❍	❍	❍
Electronic Communication (Text/Email/Phone) With:								
Family	❍	❍	❍	❍	❍	❍	❍	❍
Friends	❍	❍	❍	❍	❍	❍	❍	❍
Romantic Partner	❍	❍	❍	❍	❍	❍	❍	❍

12. Mark how **often** you have experienced the following in *the past week*:

	Not at all	A few times	Sometimes	Most of the time	All of the time
Pleasure being with other people	❍	❍	❍	❍	❍
Pleasure from work, hobbies, or recreation	❍	❍	❍	❍	❍
Importance of close, caring relationships	❍	❍	❍	❍	❍
Motivation and effort to engage in activities	❍	❍	❍	❍	❍

13. Mark how **strongly** you have felt about the following in *the past week*:

	None	Slight	Moderate	Considerable	A lot
Pleasure being with other people	❍	❍	❍	❍	❍
Pleasure from work, hobbies, or recreation	❍	❍	❍	❍	❍
Desire for close, caring relationships	❍	❍	❍	❍	❍
Motivation and effort to engage in activities	❍	❍	❍	❍	❍

14. Mark the strongest level of pleasure that you **expect to experience** from the following in the *next few weeks*:

	None	Slight	Moderate	Considerable	A lot
Being with other people	❍	❍	❍	❍	❍
Work, hobbies, or recreation	❍	❍	❍	❍	❍

15. Please rate the follow as you *currently* feel:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I have goals in life that I want to reach	❍	❍	❍	❍	❍
I ask for help when I need it	❍	❍	❍	❍	❍
I am hopeful about my future	❍	❍	❍	❍	❍
Even when I don't believe in myself, other people do	❍	❍	❍	❍	❍
My symptoms interfere less and less with my life	❍	❍	❍	❍	❍

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