FIRST-EPISODE PSYCHOSIS IN EMERGING ADULTHOOD: EXPLORING COGNITIVE

FUNCTIONING, SYMPTOMATOLOGY, QUALITY OF LIFE, AND POTENTIAL

STRENGTHS

by

by © Sidney Lichtenstein

A thesis submitted to the School of Graduate Studies

in partial fulfilment of the requirements for the degree of

Doctor of Psychology

Memorial University of Newfoundland

August 2024

St. John's, Newfoundland and Labrador

Abstract

This thesis is an exploration of first-episode psychosis in emerging adults. Emerging adulthood is a developmental period comprised of critical psychosocial milestones (e.g., transitioning to independence, educational/occupational achievement, establishing one's social network, identity formation) and neurocognitive milestones (e.g., frontal lobe development). First-episode psychosis can severely disrupt milestone attainment during this period, leading to adverse personal and societal costs. Therefore, this thesis elucidates how first-episode psychosis presents in emerging adults and explores potential strengths in this group with the intention of helping early intervention programs support emerging adults in meeting their milestones and thus reducing the risk of adverse outcomes.

The methodology of this study is naturalistic. Cross-sectional and two-year longitudinal secondary data on the cognitive functioning, symptomatology and quality of life of 41 emerging adults was analyzed following an Exploratory Data Analysis framework. Executive functioning and letter fluency predicted global quality of life and productivity quality of life one year into treatment. Letter fluency and baseline negative symptoms predicted social quality of life one year into treatment. None of these variables predicted any area of quality of life at two years into treatment. These findings suggest that first-episode psychosis during the period of emerging adulthood presents similarly to first-episode psychosis at other stages of life. However, emerging adults appear unique in that the severity of baseline negative symptoms did not impact global and productivity quality of life in the first year of treatment. This finding might distinguish first-episode psychosis during emerging adulthood from other developmental periods by suggesting that, unlike at other ages, occupational functioning during this period of development is less destabilized by early negative symptoms. The domains of executive functioning and letter

fluency also appear to be assets that could protect emerging adults from risks to their academic/occupational milestones in the first year following initiation of treatment. Moreover, the social milestone may be protected by letter fluency in the first year of treatment. To build towards developmentally-informed, strengths-based early interventions, more research into the assets identified in this study and other possible strengths is needed to help emerging adults with first-episode psychosis meet their milestones.

General Summary

Using both developmental and strengths-based lenses, this thesis examines the cognitive functioning, symptomatology, and quality of life of emerging adults (18-25 years old) with first-episode psychosis in an early intervention program over two years. The first chapter begins with descriptions of emerging adulthood and first-episode psychosis. The chapter then dissects how psychosis can interfere with meeting milestones during that developmental period, which leads to the personal and societal costs that make this study pertinent. A review of the available literature on the cognitive functioning, symptomatology, and quality of life of emerging adults with first-episode psychosis follows and is succeeded by a discussion of Resiliency Theory in the context of first-episode psychosis. The chapter concludes with the overall aim of this thesis and the study methods. The second chapter is a journal article manuscript that summarizes the exploration into the naturalistic, secondary data on the cognitive functioning, symptomatology, and quality of life of emerging adults with first-episode psychosis. The study involved identifying key patterns amongst these variables and testing how they predicted global, social, and productivity quality of life one and two years into treatment. The last chapter reviews the results in the context of three questions: (1) If and how do emerging adults with first-episode psychosis differ from the existing first-episode psychosis literature?; (2) What strengths do emerging adults with first-episode psychosis possess that could facilitate resilience against the adverse outcomes that commonly follow a first episode of psychosis?; (3) How might early intervention services ultimately utilize this information on emerging adults' first-episode psychosis presentation and strengths to support this group with meeting their milestones?

Contribution Statement

I, Sidney Lichtenstein, am the sole author of all parts of this thesis.

and Darrell have made me feel. Finally, to Mikayla, this is your dissertation as much as it is mine. You gave me the courage to embark on this journey through thick and thicker. It is a gift to be your partner and share this with you.

This thesis, and myself (who can tell the difference anymore?), does not exist without this extraordinary company. Thank you all. Oh, I would also like to thank god…for not getting in the way!

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Emerging adults (ages 18-25) are in a critical period of development marked by fundamental psychosocial and cognitive milestones that lay the foundation for future functioning. Experiencing psychosis during this period can significantly disrupt meeting these developmental milestones and, therefore, lead to adverse outcomes that have significant personal and societal costs. To mitigate these negative outcomes and limit the costs, it is important to understand how first-episode psychosis (FEP) presents in emerging adults and what strengths this group may possess. This knowledge may help early interventions to facilitate milestone attainment despite the risks posed by the first episode.

The psychosocial milestones that characterize this period of emerging adulthood include transitioning to independence, educational and occupational achievement, establishing social connections and relationships, as well as identity formation (Arnett, 2000; Greene et al., 1992; Schulengberg et al., 2004; Shanahan, 2000). There is considerable evidence that these pivotal psychosocial milestones are disrupted by the onset of psychosis (Bassett et al., 2001; Braehler & Cogan et al., 2019; Dunkley et al., 2015; Gumley & Macbeth, 2014; Lam et al., 2010; McCarthy-Jones et al., 2013; Noel et al., 2017; Rakhshan Rouhakhtar & Schiffman, 2020; Roy et al., 2013; Roy et al., 2016; Schwannauer, 2012). For example, with respect to educational achievement, of 114 college students participating in an outpatient FEP treatment program, 81.5% paused their education as a result of their first psychotic episode (Shinn et al., 2020). With regards to identity formation, a meta-analysis by McCarthy-Jones et al. (2013) examining the lived experiences of people with psychosis found that a diagnosis of a psychotic disorder can be perceived to replace

one's current sense of self, such that the individual feels less like a person and more like a "schizophrenic."

The primary neurocognitive milestone of this time is frontal lobe development. The frontal lobe houses a collection of critical functions – attention, working memory, set-shifting, flexibility, planning, and behavioural regulation – that enable people to strategize, think abstractly, problem-solve, multi-task, adjust to changes, follow procedures, and retrieve memories (Orellana & Slachevsky, 2013). These abilities, commonly referred to as "executive functions," are essential for future functioning yet are also affected by the onset of psychosis (Braver et al., 1999; Chan et al., 2006; Hutton et al., 1998; Ihara et al., 2000; Liu et al., 2011; Mesholam-Gately et al., 2009; Reichenberg & Harvey, 2007). For example, in a sample of 78 untreated individuals with FEP, 29.50% were found to have one executive function impaired, 14.10% had two functions impaired, 6.40% had three functions impaired, and 3.80% had four functions impaired (Chan et al., 2006). More specifically, a study comparing 30 people with FEP and 30 healthy controls found a severe deficit in planning and strategizing among the clinical group compared to the healthy controls (Hutton et al., 1998).

When these developmental milestones are missed, emerging adults grow to face various adverse outcomes that inhibit functioning. For example, with respect to financial independence, healthy controls have been shown to have significantly higher income, on average, than individuals with FEP (Roy et al., 2013). Furthermore, educational achievement among individuals with FEP can be compromised. For instance, Roy et al. (2016) found in their comparison of academic functioning between 50 individuals with FEP and 50 healthy controls that significantly fewer individuals from the FEP sample (22%) were enrolled in post-secondary studies compared to controls (54%). These youths also struggle with obtaining employment

(Killackey et al., 2013). The arrival of the first episode interferes with the opportunity to build fundamental vocational skills in job hunting and interviewing, which often leaves these youths with minimal work experience and limits them as competitive job applicants. These negative outcomes beget other negative outcomes, including unstable housing, treatment non-adherence, relapse, substance abuse, hospitalizations, service use, discrimination, and elevated rates of suicide (Abdel-Baki et al., 2017; Addington et al., 2007; Barnett et al., 2007; Blanchard et al., 2000; Colizzi et al., 2016; Doyle et al., 2014; Drake et al., 1991; Foglia et al., 2017; Haywood et al., 1995; Lal & Mall, 2015; Miller et al., 2009; Myles et al., 2015; Østergaard et al., 2017; Schoeler et al., 2016a; Schoeler et al., 2016b; Schoeler et al., 2017). For example, in a study of 101 individuals with FEP, unemployment was associated with an elevated risk of relapse (Owens et al., 2010).

Together, these adverse outcomes have substantial personal and societal costs. Individuals with schizophrenia-spectrum disorders often experience poor quality of life (QoL; Addington et al., 2003b; Evans et al., 2007; Ritsner et al., 2002). For example, a longitudinal study compared objective QoL between 117 FEP participants and 40 healthy controls at admission and a one-year follow-up (Addington et al., 2003b; Heinrichs et al., 1984). At the follow-up, Addington et al. (2003b) found that the QoL of those experiencing their first episode was significantly lower than that of controls. At a societal level, when individuals with schizophrenia struggle with functionality, their dependence on public resources and support, as well as difficulties obtaining and maintaining employment, create a large economic burden. In 2004, a review of the financial costs associated with schizophrenia-spectrum disorders in Canada, comprised of healthcare expenses and productivity losses, was estimated to be $6,850,000,000 (Goeree et al., 2005). The estimated cost of public resources spent on a single person with schizophrenia in Canada was

estimated to be $1,122,000 (Blomqvist et al., 2006). For example, healthy controls have been shown to acquire their funds primarily from jobs, loans, or bursaries, while youths with FEP have been shown to more often rely on social welfare (Roy et al., 2013).

Evidently, FEP renders emerging adults vulnerable to not meeting psychosocial and cognitive milestones that are fundamental for later functioning. Without these foundational milestones, these youths face a range of negative outcomes and, subsequently, personal, and societal costs. Considering the widespread support for early intervention for youths with psychosis (Albert & Weibell, 2019; Cornell et al., 2018), it is appropriate to look to these services as grounds to support emerging adults in meeting their milestones to support their functional trajectory. Therefore, an exploratory study is imperative to (a) understand how emerging adults fit or do not fit with the existing literature on FEP and (b) identify potential strengths among this group. Exploration into these areas may generate evidence to support developmentally-informed, strengths-based early interventions that can account for and facilitate meeting the developmental milestones of emerging adults despite the risks posed by the first episode.

Emerging Adulthood and First-Episode Psychosis

Across the world, a diagnosis of a schizophrenia-spectrum disorder (SSD) is considered one of the most debilitating conditions one could suffer from (Charlson et al., 2018; Vos et al., 2017). For instance, the 2013 Global Burden of Disease study ranked schizophrenia as the most impairing condition worldwide (i.e., most years living with or lost to a disability) (Saloman et al., 2015). While there is no unanimous definition for FEP, broadly, it represents the clear onset of an SSD (Breitborde et al., 2009). This event is unquestionably disruptive to one's life as psychotic symptoms are most severe at this time, and difficulties with cognitive functioning become most

apparent, which results in functional challenges (Censits et al., 1997; Corcoran et al., 2007; Haas & Sweeney, 1992; Häfner et al., 1998; Keefe, 2014; Mesholam-Gately et al., 2009). From a development perspective, the timing of the first episode in one's lifespan is critical because of the developmental milestones this event can disrupt, subsequently leading to problems with future functioning.

FEP typically occurs between the late teens and early twenties (Jones et al., 1994; Kessler et al., 2007; Moe & Breitbore, 2019; Nowrouzi et al., 2015). For example, a review by Kessler et al. (2007) examined the age of onset of various mental illnesses. The authors noted that the median age of onset for participants with FEP (*n*=1019) was 22 years old. Furthermore, in a study examining the onset of psychosis across different age intervals, of the 612 participants with schizophrenia, 34.6% had an average age of onset of 17.11 years, 42.6% had an average age of onset of 21.96 years, and 22.8% had an average age of onset of 30.02 years (Nowrouzi et al., 2015). Overall, the incidence of psychosis during the late teens to early twenties is apparent.

Despite being a time of critical psychosocial and neurocognitive development, it has been difficult for developmental psychologists to define this vague period between adolescence and young adulthood (Arnett, 2000). In response to this issue, Arnett (2000) proposed a framework to conceptualize this unique and critical transitional developmental period, which he referred to as "Emerging Adulthood." The alignment of the onset of FEP with emerging adulthood suggests the milestones of this period are at risk of being disrupted, which can put future functioning in jeopardy (Moe & Breitbore, 2019). Therefore, there is a call to explore FEP in emerging adults (Moe & Breitbore, 2019).

Defining First-Episode Psychosis

SSDs are characterized by possessing at least one of five features. The first two potential features are delusions and hallucinations, which are collectively referred to as "positive symptoms" (Bhati, 2013). Positive symptoms add to or distort a person's experience of reality and are present to some degree in all disorders across the spectrum, which makes them the defining feature of psychosis (American Psychiatric Association, 2013; Bhati, 2013). Delusions are firm beliefs that endure despite conflicting evidence (American Psychiatric Association, 2013). Hallucinations are when an individual experiences involuntary stimulation of one or more of their senses without any actual external stimulus (American Psychiatric Association, 2013). The third possible feature is negative symptoms (Bhati, 2013). Negative symptoms detract from or diminish a person's experience of reality (Stahl & Buckley, 2007). The National Institute of Mental Health (NIMH) has settled on five types of negative symptoms: diminished affect, alogia, avolition, asociality, and anhedonia (Kirkpatrick et al., 2006; see Appendix A for definitions of these terms). Unlike positive symptoms, negative symptoms are not always present or pronounced across the spectrum (American Psychiatric Association, 2013; Lyne et al., 2012). The final two possible features that characterize SSDs are disorganized thinking and behaviour (Bhati, 2013). Disorganized thinking is when the composition and cohesiveness of one's thoughts become disrupted (Elvevåg & Goldberg, 1997). This disruption is often represented by one's manner of speaking, which can be challenging to understand (American Psychiatric Association, 2013; Elvevåg & Goldberg, 1997). Disorganized behaviours are unusual and potentially inappropriate actions (American Psychiatric Association, 2013; Flaum & Schultz, 1996). For instance, individuals may stare, grimace, present childlike, be unwilling to follow directions, and become unexpectedly upset (American Psychiatric Association, 2013; Flaum & Schultz, 1996).

The course leading to a diagnosis of an SSD can be divided into 3 phases: the premorbid phase, the prodromal phase and the first episode of psychosis. The premorbid phase is the period before any symptoms are present (Keith & Buchsbaum, 1978). The prodromal phase is the period before the first episode and may also be considered the period prior to any future episode (Herz, 1999). The prodromal phase is characterized by a departure from one's typical behaviour and functioning alongside the emergence of broad, indistinct symptoms that become more distinct and escalate until the first episode (Cameron, 1938; Siddiqui et al., 2010). The prodromal period may last weeks or years (Cameron, 1938; Siddiqui et al., 2010). Generally, the prodromal phase lasts about six years, with negative symptoms appearing around five years before positive symptoms (Häfner & an der Heiden, 1997). However, more recent studies suggest a prodromal period of, on average, 21.6 months (Powers et al., 2020). Ultimately, these phases culminate in FEP, which is typically marked by the presentation of clear positive symptoms, often at their most extreme, alongside a decrease in functioning (Breitborde et al., 2009; Censits et al., 1997; Corcoran et al., 2007; Haas & Sweeney, 1992; Häfner et al., 1998). Depending on the etiology, presentation and duration of one's symptoms, an individual may then be diagnosed with an SSD such as delusional disorder, brief psychotic disorder, schizophreniform disorder, schizophrenia, schizoaffective disorder, substance/medication-induced psychotic disorder, psychotic disorder due to another medical condition, and unspecified/other schizophrenia spectrum and psychotic disorder (Bhati, 2013). There is also evidence to suggest bipolar disorders should be included in the schizophrenia spectrum due to significant overlap in clinical presentation and physiology (Pearlson, 2015). Relatedly, other disorders can be accompanied by psychotic features like bipolar disorder and major depressive disorder (American Psychiatric Association, 2013). Individuals with these disorders and psychotic features are commonly accepted to Canadian early

intervention programs for psychosis since they can also be considered part of the wider

schizophrenia spectrum (Nolin et al., 2016).

Defining Emerging Adulthood

According to Arnett (2000), emerging adults are individuals between 18 and 25 years old

living in modern and industrialized areas. Several features set emerging adults apart from

adolescents (10 to 18 years old) and young adults (26 years old to early 30s). First, a unique

feature of emerging adults is that they are defined by being difficult to define. While there are

common characteristics for teenagers (e.g., living with parents, attending school, single, without

children) and young adults (e.g., living independently of parents, not in school, married, with

children) in contemporary societies, emerging adults do not follow a predictable pattern. For

instance, emerging adults are more likely to engage in informal "gig" work compared to adults

and commonly change residences throughout these years (Goldscheider & Goldscheider, 1994;

Kostyshyna & Luu, 2019; Pendakur & Young, 2013).

Relatedly, a second unique characteristic of emerging adults is an acute and more

intimate exploration of one's identity (Arnett, 2000). Building on the concepts of "prolonged

adolescence" and "psychosocial moratorium" proposed by Erik Erikson, Arnett (2000) suggests

that, like adolescents, emerging adults continue to explore their sense of self and investigate

various role functions. Furthermore, like adults, emerging adults begin to accumulate more

responsibilities, which facilitates identity exploration especially as it pertains to partnership,

vocation, and one's beliefs and values. Still, emerging adults are not as dependent as teenagers

and do not have the same number and types of obligations as young adults, which keeps them

distinct from both groups. Altogether, emerging adulthood is a unique time because it involves

deepening the identity exploration that begins in adolescence by starting to interact with new adult roles (Arnett, 2000).

The third feature of emerging adulthood that separates it from young adulthood is that these youths do not view themselves as adults (Arnett, 2000). Multiple studies have demonstrated that emerging adults associate adulthood with three key characteristics: (1) accepting responsibility for oneself, (2) making independent decisions, and (3) achieving financial independence (Arnett, 1994; Arnett, 1998; Arnett, 2000; Greene et al., 1992; Scheer et al., 1996). Taken together, emerging adults view adulthood as secured once they have a strong sense of self and are autonomous (Arnett, 2000; Arnett, 1998). However, many do not believe they qualify as adults (Arnett, 2000; Arnett, 2001). For instance, when asked, "Do you feel that you have reached adulthood?" approximately 50% of the individuals 18 to 25 years old responded "Yes and no," which was higher than younger and older age groups (Arnett, 2001). Therefore, considering emerging adults often do not view themselves as adults (based on their definition), they should not be classified as such (Arnett, 2000; Arnett, 2001). Rather, their unique perspective on adulthood supports the existence of the distinct transitional developmental period of emerging adulthood (Arnett, 2000).

Arnett (2015) also noted two additional features of emerging adults: self-focus and optimism. As parents relinquish control and youths are afforded more freedom, emerging adulthood is when youths are least responsible to others and most to themselves. Furthermore, emerging adulthood is an exciting time where there is potential to reshape one's life. Altogether, emerging adulthood is a valid and unique transitional developmental period in which one does not possess the dependence of adolescence nor the self-sufficiency of adulthood and is

characterized by instability and deeper exploration into oneself fueled by self-focus and perceived possibility (Arnett, 2000; Arnett, 2015).

Psychosocial and Neurodevelopment Milestones of Emerging Adulthood

Several psychosocial and neurocognitive milestones occur during emerging adulthood that are critical for future functioning (Arnett, 2000; Taber-Thomas & Pérez-Edgar, 2014; Tanner, 2006). Typical psychosocial milestones during this period can include establishing key social connections and relationships, setting educational and occupational trajectories, transitioning to financial independence, and forming one's identity (Arnett, 2000; Greene et al., 1992; Schulengberg et al., 2004; Shanahan, 2000). These milestones reflect the experimentation and search for individuality and autonomy that is characteristic of this period while also helping emerging adults move toward their conceptualization of adulthood. These psychosocial milestones are pivotal for future functioning. For example, developing a secure sense of self is associated with numerous benefits, including greater well-being, satisfaction with life, career adaptability, supportive relationships, engagement with society, social participation, self-regulation, and lower depression and anxiety (Crocetti, 2018).

Notably, emerging adults with FEP have been shown to have life goals related to these psychosocial milestones (Ramsay et al., 2011). Ramsay et al. (2011) conducted a qualitative study asking 100 emerging adults with FEP about their life goals. Of their sample, 38% had responses centred around education, such as acquiring their high school diploma, attending post-secondary studies or completing a post-secondary degree, and receiving professional training. Moreover, 53% of participants' responses focused on employment, including obtaining employment, running a business or learning a trade. Finally, 35% of participants reported goals related to relationships, such as bonding with family, having children, and meeting new people.

These results highlight that emerging adults with FEP have goals similar to what may be expected of typical emerging adults. As such, there is a need to learn about FEP in emerging adults to minimize disruption to these milestones to help them meet their goals and maximize future functioning. Without a comparison group, however, it is difficult to discern if emerging adults with FEP have a different quantity of goals compared to typical emerging adults. Considering the nature of the SSDs (i.e., negative symptoms such as avolition, asociality and anhedonia), it is possible emerging adults with FEP possess fewer goals than emerging adults without FEP. This possibility would further emphasize the need to understand FEP in emerging adults to support them in attaining their specific psychosocial goals and milestones.

Emerging adults also undergo unique and crucial neurodevelopment during this time (Taber-Thomas & Pérez-Edgar, 2014). Across neurodevelopment, the density of grey matter (responsible for processing information) and white matter (responsible for transmitting the information) in the brain changes (Fields & Stevens-Graham, 2002; Taber-Thomas & Pérez-Edgar, 2014). The changes in grey and white matter density in the brains of emerging adults occur primarily in the frontal lobe, specifically the frontolimbic system, along with association cortices (Taber-Thomas & Pérez-Edgar, 2014). The frontolimbic system, which links the frontal lobe and limbic system, incorporates emotional information into thinking and behaviour, while the association cortices allow for a more sophisticated integration of sensory information into thinking and behaviour (Taber-Thomas & Pérez-Edgar, 2014). As a result of these specific neurological changes, emerging adults develop more advanced cognitive functions including, executive functions (explained below), behaviour regulation and social reasoning (Taber-Thomas & Pérez-Edgar, 2014). Together, these advanced cognitive functions enable more mature thinking and behaviour among emerging adults that is less volatile and risky and more adaptive

and enterprising, which distinguishes them from adolescents but is not quite at the same level or proficiency as young adults (Taber-Thomas & Pérez-Edgar, 2014). Developing this more mature thinking style is critical because it equips emerging adults with the cognitive capacity to make changes in their lives that they could not make in adolescence, more thoughtfully reflect on their identities, and become more self-sufficient, all of which characterizes emerging adulthood and enables them to achieve adulthood (Taber-Thomas & Pérez-Edgar, 2014). Overall, emerging adulthood possesses psychosocial and neurodevelopmental milestones that are crucial for a healthy transition into young adulthood, which underscores the necessity of exploring if, how, and to what degree these milestones could still be preserved despite an episode of psychosis.

Psychosocial Milestone Interference

There is considerable evidence indicating that the typical psychosocial milestones of emerging adulthood (i.e., establishing key social connections and relationships, setting educational and occupational trajectories, transitioning to financial independence and forming one's identity) are significantly obstructed by FEP. For instance, emerging adults with FEP have been shown to struggle with peer relationships for multiple reasons, including the presence of symptoms, feeling others are unable to connect with their experience, challenges discussing their episode, fear of stigma, commitment to treatment, and focusing on managing other areas of their life (e.g., academics) (Bassett et al., 2001; Dunkley et al., 2015; Kinson et al., 2018; Roy et al., 2013). A testimony from an individual 3-9 months following their first episode highlights the unintentional uncoupling that can occur between individuals with FEP and their peers:

> Before I was unwell I needed twenty hands to count all my friends. After being unwell I
> can use two, like people fade away, people drift away, they can't, they don't either want

to deal with it or they don't understand or when you try to talk to them they don't listen. (Dunkley et al., 2015, p. 216)

With regards to educational achievement, when compared to healthy controls, individuals with FEP often perform worse academically, enjoy school less and are more likely to end their studies prematurely (Isohanni et al., 2001; Roy et al., 2013; Roy et al., 2016; Shinn et al., 2020). For example, a longitudinal medical record review of 114 college-aged students participating in an outpatient FEP treatment program found that 81.5% paused their education following their first episode (Shinn et al., 2020). This interruption is especially concerning for emerging adults since individuals diagnosed with schizophrenia prior to age 23 have been shown to be six times more likely to stop their education early (Isohanni et al., 2001). Accordingly, the interruption to education also interferes with vocational trajectories and financial independence (Killackey et al., 2013).

Individuals with FEP struggle to obtain and maintain employment, with the unemployment rate among this group at approximately 60-70% (Marwaha & Johnson, 2004; The International First Episode Vocational Recovery Group, 2010). To explain this high unemployment rate, the literature points to numerous obstacles emerging adults face to obtaining and maintaining employment upon arrival of the first episode, including fewer opportunities to build fundamental vocational skills (e.g., job hunting, interviewing), short work histories, low encouragement from concerned clinicians and family members, fear of assumptions regarding their professional abilities, discrimination, and worries related to side effects from medications (e.g., sedation) (Killackey et al., 2013; Lam et al., 2010; Rinaldi et al., 2010). In a qualitative study with 126 young people with a psychiatric disability, 23% reported unmanaged symptoms, and 15% reported poor cognitive functioning as obstacles interfering with becoming employed

(Noel et al., 2017). The employment struggles of emerging adults with FEP translate to financial difficulties as well. Emerging adults without FEP have been shown to be earning a significantly larger income, on average, than emerging adults with FEP (mean difference = $7690 CAD) and often acquire their funds from jobs, loans or bursaries, whereas emerging adults with FEP often require social welfare (Roy et al., 2013). Given that autonomy and financial independence are key components of emerging adults' definition of adulthood, the evidence suggests that the FEP withholds emerging adults with FEP from reaching adulthood.

Finally, while challenging enough as a typical emerging adult, shaping one's identity is incredibly challenging when faced with FEP (Cogan et al., 2019; Gumley & Macbeth, 2014). Youth with FEP have described significant struggles obtaining a secure sense of self following their first episode, including concerns that they may now be classified as "sick," "mad," "tainted," "dangerous," or as a "schizophrenic," "patient," or "deviant" (Cogan et al., 2019; McCarthy-Jones et al., 2013). Moreover, youths with FEP have expressed that estrangement from past relationships, alongside observing others who are severely unwell in group therapy, made them feel trapped in a new undesirable identity without important figures from which to build their identities (Cogan et al., 2019). Furthermore, the common side effects of antipsychotics, such as weight gain and sexual dysfunction, have also been shown to shape one's identity (McCarthy-Jones et al., 2013). Altogether, it is clear that FEP can significantly disrupt the psychosocial milestones of emerging adults.

Neurodevelopmental Milestone Interference

FEP during emerging adulthood can also have significant impacts on neurodevelopment (Douaud et al., 2009; Gur et al., 2007; Narr et al., 2005; Roy et al., 2016; Schneider et al., 1998; Taber-Thomas & Perez-Edgar, 2014). From a biological lens, grey matter density among young

people with SSDs starts to increase later and does not reach as high a density as healthy controls (Douaud et al., 2009; Narr et al., 2005). Moreover, Narr et al. (2005) noted lower grey matter density in the frontal, parietal and temporal lobes, including the dorsolateral prefrontal cortex and temporal cortices (parts of the frontolimbic system). Similarly, functional magnetic resonance imaging studies have demonstrated that the amygdala (a structure of the limbic system) among people with SSDs does not perform comparably to neurotypical individuals (Gur et al., 2007; Schneider et al., 1998; Taber-Thomas & Perez-Edgar, 2014). Taken together, these studies suggest that SSDs interfere with the maturation of the frontolimbic system and thus disrupt emerging adult's neurodevelopmental milestones (Douaud et al., 2009; Narr et al., 2005; Taber-Thomas & Perez-Edgar, 2014).

Further evidence of FEP interfering with neurodevelopment is the severe and persistent cognitive deficits, particularly in executive functioning, among people with FEP (Braver et al., 1999; Chan et al., 2006; Hutton et al., 1998; Ihara et al., 2000; Liu et al., 2011; Mesholam-Gately et al., 2009; Narr et al., 2005; Reichenberg and Harvey, 2007; Taber-Thomas & Perez-Edgar, 2014). Localized to the frontolimbic system, executive functioning may be thought of as a collection of domains, including attention, working memory, set-shifting, flexibility, planning, and behavioural regulation that enable people to strategize, think abstractly, problem-solve, multi-task, adjust to changes, follow procedures, and retrieve memories (Orellana & Slachevsky, 2013). Together, these functions coordinate and evaluate input from the environment, the body, our goals, and other cognitive domains to plan, guide, monitor and revise choices and actions (Palmer & Heaton, 2000; Reichenberg & Harvey, 2007). With this cognitive domain severely impaired among people with FEP, it is unsurprising they struggle with the psychosocial milestones indicated above, as these functions facilitate the exploration and self-sufficiency

needed for emerging adults to transition into adulthood (Arnett, 2000; Arnett, 2015; Taber-Thomas & Perez-Edgar, 2014). For instance, emerging adults enrolled in post-secondary studies have reported academic challenges due to their cognitive functioning difficulties (Roy et al., 2016). One emerging adult with FEP reported:

> Well, what really affects my performance in school are my skills, my skills that are not the same as before. I've lost reading skills, listening skills, the things that are said to me, it's really hard for me to remember them. It's not as bad if it's written down. So that's a real obstacle, because it really affects my ability to focus and listen, in school or anywhere else. (Roy et al., 2016, p. 48)

Overall, FEP can significantly interfere with the neurodevelopmental milestones of emerging adults.

Future Outcomes and Costs

The interruption to these key psychosocial and neurocognitive milestones following the onset of FEP consequentially leaves a devastating impact on the individuals, their families and society. At the individual level, people with SSDs tend to have a lower QoL than the average population (Addington et al., 2003b; Evans et al., 2007; Ritsner et al., 2002). Sadly, this discrepancy in QoL can become apparent as soon as one year following the first episode amongst emerging adults (Addington et al., 2003b). Adverse outcomes can include substance abuse, relapse, unstable housing, stigmatization and discrimination, as well as an elevated risk of dying by suicide (Addington et al., 2007; Babidge et al., 2001; Barnett et al., 2007; Blanchard et al., 2000; Cantor-Graae et al., 2001; Drake et al., 1991; Dutta et al., 2010; Folsom & Jeste, 2002; Fowler et al., 1998; Harvey et al., 2012; Hunt et al., 2018; Kavanagh et al., 2004; Kinson et al.,

2018; Lévesque & Abdel-Baki, 2020; Nordentoft et al., 2015; Regier et al., 1990; Robinson et al., 1999; Soyka et al., 1993).

Families and caregivers of individuals with SSDs also face unique costs (Awad & Voruganti, 2008). For example, Caqueo-Urízar et al. (2009) completed a systematic literature review of 37 studies examining QoL among caregivers of people with schizophrenia. The authors reported finding that caregivers' became more vulnerable to physical illnesses as stress levels elevated and that their social functioning deteriorated (e.g., frequent fighting and isolation from others). Moreover, Caqueo-Urízar et al. (2009) also found that caregivers' livelihoods were destabilized (e.g., quitting or switching their jobs or adjusting their working hours), which compounded the financial stress from supporting their loved ones' needs and treatment. Relatedly, in a review of the burden among families with a member with a psychotic disorder, Kuipers (1993) indicated that these families face financial stress as a result of the emerging adult family member struggling to secure work. This finding highlights the widespread disruption of missing milestones due to the onset of FEP.

Finally, there are also major societal costs associated with SSD. In 1996, a review of the financial costs associated with SSDs in Canada, comprised of healthcare expenses and productivity losses, was estimated to be $2,350,000,000 (Goeree et al., 1999). This value increased in a 2004 review to an estimated $6,850,000,000 (Goeree et al., 2005). According to Goeree et al. (2005), the estimated total cost is comprised of $2,020,000,000 spent in healthcare (e.g., hospitalizations, treatment services, medications, care facilities) and non-healthcare (e.g., justice system resources, financial support programs, deaths by suicide, suicide attempts) costs alongside the $4,830,000,000 lost due to productivity losses (e.g., unemployment, exiting work).

The estimated cost of public resources spent on a single person with schizophrenia in Canada at that time was estimated to be $1,122,000 (Blomqvist et al., 2006).

Altogether, the evidence suggests that FEP significantly disrupts both psychosocial and neurocognitive development during emerging adulthood, leading to pervasive and devastating outcomes. To mitigate these negative outcomes, there is a call for early intervention services to become more developmentally-informed and support emerging adults with FEP with milestone attainment (Breitbore & Moe, 2019). Early interventions first need a clear and refined understanding of how FEP presents among emerging adults to eventually achieve this goal. Knowledge of key variables such as the cognitive functioning, symptomatology and QoL of this group will prepare services to support milestone attainment by meeting these youths at their level of need and functioning. For example, as mentioned above, youths with psychosis have cited symptom severity and cognitive functioning as barriers to securing employment (Noel et al., 2017). These results suggest a refined understanding of symptom severity and cognitive functioning among emerging adults with FEP is important so that these concerns may be accounted for by services when supporting meeting milestones such as finding employment.

Moreover, despite the considerable evidence supporting the efficacy and longstanding benefits of early intervention for youth with psychosis, commitment to treatment has been demonstrated to be poor among this group (Albert & Weibell, 2019; Cornell et al., 2018; Doyle et al., 2014; Lal & Mall, 2015). In their systematic review of drop-out rates from FEP services, Doyle et al. (2014) found around 30% of people with FEP left treatment prematurely. Similar attrition rates have been found among emerging adults with FEP as a longitudinal study following 660 emerging adults with FEP enrolled in an early intervention service for 18 months found that 23.3% of participants exited the service prematurely (Conus et al., 2010). Factors that

have been shown to contribute to this early disengagement from services include struggles with medication adherence, frequent substance use, low family support, and living independently (Mascayano et al., 2021). It has been suggested, however, that service engagement amongst emerging adults may improve by incorporating support meeting milestones (Breitbore & Moe, 2019). Given the benefits of early intervention and the potential to improve engagement, helping services become more developmentally-informed appears critical. Therefore, there is a need to continue to move towards this ideal, which requires acquiring knowledge of key descriptive variables such as cognitive functioning, symptomatology and QoL among emerging adults with FEP.

Cognitive Functioning, Symptomatology, and Quality of Life of Emerging Adults with First-Episode Psychosis

Cognitive functioning, symptomatology and QoL are three useful ways to describe the presentation of FEP among emerging adults. The Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) criteria for SSDs are described in terms of phenomenology rather than underlying deficits (e.g., the cognitive impairments behind disorganized speech). Even though cognitive deficits are not explicitly included in the diagnostic criteria, these deficits are considered by many to be a central feature of SSDs (Bowie & Harvey, 2005; Dickinson et al., 2004; Harvey et al., 2004; Heaton et al., 2001; Heinrichs & Zakzanis, 1998; Rajji et al., 2014; Reichenberg & Harvey, 2007; Saykin et al., 1991). Numerous reviews and studies have demonstrated stable, generalized deficits across all cognitive faculties among people with SSDs, with the magnitude of these deficits ranging from moderate to severe (Addington et al., 2003a; Bowie & Harvey, 2005; Heinrichs & Zakzanis, 1998; Mesholam-Gately et al., 2009; Rajji et al., 2014; Reichenberg & Harvey, 2007; Rund, 1998). For example, a meta-analysis by Heinrichs

and Zakzanis (1998) comparing neurocognitive data between 7420 individuals with schizophrenia and 5865 healthy controls found individuals with schizophrenia showed widespread cognitive impairment compared to controls. While different neuropsychological studies have reported various degrees of generalized cognitive impairment compared to healthy controls, the literature seems to support a generalized cognitive deficit among people with SSDs of 1.5-2.5 standard deviations below the general population (Keefe, 2014). Overall, cognitive functioning cannot be ignored when describing the presentation of FEP. Symptomatology is unmistakably an important variable to include, as symptoms comprise the diagnostic criteria. Lastly, QoL is a third useful lens from which to understand FEP in emerging adults because QoL, broadly, refers to an evaluation of an individual's living circumstances, including their functionality, personal welfare, and needs and expectations being met (Lehman, 1996; Najman & Levine, 1981). Thus, understanding the QoL of emerging adults with FEP will likely help service providers meet these youths at their level of well-being and functionality when supporting them with milestone attainment. Therefore, it seems essential to examine these three variables when describing FEP among emerging adults.

Cognitive Functioning in Emerging Adults with First-Episode Psychosis

Based on the available literature, cognitive functioning among emerging adults with FEP appears similar to that of the wider population of people with an SSD. Generally, emerging adults with FEP, regardless of their diagnosis along the spectrum, have been shown to perform moderately to severely worse than their healthy peers in all cognitive domains at approximately 1.5 standard deviations below healthy controls (Addington et al., 2003a; Bilder et al., 2000; Hoff et al., 1992; Langdon et al., 2014; Mesholam-Gately et al., 2009; Rajji et al., 2009; Rodríguez-Sánchez et al., 2008). In their meta-analysis examining the neurocognition of 2204 individuals

with FEP, Mesholam-Gately et al. (2009) reported that the degree of cognitive deficit among emerging adults with FEP is comparable to those individuals with chronic psychosis. While all domains appear impacted by FEP, some studies have suggested greater impairments in areas such as learning and memory (Bilder et al., 2000) as well as executive functions, processing speed, visuospatial abilities and intellectual capacity (Mesholam-Gately et al., 2009).

Moreover, these deficits appear to remain fixed over time with one systematic review on the trajectory of cognitive functioning in FEP suggesting these impairments hold steady up to ten years after the first episode (Bilder et al., 1991; Bozikas & Andreou, 2011; Leeson et al., 2009; Mesholam-Gately et al., 2009; Nopoulos et al., 1994; Rodríguez-Sánchez et al., 2008; Zipparo et al., 2008). Some studies, however, have found improvements in particular domains despite remaining below the cognitive functioning of healthy controls (Hoff et al., 1992; Nopoulos et al., 1994; Zipparo et al., 2008). For example, Zipparo et al. (2008) conducted a longitudinal study over 2-3 years looking at the cognitive functioning of emerging adults with a first episode of schizophrenia (*n*=32). The authors found statistically significant improvements in the full-scale IQ and performance IQ, as measured by the Weschler Adult Intelligence Scale Third Edition (WAIS-III; Wechsler, 1997a; Wechsler, 1997b), and in the domain of visual memory in their sample. Moreover, a longitudinal study of 17 emerging adults with schizophreniform disorder showed that many domains of cognitive functioning improved two years after onset, including complex attention, concentration, motor speed and problem-solving abilities (Hoff et al., 1992). In particular, cognitive functioning improvements have been found for emerging adults enrolled in early intervention programs and using various atypical antipsychotic medications, which emphasizes the importance of finding how to better engage this group in treatment (Keefe et al., 2007; Kopala et al., 2006; Townsend et al., 2002). For example, a one-year longitudinal study of

83 emerging adults with FEP in an early intervention program providing therapeutic and cognitive services alongside medication found significant improvement in domains of verbal and non-verbal intelligence, immediate and delayed auditory and visual memory and working memory (Townsend et al., 2002) On the other hand, verbal learning and memory domains have been shown to worsen or, at least, not improve as much over time in this group (Rodríguez-Sánchez et al., 2008; Zipparo et al., 2008). Overall, though some domains may be more impaired and others improve over time, generally, the evidence suggests that cognitive functioning among emerging adults with FEP is typically below average and consistent throughout one's life.

Symptomatology in Emerging Adults with First-Episode Psychosis

The symptomatology of emerging adults with FEP appears to have an optimistic trajectory if one is receiving treatment. Zipparo et al. (2008) conducted a longitudinal study over 2-3 years that examined the course of symptom severity among emerging adults with FEP. Their study showed that symptoms became significantly less severe over time. More specifically, over five years, Gold et al. (1999) found in their longitudinal study of 54 emerging adults with FEP that negative, positive and disorganized symptom severity all decreased over time. Together, these results suggest that symptoms generally improve for emerging adults with FEP over time. However, the longer symptoms go untreated, the more unfortunate the trajectory is. For example, Harris et al. (2005) conducted an 8-year naturalistic study with 318 emerging adults with FEP, examining outcomes such as symptoms following presenting to an early intervention service. The authors found that those with a duration of untreated psychosis (DUP; the period from the first positive symptom to the beginning of suitable antipsychotic treatment) over three months had more severe positive and general symptoms and over one year had more severe symptoms

overall (Marshall et al., 2005). As mentioned above, these studies highlight the importance of investigating ways to improve engagement with early intervention.

A systematic review of the relationship between symptomatology and cognitive functioning across a year suggests that as overall symptoms improve, so does cognitive functioning (Bozikas & Andreou, 2011). More specifically, negative symptoms have been demonstrated to be significantly negatively correlated with overall cognitive functioning such that less severe negative symptoms is associated with better cognitive functioning (Engen et al., 2019; Langdon et al., 2014). For example, Addington and Addington (2002) found relationships between negative symptoms and executive functioning as well as visual and verbal memory among emerging adults with FEP. With regard to the relationship between positive symptoms and cognitive functioning, the results appear to be mixed. On the one hand, while Addington and Addington (2002) did not find a relationship between positive symptoms and cognitive functioning, Gisselgard et al. (2014) reported a connection between verbal auditory hallucinations and verbal working memory in their study of 52 emerging adults with FEP. These authors found that verbal auditory hallucinations were affiliated with poorer processing of auditory information in the working memory domain. Altogether, when in treatment, symptoms among emerging adults with FEP seem to improve over time, which correlates with cognitive functioning improvements.

Quality of Life in Emerging Adults with First-Episode Psychosis

Similar to cognitive functioning and symptomatology, the current evidence suggests that the QoL of emerging adults with FEP is typically below that of the general population yet can improve over time with treatment (Addington et al., 2003b; Langdon et al., 2014; Malla et al., 2001; McGorry et al., 1996). For example, McGorry et al. (1996) compared objective QoL

between 51 emerging adults with FEP who had received a new early intervention program (Early Psychosis Prevention and Intervention Centre; EPPIC) and 51 people with the sample profile who had received a previous version of an early intervention service. Participants in both groups were followed up following recovery from their first episode at three months for the new intervention group, six months for the old intervention group, and again at one year following recovery for both groups. Both groups demonstrated significant improvement in objective QoL between the 3-6 month follow-up and one year follow-up. Interestingly, Malla et al. (2001) and Górna et al. (2008) both reported that occupational functioning, a component of QoL, appears not to improve and even slightly declines over time. Considering occupational achievement is a psychosocial milestone of emerging adults, these results highlight the need for developmentally-informed early interventions that can support milestone attainment, like occupational functioning. Still, as expected, the evidence suggests that the longer the DUP (i.e., exceeding three months), the worse the QoL of emerging adults with FEP becomes (Harris et al., 2005). Once again, these studies underscore the need to find ways to increase engagement with early intervention.

The current literature also suggests strong relationships between QoL and cognitive functioning and symptomatology among emerging adults with FEP. With regard to cognition, improvements in cognitive functioning seem to be associated with improvements in QoL. For example, Wegener et al. (2005) examined the relationship between QoL, symptomatology and cognitive functioning among 51 emerging adults with FEP. The authors found that social QoL (i.e., satisfaction with social relationships) was significantly associated with domains such as sustained attention, verbal fluency, and cognitive flexibility and that environmental QoL (i.e., satisfaction with community resources and standard of living) was significantly associated with

verbal abilities. The results indicate specific relationships exist between domains of cognitive functioning and QoL. However, Wegener et al. (2005) also indicated a stronger relationship between QoL and symptomatology compared to cognitive functioning.

With regards to symptoms, the strongest relationship appears to be between negative symptoms and QoL (Addington et al., 2003b; Górna et al., 2008; Langdon et al., 2014). For example, in their study of 81 emerging adults with FEP, Cotton et al. (2010) found that the negative symptoms of anhedonia and apathy were both significantly negatively correlated with all four QoL scales on the World Health Organization Quality-of-Life-Scale (WHOQOL-BREF): physical health, psychological health, social relationships and environmental health. While the primary relationship appears to be between negative symptoms and QoL, some have also suggested positive symptoms and QoL are associated as well (Addington et al., 2005; Malla et al., 2001). However, Law et al. (2005) reported in their exploration of subjective QoL among 117 emerging adults with schizophrenia that neither negative nor positive symptoms were significantly associated with subjective QoL during the acute phase of the first episode. Overall, as with the other variables, QoL appears to improve over time when in treatment and correlates well with cognitive functioning and, primarily, negative symptoms following the onset of the FEP among emerging adults.

Altogether, the current research involving emerging adults with FEP has tackled many key questions involving cognitive functioning, symptoms and QoL variables. However, while the average age of these studies' participants falls into the emerging adult age range (18 to 25 years old), their range includes participants younger and older than emerging adults. As such, the current research may not wholly reflect emerging adults' cognitive functioning, symptom severity and QoL since younger and older participants' performance on these variables may skew

the results. For example, a meta-analysis of 109 studies compared the cognitive functioning of 5010 people with SSDs that had different ages of onset (Rajji et al., 2009). Of their sample, 682 people were classified as youth-onset (19 years old or younger; mean age = 16; mean age of onset = 13.6), 261 people were designated late-onset (40 years old or older; mean age = 68.4; mean age of onset = 60.7) and 4057 were classified as first episode (any age in between 19 and 40; mean age = 24; mean age of onset = 23.7). The researchers found different degrees of cognitive impairment in different domains between the different age groups. For instance, the youth-onset group performed worse than the FEP group in domains of executive functioning, intellectual ability, processing speed, verbal memory and tests of arithmetic skills. However, the late-onset group had relatively less severe impairments than the youth-onset group. These results demonstrate that the severity of cognitive impairment is closely related to age of onset. Accordingly, it is plausible that, while the above studies had mean ages in the emerging adults age range, having data from younger and older participants in these samples may have produced results that are not fully representative of nor applicable to emerging adults with FEP. Unrepresentative data may ultimately not be as helpful to clinicians when trying to support emerging adults with FEP with milestone attainment. Therefore, there is a need to describe these variables in a sample of only individuals 18 to 25 years old in order to illuminate any differences from other age groups and use those differences to tailor services to support emerging adults with milestone attainment.

A Strengths-based Approach to First-Episode Psychosis

A deficits-based approach is often used when working with individuals with SSDs (Le Boutillier, 2017; Rosen & O'Halloran, 2014; Steele et al., 2021). While useful to a degree, focusing only on the problems and struggles of this population can compound the disruptions to

identity formation already occurring following the first episode (Cogan et al., 2019; McCarthy-Jones et al., 2013). For example, a meta-analysis by McCarthy-Jones et al. (2013) found that individuals with psychosis perceive clinicians to treat them like guinea pigs or rowdy children, which can harm their identity and sense of self. As evidenced above, disruption to the identity formation milestone during emerging adulthood can contribute to future negative outcomes. The potential harm a deficits approach may have on identity formation and, consequently, future outcomes suggest implementing a strengths-based approach in early intervention with emerging adults with FEP is critical.

Resiliency Theory and First-Episode Psychosis

Resiliency theory is a strengths-based conceptual framework used for conceptualizing youth development (Fergus & Zimmerman, 2005; Zimmerman, 2013). Resiliency theory is comprised of two components: risk and promotive factors. Risk factors are anything a youth may be exposed to or engage in that can lead to harmful or adverse outcomes or trajectories. Promotive factors are anything that helps a youth minimize, evade or eliminate the negative consequences of exposure to a risk factor. Promotive factors can be divided into assets and resources. Assets are characteristics within the individual, such as self-efficacy, that allow them to manage risk exposures. Resources are external sources of support, such as family support, that assist the individual with managing risk exposures. The interplay between risk and promotive factors is specific to each individual, and overall resilience is viewed as a context-dependent process. Altogether, resiliency theory seeks to identify what strengths a youth has in terms of their promotive factors (i.e., assets and resources) that help towards healthy development when exposed to risks that could lead to adverse outcomes.

FEP can be viewed as a risk exposure for emerging adults since it is associated with numerous adverse outcomes, as described above. With the risk exposure identified, there is now a need to find promotive factors that may exist among emerging adults with FEP. One potential asset that may warrant exploration is cognitive strengths (Allot et al., 2020). For instance, a systematic review by Jordan et al. (2018) looking at positive outcomes following the onset of FEP found that youth reported cognitive strengths such as clearer thinking and greater intrigue and imagination. While this study highlights self- or family-reported cognitive strengths, analysis of strengths has yet to be done using quantitative data from neuropsychological measures. Discovery and fostering of these cognitive strengths may be instrumental in mitigating the adverse outcomes that can follow the first episode and facilitate functioning (Allot et al., 2020).

Other potential assets may include characteristics such as empathy and motivation. For example, empathy contributes to social functioning and developing bonds, which may limit the risk of isolation from peers that can follow a first episode (Corbera et al., 2013). Additionally, a mixed-methods study on the post-secondary experiences of students with FEP identified that youth who excel in their studies exhibit and depend on motivation, whereas healthy controls lean on their cognitive functioning and social abilities (Roy et al., 2016). Motivation may, therefore, be another asset that warrants further exploration and promotion since it may limit the risk of poor educational outcomes that can also follow a first episode.

Identifying promotive factors among emerging adults with FEP would be extremely valuable for developmentally-informed early intervention services to emphasize. By making emerging adults with FEP aware of these strengths and nurturing them, clinicians can better help these emerging adults meet their milestones, like identity formation, and thus could minimize the risk of negative outcomes that spawn from the first episode and using a deficit-approach. These

strengths may be capitalized on in treatment to possibly improve efficacy and engagement. Evidence already exists that clinicians of individuals with FEP are receptive to strengths-based care, and implementation may lead to positive outcomes (Gelkopf et al., 2016; Steele et al., 2021). For example, a randomized controlled trial by Gelkopf et al. (2016) compared individuals with severe mental illness, including people with schizophrenia, receiving strengths-based case management or treatment as usual. The results showed that strengths-based case management was associated with a variety of benefits, including enhanced self-efficacy and QoL, as well as more service engagement and goal setting. Altogether, a strengths-based approach to developmentally-informed early interventions could help emerging adults with FEP meet their milestones and minimize adverse outcomes. As such, there is a need to begin identifying strengths among this group, which, to the author's knowledge at this time, has not been done before.

Research Objectives and Questions

The overall aim of this study is to report on how FEP presents in individuals 18-25 years old using data on their cognitive functioning, symptomatology and QoL to discuss three questions:

1) If and how emerging adults with FEP fit into or differ from the existing literature on FEP?

2) What strengths might emerging adults with FEP possess that could facilitate resilience against the adverse outcomes that commonly follow a first episode of psychosis?

3) How could early intervention services utilize information on FEP presentation and strengths in emerging adults to support this group with milestone attainment?

To accomplish this exploratory study, secondary cross-sectional and longitudinal naturalistic data collected from an early intervention service over three years was examined.

Cognitive functioning data were collected cross-sectionally, while symptom and QoL data were collected longitudinally. This study employed the resiliency theory framework to identify potential strengths. The FEP was designated as the risk exposure, and potential assets were explored. The research objectives of this exploratory study were as follows:

1) To describe the cognitive functioning (i.e., intellectual ability, academic skills, verbal fluency, executive functioning), symptom severity and QoL of individuals 18-25 years old with FEP attending an early intervention service.

2) To examine the relationships between cognitive functioning, symptom severity and QoL in this group.

3) To identify potential assets in the cognitive domains in this group that predict greater QoL or aspects of QoL (e.g., motivation, empathy, curiousity).

Methods

Participants

Participants were recruited from the Psychosis Intervention and Early Recovery Program (PIER Program) in St. John's, Newfoundland, Canada. PIER is an interdisciplinary treatment program for individuals experiencing their first episode of psychosis. The PIER program accepts clients experiencing their first episode of psychosis or those who have been treated with antipsychotics for six months or less. Participants consisted of people experiencing their first episode of psychosis coming from both inpatient and outpatient healthcare environments. Assessments of cognitive functioning were conducted as part of the program as some participants were referred to determine eligibility for future education and employment following discharge. For other participants, it was determined by their care team that cognitive testing

would be clinically useful information for recovery and educating families. For more details on the program, see the peer-reviewed article by Hadden et al. (2018).

For this study, inclusion criteria were (a) a diagnosis of an SSD or Bipolar Affective Disorder (BAD) (diagnosis confirmed by a psychiatrist based on DSM-IV criteria at termination from the service), (b) for the symptom and QoL data: 18 to 25 years old at admission to the program (c) for the cognitive functioning data: 18 to 25 years old at the time of testing. Regarding the first criterion, while not officially included as part of SSDs in the DSM-5, research has suggested that bipolar disorders should be included along the spectrum of psychotic disorders due to overlapping presentation and genetic origins (Angst, 2007; Craddock & Owen, 2005; Keshavan et al., 2011; Lichtenstein et al., 2009; Potash, 2006; Potash & Bienvenu, 2009). As such, individuals diagnosed with a BAD were included in this study's sample. It should be noted that the presence of psychotic features for BADs was not documented at the time the data was collected, perhaps due to that detail being less explicitly specified in DSM-IV BADs criteria. Due to the retrospective and naturalistic nature of the study, it is unknown how many individuals were approached and the subsequent response rate.

Procedure

Participants consented into the study at entry into the PIER program. Data were collected naturalistically between January 2001 and August 2013 by two psychiatrists, two doctoral-level psychologists, two neuropsychologists, one nurse coordinator and several case managers as part of a larger cross-sectional and longitudinal study. Symptom and QoL data were collected approximately every three months (baseline = one month) for up to three years into the service, depending on how often the participant attended the program and how early they terminated. Symptom data were primarily collected by the psychiatrists and, occasionally, a nurse

coordinator. QoL data were primarily collected by the nurse coordinators and case managers (whoever was available at the time) and, occasionally, the psychiatrist and once by an occupational therapist. Cognitive assessments were conducted by the neuropsychologists once throughout the three years in the program. Considering the nature of the data collection was naturalistic, not all participants completed all measures.

Measures

Symptom Severity Measure

The Positive and Negative Syndrome Scale (PANSS) was used to measure the presence and severity of positive and negative symptoms as well as general psychopathology such as anxiety and depression (Kay et al., 1987). The PANSS consists of 30 items (7 positive symptom items, 7 negative symptom items and 16 general psychopathology items) that are rated on a 7-point Likert scale ranging from "absent" (1) to "extreme" (7) and account for symptoms from the previous week. Accordingly, the PANSS is comprised of three subscales – Positive, Negative and General Psychopathology subscales – and a total symptom severity scale. The reliability and validity of the PANSS as a measure of symptom severity among people with SSD has been substantiated in a sample of 101 individuals with schizophrenia and corroborated by several other studies (Kay et al., 1987; Kay et al., 1988; Kay et al., 1989).

Quality of Life Measure

The 21-item Quality of Life Scale (QLS) was used to measure functionality and psychological well-being over the past month (Heinrichs et al., 1984). The QLS is an objective (i.e., clinician-rated) QoL measure, which facilitates understanding QoL based on standard conventions and providing services with concrete goals for treatment (Lehman, 1983; Lehman, 1996). The QLS has been established as a reliable and valid measure of QoL among individuals

with SSD in a sample of 111 people with schizophrenia and has been corroborated by other studies (Heinrichs et al., 1984; Kaneda et al., 2002; Lehman et al., 1993; Simon-Abbadi et al., 1999).

Cognitive Functioning Measures

Though, at the time of writing, several of the following neuropsychological tests have been updated and newer versions are available, these earlier tests may still provide useful provisional information about the cognitive functioning in this population.

Overall, intellectual abilities were measured using the Wechsler Adult Intelligence Scale 3rd Edition (WAIS-III) (Silva, 2008; Wechsler, 1997a; Wechsler, 1997b). The WAIS-III produces three intelligence quotient scores: Full Scale IQ (FSIQ), Verbal IQ (VIQ) and Performance IQ (PIQ). FSIQ represents overall intelligence based on one's VIQ and PIQ. The VIQ is comprised of two standardized index scores: the Verbal Comprehension Index (VCI) and Working Memory Index (WMI). Altogether, the VIQ represents one's verbal reasoning and working memory abilities. The PIQ is comprised of two standardized index scores as well: the Perceptual Organization Index (POI) and Processing Speed Index (PSI). Overall, the PIQ captures one's perceptual reasoning as well as visuo-spatial skills. The WAIS-III has been demonstrated to have strong reliability in a sample of 38 people with schizophrenia and strong construct validity in a sample of 120 people with schizophrenia and schizoaffective disorder (Dickinson et al., 2002; Zhu et al., 2001)

Fundamental academic skills were measured using the Wide Range Achievement Test 3rd Edition (WRAT-III) (Knoop, 2004; Wilkinson, 1993). The WRAT-III is comprised of three subtests: reading, spelling and arithmetic. The reading subtest includes letter and word reading tasks. The spelling subtest involves an assessor reading a set list of words that participants are

required to write to demonstrate their spelling skills. Finally, the arithmetic subtest contains an oral component (i.e., counting, reading numbers aloud, solving simple spoken arithmetic problems) and a written component (i.e., 15 minutes to solve up to 40 arithmetic problems). The WRAT-III has demonstrated suitable reliability and validity at assessing academic skills in a sample of 4433 individuals from the general population (Knoop, 2004).

To measure verbal fluency, both semantic/categorical and phonemic/letter fluency, the Animal Naming Task and Controlled Oral Word Association Test (COWAT) were used, respectively (Benton et al., 1983; Brickman et al., 2005; Tombaugh et al., 1999). For the animal naming task, in accordance with the instructions used by Tombaugh et al. (1999), participants were provided 1 minute to "give the names of many animals as you can think of" verbally. A total score is comprised of the number of different animal names provided excluding repeats. Similarly, for the COWAT, participants have 1 minute to verbally generate as many words as they can that start with a specific letter of the alphabet. There are three trials that each use a different letter: "F," "A," and, "S." The COWAT was shown to have high internal and test-retest reliability in a study with 1300 healthy individuals while the Animal Naming Task demonstrated reasonable reliability in a sample of 99 healthy individuals (Bird et al., 2004; Strauss et al., 2006; Tombaugh et al., 1999). Both the measures have been shown to possess construct validity as measures of language-processing (i.e., verbal fluency) in a sample of 304 outpatients with various mental health and medical issues (Whiteside et al., 2016).

Lastly, two measures were used to capture different areas of executive functioning. First, the Wisconsin Card Sorting Task (WCST) was used to measure concept formation, planning, cognitive flexibility, visuospatial working memory, deductive reasoning, problem solving, set-shifting ability (Heaton, 1981; Heaton et al., 1993; Singh et al., 2017). The WCST begins with

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the participant being presented with four stimulus cards. Each stimulus card is comprised of a unique shape (cross, circle, triangle or star), colour (red, blue, yellow, or green) and number of shapes (one, two, three or four). The participant is then provided with one of 128 response cards that contains a specific combination of these features. There is a pattern based on these features the participant is not privy to but tries to find by matching the response card to one of the four stimulus cards presented. After each attempt at finding the pattern, the assessor notifies them if they are correct or incorrect and the participant uses that information to find the pattern. Once the participant correctly matches 10 cards consecutively, the pattern changes. The WCST continues until the participant identifies six patterns or all 128 response cards have been used. The first pattern is based on colour, followed by shape and, lastly, number and then it repeats. The WCST was demonstrated to be a reliable and valid measure of executive functioning in a sample of 198 people with schizophrenia and schizoaffective disorder (Bell et al., 1997).

Second, the Trail Making Tests (TMT: TMT-A and TMT-B) were used to measure other areas of executive functioning (Partington & Leiter, 1949; Reitman, 1958). While there is some overlap, the two tests generally tap into different domains. TMT-A appears to be a specific measure of processing speed and motor speed while TMT-B appears to specifically measure mental flexibility, attention, set switching and executive control (Arbuthnott & Frank, 2000; Bowie & Harvey, 2006; Crowe, 1998; Kortte et al., 2002; O'donnell et al., 1994; Reitman, 1958). For administration of TMT-A, the participant is presented with a paper with circles containing numbers from 1 to 25 and is instructed to connect the circles as fast as possible in numerical order without lifting their pencil from the page. For administration of TMT-B, the participant is provided with the same instructions except the paper now contains circles with number 1 to 13 and letters A to L. The objective for TMT-B is to alternate between connecting

the numbers in numerical order and the letters in alphabetical order as fast as possible without moving their pencil from the page. The test-retest reliability of the TMT has been demonstrated to be weaker than other clinical groups in a sample of 33 people with schizophrenia, but it is still considered to be a fairly reliable and well-validated measure of executive functioning (Goldstein & Watson, 1989; Strauss et al., 2006).

Analysis

This study will employ an Exploratory Data Analysis (EDA) framework (Behrens & Yu, 2003; Jebb et al., 2017; Tukey, 1977). An EDA framework seeks to utilize the full potential of the data collected by approaching statistical analysis with flexibility and a healthy degree of interrogation to allow the data to reveal any patterns that can then be described to launch future research. The attitude of the EDA framework is to learn about and become familiar with the data collected and answer "What is going on here?" with a readiness to uncover anticipated and unanticipated patterns that can be worthy of attention regardless of their size or significance (Behrens, 1997; Behrens & Yu, 2003; Jebb et al., 2017). An EDA framework was selected for this study because (a) the nature of this study is to discover information about this specific group since they have never been studied in isolation before; (b) this study is only able to supply foundational knowledge on emerging adults with FEP from which further research may be built upon due to the small sample size; and (c) the EDA framework capitalizes on the extensive naturalistic data collected. While this analysis will not confirm or deny any specific hypothesis or provide any direct evidence, this framework will build a foundation for future confirmatory data analytic research with the hopes of building toward developmentally-informed, strengths-based early interventions for emerging adults with FEP.

Objective 1: Describing the Variables

Considering EDA's emphasis on visualization, histograms and spaghetti plots of longitudinally collected data (PANSS and QLS) will be generated, reviewed and described first. Similarly, histograms and dot plots for the cognitive functioning data will be generated and reviewed. Second, based on those plots, correlation and regression analysis may be used with select data to quantify any relationships. These variables will be examined at baseline (one month) and one and two years into the program.

Objective 2: Describing the Relationships between Variables

Based on longitudinal patterns identified during Objective 1, an appropriate predictive longitudinal model will be built to determine if baseline values, change over time, or relative change in positive or negative symptoms or cognitive functioning influence change in QoL over time.

Objective 3: Identifying Potential Assets

To determine potential assets as part of the strengths-based approach, we will produce plots of the total scores on the QLS at 1 and 2 years into treatment against various domains of cognitive functioning. Based on patterns identified in previous steps, an appropriate predictive longitudinal model will be built to determine if measures of cognitive functioning influence change in QoL over time or aspects of QoL (e.g., motivation, empathy, curiosity). Moderation models will be explored to determine if cognitive functioning moderates the relationship between symptoms and QoL.

Chapter 2: Journal Article Manuscript

Abstract

Experiencing psychosis during emerging adulthood (18-25 years old) can significantly disrupt meeting fundamental psychosocial and cognitive milestones, leading to adverse outcomes. Therefore, using naturalistic cross-sectional and longitudinal data, this study explores how first-episode psychosis (FEP) presents in emerging adults (EA) and what strengths they may possess that could facilitate milestone attainment. Data on the symptomatology, quality of life (QoL), and cognitive functioning of 41 EA from an early intervention program was collected between 2001 and 2013. The secondary data was visualized, after which clusters of plots were selected based on observed patterns, and linear regressions were performed to build predictive longitudinal models. QoL was used to approximate milestones. Executive functioning and letter fluency predicted global QoL and productivity QoL one year into treatment. Letter fluency and baseline negative symptoms predicted social QoL one year into treatment. None of these variables predicted any area of QoL at two years into treatment. FEP in EA appears consistent with the broader FEP literature except in how the severity of EA's baseline negative symptoms does not seem to impact global and productivity QoL in the first year of treatment. Executive functioning and letter fluency may be assets in protecting EA from risks to their academic and occupational milestones in the first year as well. Letter fluency may also safeguard EA from risks to their social milestone in the first year. Therefore, compensating for and bolstering these domains may help EA meet their social and academic/occupational milestones.

1. Introduction

Individuals ages 18-25, otherwise known as emerging adults (EA), are in a critical period of development marked by fundamental psychosocial and cognitive milestones that lay the foundation for future functioning. The psychosocial milestones that characterize this period

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include transitioning to independence, educational and occupational achievement, establishing social connections and relationships, as well as identity formation (Arnett, 2000; Greene et al., 1992; Schulengberg et al., 2004; Shanahan, 2000). The primary neurocognitive milestone at this life stage is frontal lobe development since it establishes executive functions (e.g., attention, working memory, set-shifting, flexibility, planning, behavioural regulation) that enables more mature thinking and behaviour (Orellana & Slachevsky, 2013; Taber-Thomas & Pérez-Edgar, 2014). Together, achieving these milestones facilitate greater self-sufficiency and satisfaction with life (Crocetti, 2018; Taber-Thomas & Pérez-Edgar, 2014).

Unfortunately, there is considerable evidence that experiencing psychosis during this period can significantly disrupt meeting these key developmental milestones (Bassett et al., 2001; Braehler & Schwannauer, 2012; Braver et al., 1999; Chan et al., 2006; Cogan et al., 2019; Dunkley et al., 2015; Gumley & Macbeth, 2014; Hutton et al., 1998; Ihara et al., 2000; Lam et al., 2010; Liu et al., 2011; McCarthy-Jones et al., 2013; Mesholam-Gately et al., 2009; Noel et al., 2017; Rakhshan Rouhakhtar & Schiffman, 2020; Reichenberg & Harvey, 2007; Roy et al., 2013; Roy et al., 2016). For example, of 114 college students participating in an outpatient first episode psychosis (FEP) treatment program, 81.5% were found to have paused their education as a result of their first episode (Shinn et al., 2020). With regards to cognitive development, individuals with FEP have been shown to present with severe deficits in planning and strategizing as well as other domains, such as verbal fluency, compared to healthy controls (Hutton et al., 1998; Langdon et al., 2014).

When these developmental milestones are missed, emerging adults with FEP grow to face various adverse outcomes that inhibit functioning and have personal and societal costs. For instance, educational and financial challenges can arise such as lower post-secondary enrollment

and earning significantly less income than their healthy counterparts (Roy et al., 2013; Roy et al., 2016). As a result, on an individual level, people with FEP often experience poorer QoL compared to their peers (Addington et al., 2003b). Moreover, at a societal level, dependence on public resources and support, as well as difficulties in obtaining and maintaining employment, create a large economic burden estimated to be $6,850,000,000 in Canada in 2004 (Blomqvist et al., 2006; Goeree et al., 2005; Roy et al., 2013).

It is important to understand how schizophrenia-spectrum disorders present in emerging adults and what strengths these individuals possess so that interventions can facilitate milestone attainment, and thus mitigate future adverse outcomes and associated costs. Therefore, this exploratory study seeks to report on the cognitive functioning, symptomatology and QoL of individuals with FEP (18-25 years-old) using cross-sectional and longitudinal naturalistic data. The research objectives are to describe these variables with this specific group, examine the relationships between these variables and identify potential strengths in this group that predict greater QoL or aspects of QoL. The overall aim is for this study to support a discussion on three questions: (1) If and how emerging adults with FEP differ from the existing literature on adolescents and adults with FEP?; (2) What strengths might emerging adults with FEP possess that could facilitate resilience against the negative outcomes that commonly follow a first episode of psychosis?; and (3) How early intervention services might utilize information on FEP presentation and strengths in emerging adults to support this group with milestone attainment?

2. Methods

2.1. Participants

Participants were recruited from the Psychosis Intervention and Early Recovery Program (PIER Program) in St. John's, Newfoundland, Canada. PIER is an interdisciplinary treatment

program for individuals from both inpatient and outpatient environments experiencing their first episode of psychosis or having been treated with antipsychotics for 6 months or less. For more details on the program see Hadden et al. (2018).

Inclusion criteria in this retrospective cohort study were (a) a diagnosis of a schizophrenia-spectrum disorder or Bipolar Affective Disorder (BAD) (confirmed by a psychiatrist using DSM-IV criteria at termination from the service) (b) 18 to 25 years-old at admission to the program and time of cognitive testing. Individuals diagnosed with a BAD were included in the sample because research has suggested that bipolar disorders should be incorporated into the schizophrenia-spectrum due to overlapping presentation and genetic origins (Angst, 2007; Craddock & Owen, 2005; Keshavan et al., 2011; Lichtenstein et al., 2009; Potash, 2006; Potash & Bienvenu, 2009). It should be noted that the presence of psychotic features for BADs was not documented at the time the data was collected, perhaps due to that detail being less explicitly specified in DSM-IV BADs criteria. Due to the retrospective and naturalistic nature of the study, it is unknown how many individuals were approached and the subsequent response rate.

2.2. Measures

The measures below have adequate psychometric properties when tested in samples of people with psychosis and/or the general population (Bell et al., 1997; Bird et al., 2004; Dickinson et al., 2002; Goldstein & Watson, 1989; Heinrichs et al., 1984; Kaneda et al., 2002; Kay et al., 1987; Kay et al., 1988; Kay et al., 1989; Knoop, 2004; Lehman et al., 1993; Simon-Abbadi et al., 1999; Strauss et al., 2006; Tombaugh et al., 1999; Whiteside et al., 2016; Zhu et al., 2001).

2.2.1. Symptom severity and quality of life measures

The Positive and Negative Syndrome Scale (PANSS) was used to measure the presence and severity of positive and negative symptoms as well as general psychopathology (Kay et al., 1987). The Quality of Life Scale (QLS) was used to measure functionality and psychological well-being over the past month (Heinrichs et al., 1984).

2.2.2. Cognitive functioning measures

Overall intellectual abilities were measured using the Wechsler Adult Intelligence Scale 3rd Edition (WAIS-III) and fundamental academic skills were measured using the Wide Range Achievement Test 3rd Edition (WRAT-III) (Knoop, 2004; Silva, 2008; Wechsler, 1997a; Wechsler, 1997b; Wilkinson, 1993). To assesses verbal fluency, semantic/categorical and phonemic/letter fluency were measured using the Animal Naming Task and Controlled Oral Word Association Test (COWAT; letters "F", "A," "S"), respectively (Benton et al., 1983; Brickman et al., 2005; Tombaugh et al., 1999). Lastly, the Wisconsin Card Sorting Task (WCST) and the Trail Making Tests (TMT: TMT-A and TMT-B) were used to capture executive functioning (Heaton, 1981; Heaton et al., 1993; Partington & Leiter, 1949; Reitan, 1958; Singh et al., 2017). Though several of these neuropsychological tests have been updated, these earlier versions may still provide useful provisional information about cognitive functioning in this population.

2.3. Procedure

Participants consented into the study at entry into the program. Data were collected naturalistically between January 2001 and August 2013 by two psychiatrists, two doctoral-level psychologists, two neuropsychologists, one nurse coordinator and several case managers. Symptom and QoL data were collected approximately every three months (baseline = one month) for up to three years into the service. Cognitive assessments were conducted over 2-3

days by the neuropsychologists once throughout the three years in the program. Participants were primarily referred for testing to determine eligibility for future education and employment following discharge. For other participants, it was determined by their care team that cognitive testing would be clinically useful information for recovery and educating families. Participants' symptoms were generally stable during testing with the occasional participant not completing the full battery due to active symptoms. A few participants also reported feeling confused and anxious during testing. Since the data collection was naturalistic, not all participants completed all measures.

2.4. Analysis strategy

This study employed an Exploratory Data Analysis (EDA) framework (Behrens & Yu, 2003; Jebb et al., 2017; Tukey, 1977). An EDA framework was selected because (a) the nature of this study is to discover information about this specific group since they have never been studied in isolation before; (b) this study plans to generate hypotheses on this specific, understudied group that can fuel future research on account of the small sample size yet breadth of variables on each individual; and (c) the EDA framework capitalizes on this rich naturalistic data collected. While this analysis will not confirm or refute any specific hypothesis, this framework will build a foundation for future more refined confirmatory data analytic research with the hopes of building towards developmentally-informed, strengths-based early interventions for emerging adults with FEP. A Resiliency Theory framework was used to conceptualize strengths (Fergus & Zimmerman, 2005; Zimmerman, 2013). FEP was designated as the risk exposure (i.e., the factor that may lead to adverse outcomes for youth) and we sought to identify potential assets (i.e., characteristics that allow an individual to manage risk exposures) as part of this analysis. The analysis focused on the first two years of data since (a) most Canadian early intervention

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programs provide two years of treatment including PEPP (Prevention and Early Intervention Program for Psychosis), a leading early intervention program in Canada, and (b) premature termination from treatment commonly occurs within the first year to 18 months suggesting this period is in critical need of attention (Doyle et al., 2014; Iyer et al., 2015; Nolin et al., 2016).

Considering EDA's emphasis on visualization, the first research objective was met through plotting several potential measures and interactions from the data. Longitudinal data were visualized using histograms and spaghetti plots for the first two years in the program. Cognitive data were visualized using histograms, diverging lollipop charts and dot plots. Following visualization, the plots were then reviewed and described and clusters of plots were selected for further investigation and potential analysis. These clusters were chosen based on their potential to inform the study's discussion questions by demonstrating patterns that may align or deviate from the literature, suggest possible assets, and/or potentially be clinically useful for early intervention programs.

To meet the second and third objectives, linear regressions were performed to build general linear models and to confirm the patterns observed in these clusters. Global QoL (i.e., total QLS score), social QoL (i.e., Interpersonal Relationships QLS subscale total score), and productivity QoL (i.e., Instrumental Role QLS subscale total score) were the criterion variables. These three areas of QoL were chosen to approximate milestones such as social and vocational functioning. Furthermore, while the total QLS score is beneficial for summarizing individuals' QoL, the QLS subscales were considered to provide more direct information compared to the global QoL score by removing the multiple influences or "noise" reflected in the total QLS score. Predictor variables from the clusters were selected based on pre-existing relationships with QoL suggested in the literature (Palmer & O'Connell, 2009). Direct effect models were tested

between these variables and areas of QoL. Residual plots were used to confirm linear

relationships for the direct models. Models adjusting for baseline QoL were also tested for

cognitive predictors if the direct model was statistically significant (i.e., testing if the cognitive

variable still significantly predicted QoL when accounting for the effects of baseline QoL). The

three areas of QoL (global, social, and productivity) at baseline were also tested as predictors of

themselves at one and two years because baseline QoL has been shown to be correlated with

future QoL among people with FEP (Gardsjord et al., 2016). Any statistically significant direct

effect model was then tested in a moderation model with cognitive variables from the clusters

used as moderators to further explore potential assets. For any correlations that were statistically

significant in the first and second year these variables would then be tested with a generalized

linear mixed model using the full three years of data to build a longitudinal predictive model.

Statistical analysis was conducted using R version 4.1.2 for Mac.

3. Results

3.1. Sample demographics

Characteristics of the study sample (n=41) are displayed in Table 1. The average age at

baseline was 20.39 years (SD=1.93). All participants completed the PANSS and QLS at baseline

with fewer completing these measures at year 1 (PANSS: n=32; QLS: n=27) and year 2 (PANSS:

n=23; QLS: n=18). See Table 2 for attrition rates. The average age for cognitive assessment was

21 years (SD=1.75). Most participants (n=29; 70.73%) received a cognitive assessment in the

first year of treatment. One participant began the study at age 25 resulting in cognitive testing at

an age older than the emerging adult age-range. Therefore, their cognitive results were not

included in the analysis. Most participants (n=31; 75.56%) completed TMT-B as well as the

Animal Naming and COWAT measures (n=28; 68.29%).

Table 1

Demographic Data

Demographic Variables	Sample (*n*=41)
Age at Baseline M (SD)	20.39 (1.93)
Age at Cognitive Assessment M (SD)	21 (1.75)
Sex (%)	
Male	33 (80.5%)
Female	8 (19.5%)
Ethnicity (%)	
White	40 (97.6%)
Innu	1 (2.4%)
Year of Education (%)	
Less than 12	14 (34.1%)
12	14 (34.1%)
Greater than 12	12 (29.3%)
Unknown	1 (2.4%)
Employment Status at Baseline (%)	
Employed	5 (12.2%)
Unemployed	24 (58.5%)
Student	9 (21.9%)
Unknown	3 (7.3%)
Living Arrangement (%)	
With Parents	27 (65.9%)
Independent	11 (26.8%)
[a]Other	3 (7.2%)
Relationship Status - Single (%)	40 (97.6%)
Diagnosis (%)	
Schizophrenia	11 (26.8%)
Schizoaffective Disorder	7 (17.1%)
Schizophreniform Disorder	1 (2.4%)
Psychotic Disorder NOS	8 (19.5%)
Substance-induced Psychotic Disorder	4 (9.8%)
Bipolar I Disorder	7 (17.1%)
Bipolar II Disorder	1 (2.4%)
Bipolar Disorder NOS	2 (4.9%)

[a] Other living arrangements includes living with a partner, in supervised housing, and unclear

living circumstances.

Table 2

Attrition Rates

Time Frame	PANSS Attrition Rate	QLS Attrition Rate
Baseline to Year 1	21.95% (9 participants)	34.15% (14 participants)
Baseline to Year 2	43.90% (18 participants)	56.10% (23 participants)

3.2. Objective 1 – Visualizing and describing the data

The WAIS-III and WRAT-III standard scores and percentiles were widely distributed with processing speed and arithmetic scores noticeably lower relative to other subtests (i.e., in the Extremely Low to Average range). Plots of the z-scores for the executive functioning measures, TMT (seconds) and WCST (Categories Completed and Perseverative Errors), were widely dispersed and the majority of scores were within 1SD below the mean. Scores on the Animal Naming and COWAT measures seem to be spread across -2 to +2SDs. The Animal Naming task appeared to have more scores closer to the average than the COWAT measure.

PANSS scores across all subscales appeared to decline from baseline to year one and then stabilize between year one to two. However, the decline on the PANSS Negative subscale seemed more gradual relative to the overall scale and other subscales between baseline and year one. Across the QLS subscales, scores appeared to generally increase from baseline to year one and then remain steady from year one to two. The Interpersonal Relationships and Intrapsychic Foundations subscales seemed to increase more gradually compared to the overall scale and other subscales. Moreover, some scores declined from year one to two on the Interpersonal Relationships, Instrumental Role and Common Objects and Activities subscales. Notably, the Intrapsychic Foundations subscale scores appeared higher than other subscales at baseline.

3.3. Objectives 2 and 3 – Building longitudinal linear models to explore relationships and strengths

3.3.1. Selecting clusters and predictors of quality of life outcomes

Four clusters of plots were selected for statistical analysis. See Appendix B for samples of plots of these selected clusters during the data visualization stage. The first cluster, "Executive Functioning," was selected because the TMT and WCST z-scores appeared higher (see Figure B1) than expected considering the literature reporting a significant deficit in this domain for people with FEP (Liu et al., 2011; Mesholam-Gately et al., 2009). A "Verbal Fluency" cluster was formed because the Animal Naming z-scores appeared higher than the COWAT z-scores (see Figures B2-3). This pattern is unusual since the literature often suggests people with psychosis score higher on phonemic fluency tasks (COWAT) compared to semantic fluency tasks (Animal Naming) (Alptekin et al., 2005; Barrantes-Vidal et al., 2007; Reichenberg & Harvey, 2007). Furthermore, the patterns observed may also hint at potential cognitive assets in emerging adults with FEP that could aid early interventions in helping with milestone attainment. The third cluster focused on the Intrapsychic Foundations subscale of the QLS that measures psychological well-being including one's motivation, curiosity and empathy (Heinrichs et al., 1984). This subscale was selected because the scores appeared higher at baseline than other subscales of the QLS (see Figure B4). Considering qualitative evidence suggests traits like motivation play a key role in the academic success of post-secondary students with FEP, exploring this cluster may provide further support for possible psychological assets among emerging adults with FEP that could also be capitalized on in early intervention to support meeting milestones like educational achievement (Roy et al., 2016). Lastly, the final cluster examined was focused on positive and negative symptoms in the first year because symptom severity appeared to change the most in

this period (see Figures B5-7). This pattern fits with the literature on the course of symptoms of psychosis (Censits et al., 1997; Hoff et al., 1999; Hughes et al., 2002).

Z-scores for TMT-B (using Tombaugh, 2004 age-based norms), Animal Naming and COWAT (using Tombaugh et al., 1999 age-based norms) as well as subscale scores for Intrapsychic QoL and the PANSS Positive and Negative subscales were selected as likely predictors of future QoL. These variables were picked as predictors because of literature suggesting they are related to global or specific areas of QoL among people with FEP (Addington & Addington, 1999; Addington et al., 2003b; Addington et al., 2005; Bilder et al., 2000; Canal-Rivero et al., 2022; Liao et al., 2022; Malla & Payne, 2005; Moe et al., 2021b; Mohamed et al., 2009; Narvaez et al., 2008; Norman et al., 2000; Rajji et al., 2014; Thorup et al., 2010; Tolman & Kurtz, 2012; Watson et al., 2018; Wegener et al., 2005; Wong et al., 2021). TMT-B was chosen over the WCST to be the predictor variable from the executive functioning cluster because literature suggests the TMT more accurately detects deficits in executive functioning and is a more continuous representation of executive functioning compared to the more binary results from the WCST (Hammers et al., 2016).

3.3.2. Linear regression testing

A total of 37 linear regressions were tested. Although the number of tests is high, conducting numerous tests is common for naturalistic and exploratory studies (e.g., Bioque et al., 2022; Cuesta et al., 2018; Vogel et al., 2021). The results are presented in Table 2.

Both TMT-B and COWAT z-scores were significant predictors of global QoL and productivity QoL at one year while COWAT z-scores also significantly predicted social QoL at one year (Figures 1 and 2). These held true for the adjusted models as well. Animal Naming z-scores as well as baseline Intrapsychic QoL and PANSS Positive scores did not significantly

predict any area of QoL at any time. Baseline PANSS Negative scores, however, were a significant predictor of social QoL at one year (Figure 3). No area of QoL at baseline predicted that same area at one and two years (Table 3). Given no relationships were significant at both the first and second year, longitudinal models using all three years of data were not fitted.

Table 3

Pairwise Predictors of Quality of Life using Participants' Cognitive Functioning, Psychological

Quality of Life, and Symptomatology

Predictor	QLS Criterion	Year 1 Effect [95% CI]	SE	Test Statistic	p-Value	Year 2 Effect [95% CI]	SE	Test Statistic	p-Value
TMT-B									
	Global QoL	3.72 [0.261, 7.18]	1.65	2.26	0.0365**	2.37 [-1.84, 6.59]	1.86	1.27	0.235
	Global QoL (Adj)	3.66 [0.056, 7.26]	1.71	2.14	0.0469**				
	Social QoL	0.665 [-0.869, 2.20]	0.730	0.911	0.375	0.234 [-2.07, 2.54]	1.02	0.230	0.823
	Productivity QoL	1.38 [0.411, 2.34]	0.459	3.00	0.0077***	0.923 [-0.283, 2.13]	0.533	1.73	0.117
	Productivity QoL (Adj)	1.36 [0.364, 2.36]	0.473	2.88	0.010**				
Animal Naming									
	Global QoL	-2.95 [-15.3, 9.38]	5.82	-0.507	0.619	4.67 [-17.5, 26.9]	9.38	0.497	0.634
	Social QoL	0.819 [-4.20, 5.84]	2.37	0.346	0.734	2.35 [-8.81, 13.5]	4.72	0.497	0.634
	Productivity QoL	0.199 [-3.76, 4.16]	1.87	0.106	0.917	1.95 [-4.75, 8.66]	2.84	0.689	0.513
COWAT									
	Global QoL	4.48 [0.061, -0.235]	2.21	2.03	0.0610*	5.44 [0.478, -12.10]	7.18	0.757	0.478
	Global QoL (Adj)	5.46 [0.030, 0.600]	2.26	2.41	0.0303**				
	Social QoL	1.91 [0.082, -0.278]	1.03	1.86	0.0824*	-0.330 [0.933, -9.56]	3.77	-0.088	0.933
	Social QoL (Adj)	2.32 [0.044, 0.067]	1.05	2.21	0.0444**				
	Productivity QoL	1.63 [0.040, 0.089]	0.722	2.26	0.0395**	1.43 [0.545, -4.02]	2.23	0.641	0.545
	Productivity QoL (Adj)	1.66 [0.039, 0.102]	0.728	2.28	0.0385**				
Baseline Intrapsychic Foundations									
	Social QoL	-0.161 [-0.522, 0.200]	0.175	-0.917	0.368	0.067 [-0.502, 0.636]	0.268	0.249	0.806
	Productivity QoL	0.108 [-0.169, 0.385]	0.134	0.805	0.429	0.173 [-0.190, 0.536]	0.171	1.01	0.327
Baseline PANSS Positive									
	Global QoL	0.263 [-0.910, 1.44]	0.57	0.461	0.649				
	Social QoL	0.347 [-0.135, 0.829]	0.234	1.48	0.151				
	Productivity QoL	-0.013 [-0.397, 0.370]	0.186	-0.072	0.943				
Baseline PANSS Negative									
	Global QoL	-1.01 [-2.37, 0.342]	0.658	-1.54	0.136				
	Social QoL	-0.591 [-1.14, -0.037]	0.269	-2.2	0.0375**				
	Productivity QoL	-0.178 [-0.634, 0.278]	0.221	-0.806	0.428				

Note. QLS = Quality of Life Scale. CI = Confidence Interval. SE = Standard Error. TMT-B =

Trail Making Task B. QoL = Quality of Life. Adj = Adjusted for Baseline scores for that variable.

PANSS = Positive and Negative Syndrome Scale. * p < .10. ** p < .05. *** p < .001.

Figure 1

Executive Functioning vs. Domains of QoL in the First Year
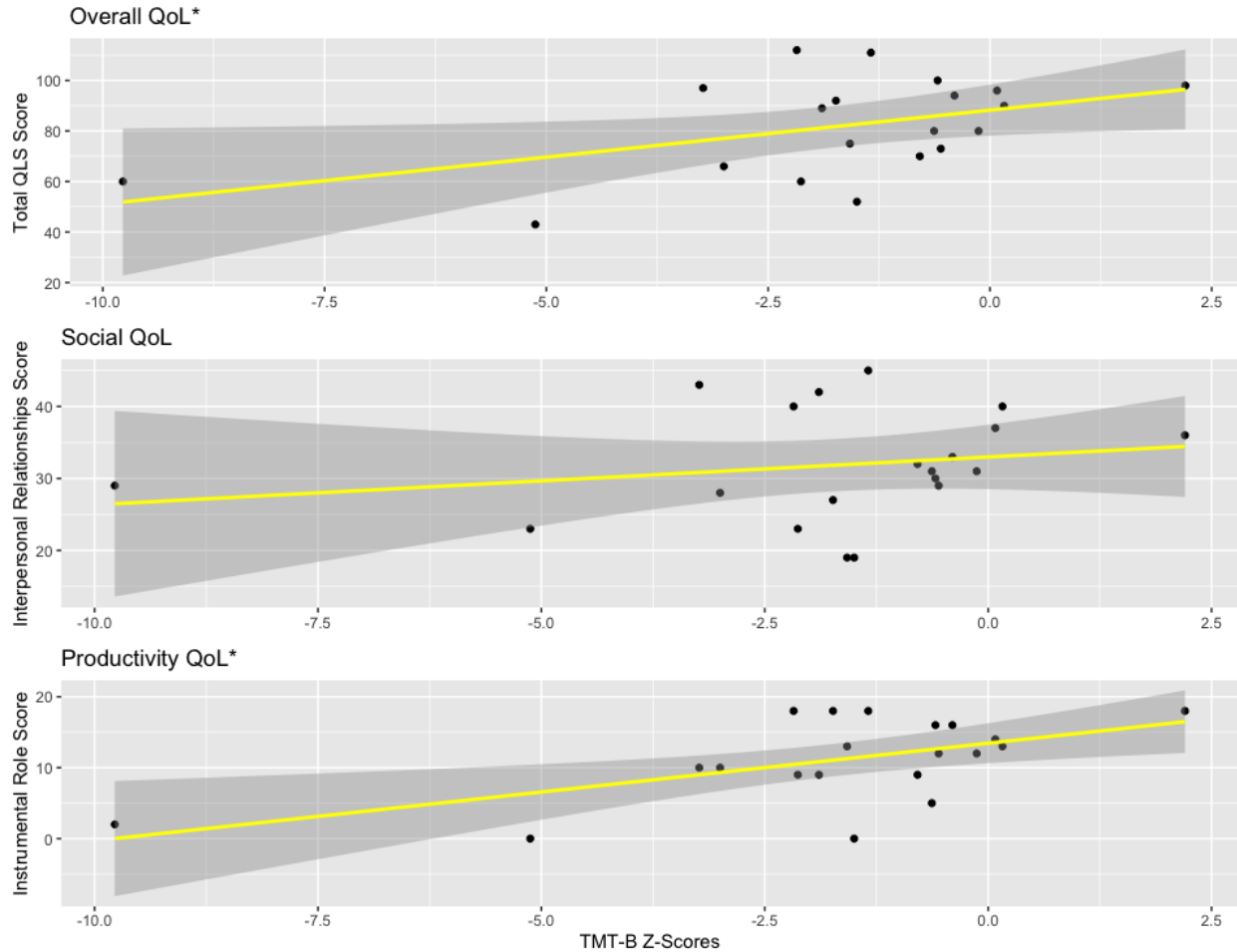
Note. Executive functioning, as measured by TMT-B z-scores, was the predictor variable.

Criterion variables were Overall, Social and Productivity QoL as measured by the Total QLS

Score, Interpersonal Relationships subscale and Instrumental Role subscale scores, respectively,

at year 1. TMT-B = Trails Making Test B. QoL = Quality of Life. QLS = Quality of Life Scale.

* = Statistically significant.

Figure 2

Letter Fluency vs. Domains of QoL in the First Year

Note. Letter fluency, as measured using COWAT z-scores, was the predictor variable. Criterion variables were Overall, Social and Productivity QoL as measured by the Total QLS Score, Interpersonal Relationships subscale and Instrumental Role subscale scores, respectively, at year 1. COWAT = Controlled Oral Word Association Test. QoL = Quality of Life. QLS = Quality of Life Scale. * = Statistically significant.
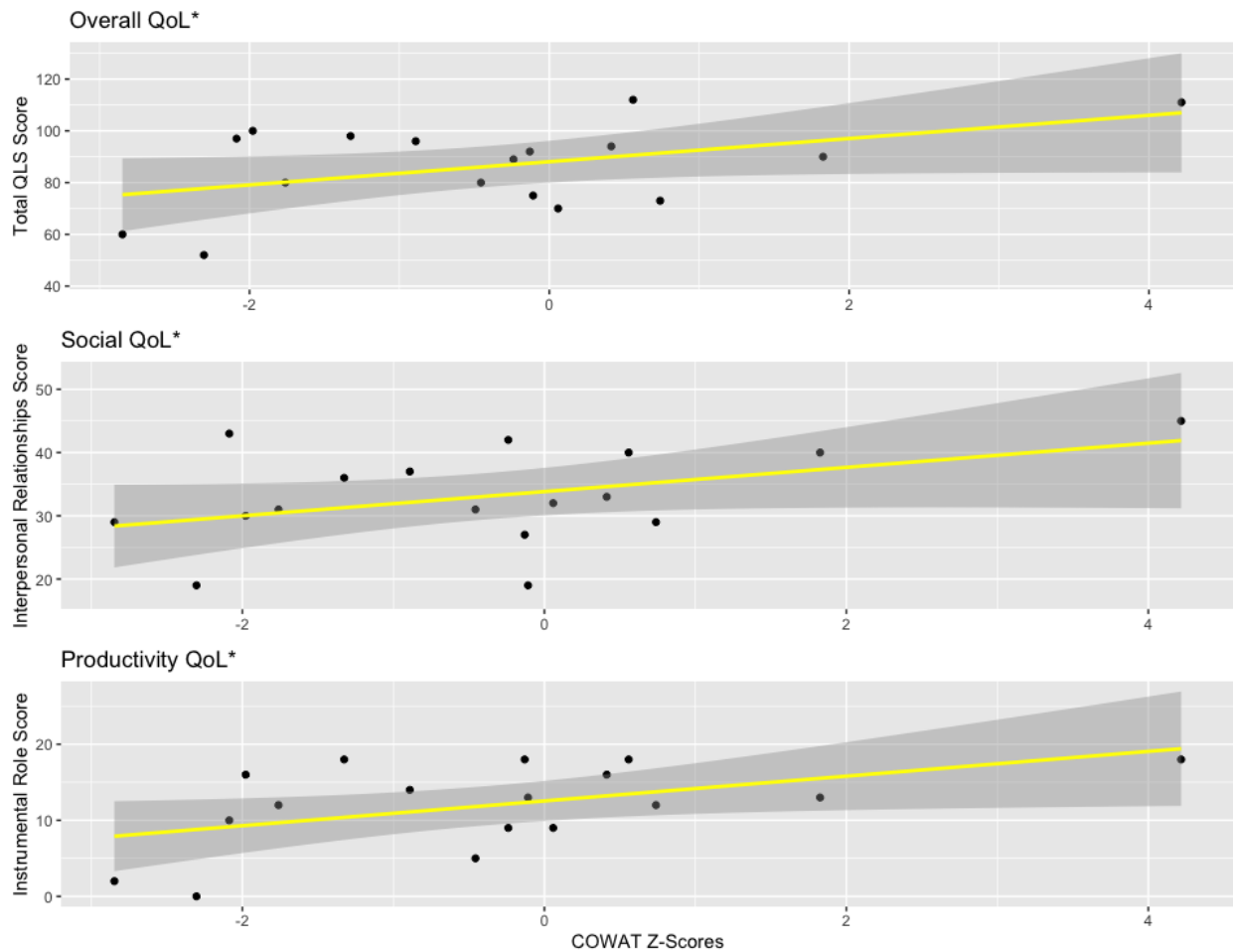
Figure 3

Baseline Negative Symptoms vs. Domains of QoL in the First Year
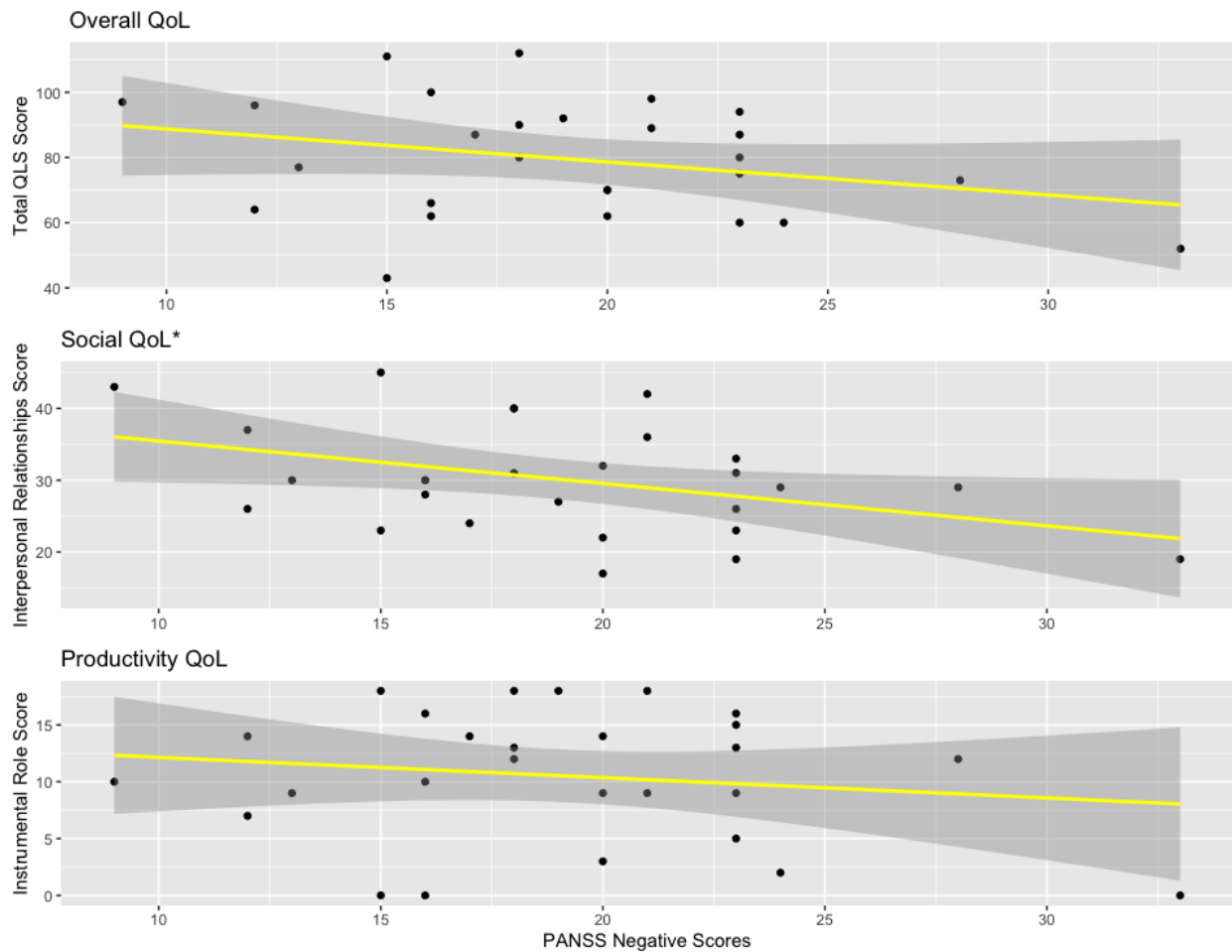
Note. Baseline negative symptoms, as measured using PANSS Negative subscale, was the predictor variable Criterion variables were Overall, Social and Productivity QoL as measured by the Total QLS Score, Interpersonal Relationships subscale and Instrumental Role subscale scores, respectively, at year 1. PANSS = Positive and Negative Syndrome Scale. QoL = Quality of Life. QLS = Quality of Life Scale. * = Statistically significant.

Table 4

Pairwise Predictors of Quality of Life using Participants' Baseline Quality of Life

Predictor (Baseline) & Criterion	Year 1				Year 2			
	Effect [95% CI]	SE	Test Statistic	p-Value	Effect [95% CI]	SE	Test Statistic	p-Value
QLS Total	0.077 [-0.252, 0.405]	0.160	0.480	0.635	0.192 [-0.247, 0.630]	0.207	0.927	0.368
Interpersonal Relationships Subscale Total	0.070 [-0.266, 0.407]	0.163	0.431	0.670	0.320 [-0.182, 0.823]	0.237	1.35	0.196
Instrumental Role Subscale Total	0.136 [-0.282, 0.555]	0.203	0.670	0.509	-0.051 [-0.507, 0.405]	0.215	-0.236	0.816

Note. QLS = Quality of Life Scale; CI = Confidence Interval; SE = Standard Error

3.3.3 Moderation model testing

Given that baseline PANSS Negative scores predicted social QoL at one year, moderation models were tested with this relationship using TMT-B, Animal Naming and COWAT z-scores as the moderators. All cognitive functioning variables did not significantly moderate the relationship between baseline PANSS Negative scores and social QoL at one year (TMT-B: β = -0.145 ± 0.157, p = 0.370, 95% CI = -0.477, 0.188; Animal Naming: β = 0.047 ± 0.420, p = 0.912, 95% CI = -0.853, 0.947; COWAT: β = -0.031 ± 0.156, p = 0.845, 95% CI = -0.369, 0.307).

4. Discussion

This study aimed to explore if and how FEP may present differently in emerging adults and identify what strengths this group may possess so that early intervention programs could provide tailored support to emerging adults to help them meet their milestones. The main findings of this study were that the cognitive domains of executive functioning and letter fluency predicted global QoL and productivity QoL one year into treatment. Letter fluency, as well as baseline negative symptoms, also predicted social QoL one year into treatment. However, none of these variables predicted any area of QoL at two years into treatment. Furthermore,

categorical fluency, baseline positive symptoms, and baseline psychological QoL did not predict any area of QoL in the first or second year.

In reviewing our major findings in the context of the FEP literature, the consistencies and inconsistencies identified here seem to communicate three key ideas about emerging adults with FEP. First, emerging adults with FEP appear to generally follow similar trajectories to the broader FEP population reported on in the literature (e.g., Gee et al., 2016; Griffiths et al., 2021; Hall et al., 2019; Hodgekins et al., 2015; Malla et al., 2002; Molina & Tsuang, 2020; Ortega et al., 2020; Rajji et al., 2014; Sawada et al., 2017). For example, the finding that executive functioning and letter fluency predicted global and productivity QoL at one year into treatment among emerging adults with FEP is consistent with the existing FEP literature (Cowman et al., 2021). For example, a meta-analysis examining the relationship between cognitive and psychosocial functioning among 3767 individuals with FEP found that executive functioning and verbal fluency were significant predictors of psychosocial functioning one year following onset (Cowman et al., 2021). The consistency between our studies suggests that the global and productivity QoL of emerging adults with FEP is susceptible to the same influences (executive functioning and letter fluency) one year into treatment as the wider FEP population reported on in the literature.

Second, emerging adults appear to diverge from the wider FEP population reported on in the literature (e.g., Addington et al., 2003b; Ayesa-Arriola et al., 2013; Chang et al., 2018; González-Blanch et al., 2009; Häfner et al., 1998) in how the severity of their baseline negative symptoms does not appear to impact global and productivity QoL in the first year of treatment. To possibly explain this inconsistency, it may be worth considering that a key characteristic of emerging adults is that they typically participate in informal "gig" work (Kostyshyna & Luu,

2019). Therefore, since their occupational functioning is often dynamic and changing, it may be less impacted or destabilized by early negative symptoms. However, as one exits emerging adulthood and begins to look for stable employment, those early negative symptoms may be more disruptive.

Third, given no significant relationships were identified between the predictors and any area of QoL in the second year, consistent with the FEP literature, the factors that predict milestones among emerging adults with FEP change over time. For example, a 3-year longitudinal study found that different variables predicted functioning at one and three years into treatment in a sample of 202 individuals with FEP (Ayesa-Arriola et al., 2013). Factors that predicted functioning at one year included baseline negative symptoms and processing speed while factors predicting functioning at three years included education completed and premorbid social adjustment (Ayesa-Arriola et al., 2013). These results suggest that the variables we tested in our study are important for working towards occupational and social milestones in the first year of treatment but seem less relevant to these milestones as time passes, while other variables possibly emerge as more critical.

Consistent with Resiliency Theory, the current results suggest that executive functioning and letter fluency may be assets in protecting emerging adults from the risks to academic and occupational functioning in the year following the onset of a first episode. Letter fluency, in particular, may also safeguard emerging adults from the risks to social functioning in the first year after an episode of psychosis. Altogether, examining our results in the context of the current FEP evidence base has helped provide a clearer impression of how FEP presents in emerging adults. This characterization, alongside knowledge of these strengths, may inform how early

interventions can support emerging adults with FEP in meeting their vocational and social milestones.

Firstly, given the overlap between our findings and the existing FEP literature, early intervention programs may not need to approach emerging adults with FEP differently from how individuals from other age groups are approached. Second, given the evidence that negative symptoms could interfere with social skill development, it is recommended that early intervention programs working with emerging adults incorporate or emphasize treatments that target negative symptoms and social skills such as Cognitive Remediation and Healthy Behaviours Training (Ventura et al., 2019) or Cognitive Behavioural Social Skills Training (Herman et al., 2016) to help emerging adults with FEP meet their interpersonal milestones. Third, interventions like Cognitive Adaptation Training (Velligan et al., 1996) or cognitive training and remediation (Miley et al., 2020) to bolster letter fluency and executive functioning may be considered to help emerging adults struggling in these domains meet their social and academic/occupational milestones.

Several limitations need to be accounted for when interpreting this study's results including small sample size, limited control of the study procedures, and the large number of regressions risking Type I Error. In particular, our small sample size limits generalizability and perhaps underpowered our analyses, which risked Type II error, especially between variables in the second year. Furthermore, many participants who received cognitive testing were selected for their interest in returning to work or school, which may have filtered out emerging adults who were struggling with their cognitive functioning and suggests our sample may be higher functioning. Moreover, subscales of the QLS, such as Interpersonal Relationships, are not perfect proxies of milestones like establishing social connections, which limits forming accurate

interpretations. In addition, since no relationship was significant in both the first and second year, we could not proceed with assessing generalized linear mixed models and, therefore, cannot identify or comment on longitudinal patterns in the data. Lastly, differences in cognitive functioning between the diagnoses included in our sample may have impacted our findings.

It is recommended that researchers delve deeper into the assets identified here and other possible strengths to help this group meet their milestones. Ultimately, it is the hope that this study contributed to building towards developmentally-informed, strengths-based early interventions so that emerging adults with FEP can meet their milestones and follow a prosperous and fulfilling trajectory.

Chapter 3: Final Discussion

This study explored the cognitive functioning, symptomatology and QoL of emerging adults with FEP in an early intervention program over two years. The main findings were that the cognitive domains of executive functioning and letter fluency predicted global QoL and productivity QoL one year into treatment. Letter fluency, as well as baseline negative symptoms, also predicted social QoL one year into treatment. However, none of these variables predicted any area of QoL at two years into treatment. Furthermore, categorical fluency, baseline positive symptoms, and baseline psychological QoL did not predict any area of QoL in the first or second year. This study aimed to explore if and how FEP may present differently in emerging adults and what strengths this group may possess so that early intervention programs could provide tailored support to emerging adults to help them meet their milestones. Therefore, these results will be reviewed in the context of three questions: (1) If and how do emerging adults with FEP differ from the existing FEP literature?; (2) What strengths do emerging adults with FEP possess that could facilitate resilience against the adverse outcomes that commonly follow a first episode of psychosis?; (3) How might early intervention services ultimately utilize this information on presentation and strengths of emerging adults with FEP to support them with meeting their milestones?

How Emerging Adults with FEP Fit Into the Existing FEP Literature

The finding that executive functioning and letter fluency predicted global and productivity QoL at one year into treatment among emerging adults with FEP is consistent with the existing FEP literature (Hall et al., 2019; Molina & Tsuang, 2020; Sawada et al., 2017). For example, Cowman et al. (2021) conducted a meta-analysis examining the relationship between cognitive and psychosocial functioning among 3767 individuals with FEP (mean age = 24.67 years) from 46 studies. Psychosocial functioning was broadly defined to include interpretations

such as QoL and educational, occupational and interpersonal functioning (Cowman et al., 2021). Both cross-sectionally and longitudinally, executive functioning and verbal fluency were significant predictors of psychosocial functioning one year following onset (Cowman et al., 2021). Our study's results fit well with that of Cowman et al. (2021). The consistency between our studies suggests that the global and productivity QoL of emerging adults with FEP is susceptible to the same influences (executive functioning and letter fluency) one year into treatment as the wider FEP population reported on in the literature. More broadly, this suggests emerging adults are similar to the wider FEP population reported on in the literature.

Interestingly, a second meta-analysis performed a similar investigation into possible predictors of future functioning among 6669 individuals with FEP (mean age = 23.30 years), with most follow-ups (20 of 50 studies) occurring at one year following the first episode (Santesteban-Echarri et al., 2017). Like in the previous study, Santesteban-Echarri et al. (2017) also loosely defined functioning, including interpretations like QoL, vocational functioning, and social functioning. However, Santesteban-Echarri et al. (2017) found that only verbal fluency, not executive functioning, significantly predicted future functioning. Notably, the average age range of participants in the Cowman et al. (2021) study (18.7 to 30.5 years) was closer to our study participants age range (18 to 25 years). In contrast, the age range in the study by Santesteban-Echarri et al. (2017) was much more expansive (15.6 to 43.2 years). The fact that our sample's age range and results more closely parallel the meta-analysis by Cowman et al. (2021) suggests that emerging adults fit better within the FEP literature that focuses specifically on individuals in their early adulthood years. Furthermore, Cowman et al. (2020) used more recent data (articles between January 2000-March 2020), which might account for progress made in earlier detection of psychosis and lead to a younger sample compared to the analysis by

Santesteban-Echarri et al. (2017) (all articles before March 2016). This possibility suggests our results also fit with findings of more contemporary youth with FEP. Given that our results aligned better with a FEP sample that had a similar age range compared to a sample with a wider age range also emphasizes that FEP can present differently across the lifespan. The importance of FEP research that targets specific age groups, such as the current study, can facilitate treatments tailored to specific age groups. Taken together, emerging adults are reasonably similar to the broader FEP population reported on in the literature but appear more similar to those with FEP closer in age (e.g., individuals with FEP in early adulthood).

Similarly, the finding that social QoL in the first year was predicted by letter fluency and baseline negative symptoms is also consistent with FEP literature (Gee et al., 2016; Ortega et al., 2020; Rajji et al., 2014). For example, with regard to verbal fluency, Malla et al. (2002) found that letter fluency predicted social functioning one year after initiating treatment in a sample of 66 people with FEP (mean age = 25.60). With respect to baseline negative symptoms, in a study examining social outcomes among 98 individuals with FEP (mean age = 24), more severe negative symptoms at the start of treatment predicted poorer social functioning one year later (Griffiths et al., 2021). Furthermore, in a study of predictors of social recovery among 764 individuals with FEP in an early intervention program (mean age = 21.29), more severe negative symptoms at the beginning of treatment predicted less time spent engaging in social activities one year later (Hodgekins et al., 2015). The consistency between the results of these studies and our own suggests that emerging adults' social functioning is responsive to the same variables (letter fluency and baseline negative symptoms) as the broader FEP community reported on in the literature in the first year of treatment. More generally, this further suggests another way in which emerging adults are similar to the wider FEP population reported on in the literature.

It is intriguing that letter fluency predicted social QoL while categorical fluency did not because categorical fluency is more commonly used in socializing (Shao et al., 2014). For example, in conversation, people often find words to say related to the topic being discussed (i.e., categorical/semantic fluency) and less frequently find what to say from a phoneme (i.e., letter/phonemic fluency) (Shao et al., 2014). One possible explanation for this unusual finding is that part of the letter fluency task involves inhibiting oneself from using semantic-based word-finding strategies, which requires executive functioning (Luo et al., 2010; Shao et al., 2014). Considering our sample's executive functioning was less impaired than expected based on other samples in the literature (e.g., Liu et al., 2011; Mesholam-Gately et al., 2009), that likely supports using phonemic-based strategies in speech production. This finding also seems to fit with the literature suggesting that people with psychosis perform better on letter fluency tasks than semantic fluency tasks (Alptekin et al., 2005; Barrantes-Vidal et al., 2007; Reichenberg & Harvey, 2007). This finding might also suggest that emerging adults with FEP utilize phonemic-based or other alternative strategies as an adaptive coping technique to navigate social interactions.

It is also intriguing that letter fluency was the only variable that predicted all areas of QoL tested (i.e., global, productivity and social QoL). A possible explanation for this finding is that verbal fluency may be subsumed under the domain of processing speed (Faber et al., 2011; Nuechterlein et al., 2008). Considering individuals with schizophrenia-spectrum disorders experience deficits across cognitive domains, it has been hypothesized that processing speed may be an underlying cognitive function that, when impaired, subsequently impacts all cognitive domains (Rodríguez-Sánchez et al., 2007). In the case of verbal fluency in FEP, if the rate at which an individual processes information is slowed, then they will likely struggle to generate

words quickly or efficiently. Evidence demonstrates this hypothesis among people with FEP (Bachman et al., 2012; Rodríguez-Sánchez et al., 2007). For example, Rodríguez-Sánchez et al. (2007) compared the performance of 126 individuals with FEP (mean age = 26.90) to 28 healthy controls (mean age = 25.67) on tasks measuring various cognitive domains, including the FAS letter fluency task used in our study. Critically, Rodríguez-Sánchez et al. (2007) compared these samples before and after accounting for the contributions of processing speed. Their results found that the samples differed significantly across all cognitive domains before they accounted for processing speed but not after (Rodríguez-Sánchez et al., 2007). These results indicate that cognitive domains, including verbal fluency, are all impacted by processing speed and, therefore, may be subsumed under that domain. Processing speed has also been found to have a widespread impact on the functioning of people with schizophrenia-spectrum disorders, including occupational and social functioning (Bowie et al., 2008). Therefore, the predictive power of letter fluency found in this study may reflect the influence of processing speed on functioning in this population.

Our finding that the severity of baseline negative symptoms did not predict global and productivity QoL differs from much of the FEP literature that suggests early negative symptoms are a strong predictor of future QoL (Addington et al., 2003b; Ayesa-Arriola et al., 2013; Chang et al., 2018; González-Blanch et al., 2009; Häfner et al., 1998). For example, Addington et al. (2003b) examined potential predictors of QoL of 177 individuals with FEP (mean age = 24.5 years, SD = 8.5 years) at one year into an early intervention program. Their results indicated that the severity of negative symptoms at admission into the early intervention program was a strong predictor of low QoL at one year into treatment. This inconsistency between our results and the FEP literature suggests that FEP in emerging adulthood is distinct from FEP at other

developmental stages because, during emerging adulthood, the severity of one's negative

symptoms at onset does not appear to contribute to the global QoL and educational/occupational

functioning as they seem to in people with FEP from other age groups. Interestingly, our

sample's baseline negative symptoms (M= 17.88, SD = 5.29) are comparable to that of

Addington et al. (2003b) (M = 14.79, SD = 6.26) – as measured by the PANSS Negative

Syndrome Scale (range 7-49). Given both studies have similar severities of baseline negative

symptoms yet diverge in their age ranges and ability to predict overall and productivity QoL at

one year into treatment further emphasizes emerging adulthood as a distinct period for FEP.

Taken together broadly, FEP during emerging adulthood may have idiosyncrasies that make it

unique from experiencing FEP during other developmental periods.

To possibly explain this inconsistency, it may be worth considering that a key

characteristic of emerging adults is that they typically participate in informal "gig" work

(Kostyshyna & Luu, 2019). Therefore, since their occupational functioning is often dynamic and

changing, it may be less impacted or destabilized by early negative symptoms. However, as one

exits emerging adulthood and begins to look for stable employment, those early negative

symptoms may be more disruptive. For example, Wunderink et al. (2020) studied the impact of

baseline negative symptoms on functionality seven years after 103 individuals with FEP (mean

age at seven-year follow-up = 26 years and four months) initiated treatment. Functionality was

defined as "adequate functioning in the core domains of everyday life for at least six months," (p.

194) with the degree of disability rated for domains such as self-care, social functioning,

occupational functioning, community involvement, and housekeeping (Wunderink et al., 2020).

Wunderink et al. (2020) found that more severe baseline negative symptoms significantly

predicted poorer overall functional outcomes at the 7-year follow-up. Their study demonstrates

that even a year after emerging adulthood, baseline negative symptoms may begin to disrupt one's functionality (Wunderink et al., 2020). Altogether, the inconsistency between our findings and the FEP literature regarding the predictive power of baseline negative symptoms suggests that emerging adulthood may be a unique developmental period.

Notably, no significant relationships were identified between the predictors (executive functioning, letter fluency, categorical fluency, baseline positive and negative symptoms, baseline psychological QoL) and any area of QoL in the second year. There is mixed evidence on whether variables like executive functioning, verbal fluency and baseline negative symptoms predict functioning among people with FEP two years into treatment (Allott et al., 2011; Bilder et al., 2000; Faber et al., 2011; Peña et al., 2012; Salagre et al., 2020; Stouten et al., 2014; Torrent et al., 2018; Verma et al., 2012). To explain this finding, it is possible that QoL is dependent on different variables as time goes on. For example, Ayesa-Arriola et al. (2013) conducted a 3-year longitudinal study with 202 individuals with FEP (mean age range = 27.8-30.25 years). Ayesa-Arriola et al. (2013) investigated possible clinical, cognitive and demographic predictors of functioning at one and three years into treatment. Future functioning was measured using the Disability Assessment Scale, which encapsulates various areas of functioning, including personal care and social and occupational functioning (Ayesa-Arriola et al., 2013; World Health Organization, 1988). Interestingly, their results showed that different variables predicted functioning at one and three years into treatment (Ayesa-Arriola et al., 2013). For instance, factors that predicted functioning at one year included baseline negative symptoms and processing speed (Ayesa-Arriola et al., 2013). In contrast, factors predicting functioning at three years included education completed and premorbid social adjustment (Ayesa-Arriola et al., 2013). These results suggest that the variables we tested in our study are important for working

towards occupational and social milestones in the first year of treatment but seem less relevant to these milestones as time passes, while other variables possibly emerge as more critical. However, our small sample size and high attrition rate may have underpowered these analyses, thus explaining the absence of a relationship between our variables and QoL in the second year.

Overall, in reviewing our major findings in the context of the FEP literature, the consistencies and inconsistencies identified here seem to communicate three key ideas about emerging adults with FEP:

1. Emerging adults with FEP appear to generally follow similar trajectories to the broader FEP population reported on in the literature, especially those in early adulthood (~18-30 years). For example, like other individuals with FEP, the executive functioning of emerging adults with FEP is likely to predict their global and productivity QoL one year into treatment.

2. Emerging adults appear to diverge from the wider FEP population reported on in the literature in how the severity of their baseline negative symptoms does not appear to impact global and productivity QoL in the first year of treatment. While this finding may be an artifact of our data, as described above, one possible explanation might be that emerging adults' employment status is often in a state of flux and, therefore, may be less disturbed by baseline negative symptoms.

3. Consistent with the FEP literature, the factors that predict milestones among emerging adults with FEP change over time.

Altogether, examining our results in the context of the current FEP evidence base has helped provide a clearer impression of how FEP presents in emerging adults. The clinical implications of these similarities and differences between emerging adults with FEP and the FEP literature

will be explored in the sections below. In particular, how early interventions can help these emerging adults meet their milestones, given this knowledge of how they compare to the current FEP literature, will be discussed.

Potential Assets for Protecting Emerging Adults from Risks to Future Functioning

Consistent with Resiliency Theory, the current results suggest that executive functioning and letter fluency may be assets in protecting emerging adults from the risks to academic and occupational functioning in the year following the onset of a first episode. Letter fluency, in particular, may also safeguard emerging adults from the risks to social functioning in the first year after an episode of psychosis. These findings could also be defined as "cognitive strengths." Using qualitative data from youths with FEP, cognitive researchers and mental health professionals, Bryce et al. (2022) developed a working definition of cognitive strengths in FEP: "personal strengths in thinking or other mental processes that are either subjective, observed or objectively measured and aid daily functioning, goal attainment or meaningful role participation" (p. 10). Based on this definition, executive functioning and letter fluency domains may be considered cognitive strengths among emerging adults with FEP since they can benefit future functioning and goals. Lastly, considering individuals with FEP report having more precise goals and values after their first episode, it is intriguing that executive functioning (the domain associated with goal-directed behaviour) has been identified as an asset here (Jordan et al., 2018). It is possible that stronger executive functioning may help with goal setting, which helps with academic/occupational functioning. Knowledge of these assets or strengths may inform how early interventions can support emerging adults with FEP in meeting their vocational and social milestones (discussed below).

Clinical Implications for Early Intervention Services

Though our findings primarily serve as a starting point for future research, several clinical recommendations can be made from these initial results that early intervention programs may consider and explore further. These recommendations aim to support clinicians in helping emerging adults with FEP meet their milestones. Specifically, these recommendations may improve areas of QoL (e.g., social and productivity) and thus help meet milestones (e.g., establishing relationships and academic/occupational achievement) in the first year of treatment.

Firstly, given the overlap between our findings and the existing FEP literature, early intervention programs may not need to approach emerging adults with FEP differently from how individuals from other age groups are approached. However, a unique pattern is that baseline negative symptoms do not appear to predict productivity in the first two years of treatment amongst emerging adults with FEP. Rather, it seems baseline negative symptoms only predict social QoL in the first year of treatment. To explore the clinical implications of this finding, it is helpful to understand first how negative symptoms could interfere with social skill development in emerging adulthood. One possible explanation was suggested in a study by Griffiths (2009) that examined peer attachment in FEP. In a sample of 54 individuals with FEP (mean age = 25.34), Griffiths (2009) tested the hypothesis that negative symptoms would disrupt participants from forming attachments with their peers one year after initiating treatment. They found that more severe negative symptoms were associated with greater struggles to form emotionally fulfilling peer attachments or friendships (Griffiths, 2009). To explain their results, Griffiths (2009) suggested that negative symptoms, such as asociality, avolition, and diminished affect, impede individuals with FEP from having the necessary interest, motivation, endurance and adaptability to develop social skills that facilitate forming new, satisfying relationships (Hansen et al., 2009). In applying this explanation to our findings, baseline negative symptoms appear to

be preventing emerging adults from harnessing key traits (i.e., interest, motivation, endurance and adaptability) that allow for learning social skills, which results in lower social QoL at one year into treatment. Therefore, to compensate for this social skills loss and minimize the risk of poor social QoL, it is recommended that early intervention programs working with emerging adults incorporate or emphasize treatments that target negative symptoms and social skills.

For example, a randomized control trial compared the effects of Cognitive Remediation and Healthy Behaviours Training on negative symptoms and social functioning in 80 individuals with FEP (mean age = 21.9 years) (Ventura et al., 2019). Cognitive Remediation is a behavioural intervention designed to improve cognitive functioning by strengthening and compensating for cognitive domains through engaging in repeated thinking exercises and applying compensation strategies that are then generalized to one's everyday life (Fan et al., 2017; McGurk et al., 2013). The Healthy Behaviours Training involves helping clients develop better eating and exercising habits and improve their stress management skills (Venutra et al., 2019). Participants in this study were enrolled in 50 sessions of either Cognitive Remediation or Healthy Behaviours Training for six months, followed by another six months of additional booster sessions (Ventura et al., 2019). Ventura et al. (2019) found that Cognitive Remediation was associated with improved negative symptoms and social functioning one year after initiating treatment. Critically, Cognitive Remediation was linked to improvements in the specific negative symptoms that Griffiths (2009) suggested are responsible for hindering emerging adults from developing social skills: asociality, avolition and diminished affect (Ventura et al., 2019). As such, early interventions might consider incorporating Cognitive Remediation into their treatment regimens for emerging adults with FEP to minimize negative symptoms' impact on social skill development and, thus, help them meet their social milestones.

Another possible intervention is to directly target and compensate for social skills using Cognitive Behavioural Social Skills Training (CBSST), an 18-session group therapy that amalgamates traditional cognitive-behavioural therapy, social skills training and problem-solving skills to target functional outcomes (Herman et al., 2016). In a feasibility study by Herman et al. (2016), 22 individuals with FEP (mean age = 25 years) completed CBSST and had their adaptive functioning measured at the start and end of treatment and three months later. This study's definition of adaptive functioning included social and occupational functioning (Herman et al., 2016). Herman et al. (2016) found that participants' social competence and general social and occupational functioning significantly improved after completing CBSST, and those benefits remained three months later. Similarly, Moe et al. (2021a) tested the implementation of a group social skills intervention designed for young adults with Autism Spectrum Disorder with 19 inpatients with FEP (mean age = 27.25). The empirically-supported social skills intervention, titled "Program for the Enrichment and Education of Relational Skills" (PEERS), involves using various strategies (e.g., instructor's directions, repetitive exercises, role-plays, and discussion) to help youths develop and maintain healthy friendships (Moe et al., 2021a). Moe et al. (2021a) adapted PEERS for young adults with FEP on an inpatient unit to be briefer by shortening the sessions from 90 to 45 minutes and offering it only twice per week throughout their hospitalization. The subjects selected from the PEERS manual (i.e., trading information, starting a conversation, maintaining a conversation, and handling verbal teasing) were chosen because they built on fundamental social skills (Moe et al., 2021a). Participants' social competency and functioning were assessed before enrolling in the program and at the end of their hospital stay (Moe et al., 2021a). Fortunately, the adapted PEERS training was associated with significant improvements in both self-reported social competency and clinician-rated social functioning

(Moe et al., 2021a). Therefore, it is recommended that early interventions consider adopting specific social skills training like CBSST or PEERS-based social skills training in order to help emerging adults with FEP develop their social skills and meet their interpersonal milestones despite the presence of severe baseline negative symptoms.

Additionally, in exploring options outside of the clinic, digital or online interventions have yet to demonstrate any improvements to the social functioning of individuals with FEP and, therefore, cannot be recommended for early interventions at this time (Maechling et al., 2023). Ultimately, severe baseline negative symptoms among emerging adults with FEP may serve as an indicator to early intervention services to implement any of these interventions in order to help emerging adults move towards their interpersonal milestone and greater social QoL in the year after their first episode.

It is important to consider if social skills training would be different for emerging adults with FEP compared to individuals with psychosis from other age brackets. Available evidence suggests that the social problems present in the first episode are consistent with the social problems of those with chronic psychosis (Pinkham et al., 2007). For example, Pinkham et al. (2007) compared the social competency of people at clinically high risk for psychosis (n=19; mean age = 21.74) to those with early (n=21; mean age = 26.42) and chronic (n=28; mean age = 39.57) schizophrenia-spectrum disorders. Interestingly, Pinkham et al. (2007) found that social skill deficits were not significantly different across the three groups. Their results echoed the findings of Grant et al. (2001) in a cross-sectional study, where they compared the social functioning of 40 individuals with FEP (mean age = 25.28 years) and 40 individuals with multi-episode schizophrenia (mean age = 35.65). Grant et al. (2001) also found no significant difference in social functioning between the two age groups. Together, the results of these

studies suggest that the social skills deficits present at the time of the first episode persist throughout one's life if unaddressed early on. The persistence of this deficit might suggest that the specific social skills that need to be taught at the time of emerging adulthood may still need to be learned as one ages. However, future research should consider investigating if specific social skill deficits are associated with specific age groups to tailor social skills training to peoples' unique age-related needs.

Secondly, conducting cognitive assessments of letter fluency and executive functioning may be worthwhile as soon as possible following entry into an early intervention program and stabilization of symptoms. Developing an early and concrete understanding of these domains, alongside follow-up or repeated testing to ensure reliability, could inform whether clinicians should capitalize on or bolster them. For example, for emerging adults with greater functioning in these domains, clinicians may wish to take advantage of these strengths by incorporating more vocational and social programming early into their treatment plans to build towards emerging adults' social and academic/occupational milestones. However, clinicians may consider bolstering executive functioning and letter fluency to improve productivity and social QoL in the first year for those with lower functioning in these areas. Researchers studying cognitive functioning in schizophrenia-spectrum disorders, as well as clinicians specializing in this area and individuals with FEP, have all expressed their support for incorporating a strengths-based lens into early intervention programs (Bryce et al., 2021; Bryce et al., 2022; Steele et al., 2021). For example, one qualitative study sought the perspectives of 10 youths with FEP (mean age = 21.44 years) on possibly incorporating a cognitive strengths-based approach in their early intervention program (Bryce et al., 2022). Participants in this study reported perceiving multiple benefits to incorporating this approach (Bryce et al., 2022). First, they believed a strengths-based

approach would help them develop their confidence, given their struggles with low self-esteem, which may help them meet their clinical and personal goals (Bryce et al., 2022). For example, in the study by Bryce et al. (2022), one participant stated:

> Say you have problem solving ability, you feel like, "Okay, so I've missed like this much of work, that's okay. Like, I can go to work for this much and like, it'll make up for it . . . Like you're able to, to use those [cognitive strengths] and kind of create a plan and like move forward . . . so you can get back to work, so you can get back to seeing friends. (p. 6)

Simultaneously, participants suggested that this approach needs to be implemented thoughtfully to limit detrimental outcomes to engagement with treatment and self-esteem (Bryce et al., 2022). To minimize detrimental outcomes, Bryce et al. (2022) recommended the following considerations if and when implementing a cognitive strengths-based approach in an early intervention program:

- Explicitly communicating the risks and benefits of participating in a cognitive strengths assessment to individuals with FEP.
- Agreeing on the purpose of conducting the assessment and aligning it with the individual's goals.
- Timing the assessment for the when the individual's symptoms are stable.
- Having the assessment administered by a clinician with solid rapport.
- Ensuring there is time to debrief and discuss the results with the client.

Both clinicians and individuals with FEP also believe that a key benefit of implementing cognitive strengths assessments could be that it fosters re-shaping one's identity and self-concept beyond one's perceived deficits (Bryce et al., 2022; Steele et al., 2021). This theme of re-shaping

one's identity aligns well with the self-focus and exploration into one's individuality that Arnett (2015) proposed as essential features of emerging adulthood. In other words, a strengths-based approach seems to fit well with the developmental stage of emerging adulthood. Overall, if applied with the considerations from Bryce et al. (2022), incorporating a strengths-based approach into early intervention programs may help emerging adults with FEP meet milestones surrounding their social life, academic/occupational functioning and identity formation.

Several interventions to bolster letter fluency and executive functioning may be considered to help emerging adults struggling in these domains meet their milestones. Firstly, implementing compensatory aids and strategies may help support these lower-functioning domains so that emerging adults may increase their likelihood of meeting their social and academic/occupational milestones. One intervention early psychosis programs may consider incorporating or amplifying for emerging adults is Cognitive Adaptation Training (CAT) (Velligan et al. 1996). CAT involves using aids and re-organizing one's environment to alleviate the demands on impaired cognitive domains (Velligan et al., 1996). For example, one might utilize signs, labels, checklists and schedules to help remember and keep on top of their daily tasks (Velligan et al., 1996). One might also re-arrange their closets or furniture to help follow procedures like picking out clothes for the day (Velligan et al., 1996). Allott et al. (2016) conducted a study testing the feasibility of CAT with five individuals with FEP (mean age = 21.4 years). Over nine months, participants received approximately 25 CAT sessions at their homes from a trained CAT therapist for about 1 hour (Allott et al., 2016). Allott et al. (2017) also analyzed participants' occupational functioning and QoL before and after implementing the intervention. Occupational functioning was measured using the Social and Occupational Functional Assessment Scale (SOFAS) and the UCSD Performance-Based Skills Assessment

(UPSA-2), which included assessing areas such as financial management, planning and organizing, transportation, housekeeping and communication skills (Allott et al., 2017). The SOFAS and UPSA-2 are scored from 0 to 100, while the UPSA-2 subdomains are scored from 0-20, with higher scores indicating better functioning (Cowman et al., 2023; Mausbach et al., 2008). Allott et al. (2017) measured QoL using the World Health Organizing Quality of Life (WHOQOL-BREF), which included areas such as physical health (e.g., pain, sleep, mobility), psychological health (e.g., self-esteem, memory, attitude), interpersonal relationships (e.g., social support, sexual health) and environmental health (e.g., health and safety, financial support, recreation) (Vahedi, 2010). WHOQOL-BREF scores also range from 0 to 100, with higher scores indicating greater QoL (Vahedi, 2010).

On average, participants in the Allot et al. (2016) study missed approximately one session for the entire duration of the treatment, resulting in a 95.3% attendance rate. The most frequently used tools in this CAT trial were calendars and diaries, followed by signs, labels, and checklists (Allott et al., 2017). CAT therapists commonly sought ways to link CAT strategies to occupational functioning. For example, CAT therapists highlighted the importance of maintaining hygiene using the aids provided to help integrate into the workforce (Allott et al., 2017). Some participants were also supplied with a "prompt card" to prepare for typical job interview questions and respond to work-related phone calls (Allott et al., 2017). As such, many of the results suggested that CAT benefitted participants' academic/occupational functioning (Allott et al., 2017). For instance, when Allott et al. (2016) asked for comments on the program, participants reported that it was useful for "Helping me find employment," (p. 482) and case managers shared, "My client's cognitive functioning and ability to become increasingly independent improved greatly during CAT" (p. 482). Allott et al. (2017) also found that four of

the five participants were employed, enrolled in school or a combination of both when they finished CAT. Their final academic/employment status differed greatly from the start of the study when three of five participants were unemployed, and only two were enrolled in university, with one of the two also working part-time (Allot et al., 2017). Furthermore, the most noticeable quantitative improvements were found in the areas of overall functioning as measured by SOFAS (change from 51.8 to 58.8), Planning and Organizing as measured by the UPSA-2 (change from 11.8 to 15), and the areas of physical health (change from 62.6 to 80.0), psychological health (change from 58.8 to 76.2) and environmental health (change from 62.6 from 75.2) as measured by the WHOQOL-BREF (Allott et al., 2017). Critically, at the end of the study, participants also reported being fairly satisfied with CAT, and, in particular, all agreed that learning how their cognitive functioning and behaviour are connected to their goals (e.g., returning to school and work) was very helpful (Allott et al., 2016).

Together, these results suggest that CAT would not only be positively received by emerging adults if incorporated into early intervention programs but could also help emerging adults struggling with letter fluency and executive functioning to meet their milestones, such as their occupational milestones. Therefore, CAT appears to be an effective compensatory method for addressing cognitive functioning difficulties and improving academic/occupational outcomes among emerging adults with FEP (Allott et al., 2016; Allott et al., 2017).

Second, though more evidence is needed with an FEP population, cognitive training and remediation have shown potential for improving executive functioning among people with FEP and could, therefore, benefit emerging adults' productivity in the first year (Miley et al., 2020). Computer-based cognitive remediation may be especially worthwhile given the evidence suggesting people with psychosis are receptive to technology-based interventions and the need

for better engagement with treatment (Alvarez-Jimenez et al., 2014; Doyle et al., 2014). Given 21% of individuals with FEP struggle with comorbid social anxiety disorder, leaning on computer-based training in the first year may be appealing to emerging adults with FEP since it would minimize the need for social interactions (McEntry et al., 2019). Third, clinicians may consider these cognitive domains when selecting medications as some have been shown to strengthen cognitive functioning in emerging adults with FEP in the first year (Karson et al., 2016). Olanzapine, an atypical anti-psychotic that blocks dopamine receptors in the mesolimbic system (associated with executive functions), may be one medication to consider for this purpose (Karson et al., 2016). However, side effects like weight gain should be monitored closely and more efficacious (i.e., better at reducing symptoms) atypical anti-psychotics like clozapine and individual needs should be considered (Haddad et al., 2012; Leucht et al., 2013; Meftah et al., 2020). Altogether, there are several possible options that early interventions can implement to help emerging adults with FEP compensate for struggles with verbal fluency and executive functioning so that they may have a greater chance of meeting their social and academic/occupational milestones.

While we advocate for emerging adults to meet their academic/occupational milestones, it is also essential to consider work/school-related stress and how early interventions can help navigate this stress and continue to support milestone attainment. Evidence suggests stress can precipitate future episodes of psychosis following onset (Colizzi et al., 2023; Martland et al., 2020). Unfortunately, at the same time, 27% of Canadian workers report being highly stressed daily (Crompton, 2011). Similarly, a 2019 report from the second American College Health Association-National College Health Assessment (ACHA-NCHA II) studying student habits at Canadian universities found that 46.2% of students experienced "more than average stress" in the

last year, and 14.4% indicated experiencing "tremendous stress" in the last year. As such, there is reason to be concerned that encouraging emerging adults with FEP to return to school or work may put them in a stressful environment that risks future psychotic episodes. It is therefore highly recommended that early intervention programs prepare emerging adults with stress management techniques before returning to school or work. It would also be beneficial to ensure emerging adults are set up with ongoing psychotherapy to help monitor and manage stress once they return to school or work. Moreover, providing emerging adults with the skills to advocate for their needs in the workplace may also help manage stress and prevent future episodes. Sometimes, clinicians may need to advocate for their clients to receive accommodations. According to Hines and Coman (2020), evidence-based accommodations early intervention programs can recommend for emerging adults with FEP entering or returning to their post-secondary studies can include:

- Access to an academic advisor to ensure a manageable course load.

- Being supplied with class notes or permission to audio record lectures.

- The option to make courses pass/fail.

- Adjustable deadlines.

- No penalty for absences.

- Private settings for tests.

- Limiting them to one exam or final evaluation per day at the end of term.

- Opportunities to re-take tests when underperforming or submit missed assignments due to becoming unwell.

Early interventions may also consider incorporating training to help emerging adults enter the workforce (Alvarez-Jimenez et al., 2021; McGurk et al., 2005). For example, a

randomized-control trial studied the benefits of adding a digital intervention (Horyzons) to treatment as usual for 170 individuals with FEP (mean age = 20.91 years) over the course of 18 months (Alvarez-Jimenez et al., 2021). A component of Horyzons is to address academic/occupational functioning by, for example, sharing information on preparing for a job interview or how to take advantage of one's strengths at work or school (Alvarez-Jimenez et al., 2021). At the end of 18 months, individuals enrolled in the Horyzons arm were 5.5 times more likely to be employed or in school compared to those engaging in treatment as usual (Alvarez-Jimenez et al., 2021). This study is an excellent example of how early interventions may incorporate training into their services that aim to help emerging adults with FEP enter the workforce and capitalize on their strengths while doing so.

Another type of occupational support early intervention programs may consider is the Individual Placement and Support (IPS) approach (Rinaldi et al., 2010). The IPS strategy aims to help individuals with long-term mental illness return to and sustain employment by working with them one-on-one to identify a job they feel fit for and quickly placing them in that role (Rinaldi et al., 2010). Clients are then trained in that role and provided with ongoing clinical support incorporated into their work and other vocational supports (Rinaldi et al., 2010). In a review by Rinaldi et al. (2010), they examined the education and employment rates found in randomized-control trials and naturalistic studies testing the IPS approach with individuals with FEP. Rinaldi et al. (2010) found that 29% of individuals with FEP returned to work or school using pre-vocational programs (i.e., training before entering the workforce). In comparison, 56% returned to work or school when enrolled in an IPS-like approach (Rinaldi et al., 2010). Moreover, on average, approximately 69% of youth with FEP returned to work or school using the IPS approach compared to only 35% when using traditional vocational programs (Rinaldi et al.,

2010). Furthermore, a meta-analysis by Modini et al. (2016) investigated the success rate of the IPS approach for people with severe mental illness, including individuals with FEP, globally. Modini et al. (2016) found that people with severe mental illness in the IPS approach were two times more likely to gain employment compared to people with severe mental illness in traditional vocational services. Modini et al. (2016) also found that the IPS approach was effective globally, including in Canada, regardless of socio-economic class. Moreover, in a randomized-control trial, Killackey et al. (2008) sought to compare specific work-related outcomes (e.g., hours worked per week, number of jobs acquired, length of employment) amongst 20 people with FEP receiving the IPS approach (mean age = 21.29 years) and 21 receiving treatment-as-usual (mean age = 21.42 years). After six months, Killackey et al. (2008) found that compared to the treatment-as-usual group, the IPS approach resulted in significantly more participants being employed (13 participants vs. 2), a greater number of hours worked (median 38 hours vs. 22.5) and longer employments (median five weeks vs. 0). As such, early intervention services may benefit from adopting the IPS approach to help emerging adults with FEP meet their educational/occupational milestones.

A third approach that may be considered comes from the Recovery After an Initial Schizophrenia Episode's Early Treatment Program (RAISE-ETP) project NAVIGATE (Kane et al., 2016; Mueser et al., 2015). NAVIGATE is a multi-intervention, strengths-based FEP program in which a small interdisciplinary team (~5 people) collaborates with youths with FEP and their families to meet clinical and personal goals (Mueser et al., 2015). The roles on a NAVIGATE team include the medication provider to manage pharmacological treatment, two master's-level clinicians to provide psychotherapy, a bachelor's-level supported employment and education specialist to help with returning to work or school and a master's-level director tasked

with coordinating and supervising all NAVIGATE teams (Mueser et al., 2015). NAVIGATE provides four types of intervention: family education programming, individual resiliency training, individualized medication treatment and supported employment and education (SEE) (Mueser et al., 2015). Kane et al. (2016) completed a multi-site, randomized-control trial comparing NAVIGATE to treatment as usual in the United States with 404 individuals with FEP over two years (mean age = 23 years). Their study showed that participants in NAVIGATE spent significantly more time in work and school than those in treatment as usual and that these benefits were sustained over two years (Kane et al., 2016). These results were echoed in other studies by Humensky et al. (2017) and Rosenheck et al. (2017). Notably, despite being more effective than treatment as usual, a cost-effectiveness analysis by Rosenheck et al. (2016) demonstrated that such a comprehensive treatment is, indeed, more expensive. Nonetheless, early interventions may wish to incorporate or adapt from the NAVIGATE approach to help emerging adults with FEP meet their educational/occupational milestones.

A fourth evidence-based option that may help emerging adults on their academic and occupational journeys is the Specialized Treatment Early in Psychosis (STEP) program (Srihari et al., 2015). Like other early intervention programs, the STEP program provides youths with FEP with a range of treatment options (e.g., psychotropic medication, family education, cognitive-behavioural therapy, and case management) (Srihari et al., 2015). However, critically, the STEP program's case management concentrates on connecting and coordinating with community-based vocational services and post-secondary institutions to support youths with FEP in transitioning to work or school (Srihari et al., 2009; Srihari et al., 2015). Srihari et at. (2015) conducted a randomized control trial comparing the clinical and functional outcomes of 120 individuals with FEP after one year of receiving the STEP program ($n = 60$; mean age = 22.40

years) or treatment as usual (n = 57; mean age = 22.60 years). Their study showed that participants involved in the STEP had significantly higher rates of engagement in school or employment one year into treatment than those in the treatment-as-usual arm (Srihari et al., 2015). In particular, 91.7% of STEP program participants were engaged in school or work compared to only 66.7% of treatment-as-usual participants (Srihari et al., 2015). Furthermore, Srihari et al. (2015) found that STEP program participants were less likely to leave work prematurely (8%) compared to treatment-as-usual participants (33%). Altogether, to help emerging adults with FEP meet their educational/occupational milestones while minimizing the risk of stress-induced future episodes, early intervention services may wish to consider replicating, adapting or incorporating elements of any of the above evidence-based vocational programs.

It is essential also to consider that not participating in work or school can potentially be more stressful and that symptoms and successful employment can coexist (Lepage et al., 2014). For instance, a longitudinal study of recovery five years after the onset of psychosis found that 26% of 76 individuals with FEP (mean age = 25 years) were stably employed while experiencing positive symptoms (Albert et al., 2011). Returning to work or school is also crucial since it offers emerging adults with FEP an environment to establish friendships and other meaningful relationships, which dovetails nicely with their interpersonal milestone (Ajnakina et al., 2021; Rinaldi et al., 2010; Shinn et al., 2020). Altogether, while clinicians must continue to be wary of the detrimental effects of work-related stress, early interventions can help emerging adults successfully navigate this stress and thus support them in meeting their educational/occupational milestones and, by extension, their interpersonal milestones.

Limitations

Several limitations need to be accounted for when interpreting this study's results. First, our small (n=41), predominantly white (97.6%), and male (80.5%) sample can limit the generalizability of our results. It is not unexpected that our sample of 18–25-year-olds would be predominately male, given research suggesting that, on average, the onset of psychosis occurs 3-4 years earlier for men than women (Häfner et al., 1998). However, research on the relationship between gender and cognitive functioning among people with SSDs and FEP is mixed, with several studies suggesting no significant differences between genders around the time of the first episode (Mendrek & Mancini-Marïe, 2016; Ochoa et al., 2012; Vila-Badia et al., 2020). It is perhaps then unlikely that our mostly male sample influenced our study's cognitive findings. Still, a meta-analysis of 30 studies examining gender differences among individuals with FEP found that men typically experience more severe negative symptoms and lower functioning compared to women (Carter et al., 2022). This gender-based difference may have influenced our findings. For instance, if our sample had more women, our predictors (like baseline negative symptoms) may not have predicted the various areas of QoL since women would be expected to have less impactful negative symptoms and better overall QoL.

The composition of diagnoses in our sample may have also influenced our findings. For example, while both individuals with bipolar disorder and SSDs perform below the general population across cognitive domains, several studies suggest that individuals with bipolar disorder typically experience less severe deficits compared to individuals with SSDs and FEP (Bora et al., 2024; Daban et al., 2006; Krabbendam et al., 2005; Schretlen et al., 2007; Szmulewicz et al., 2018; Trisha et al., 2018). For example, Bora et al. (2024) found in their study that individuals with first-episode bipolar disorder (n=55; mean age = 21.3 years) performed significantly better than individuals with FEP (n=64; mean age = 21.3 years) in domains of

verbal and visual memory, processing speed, and executive functioning. Given that approximately 24% of our sample were diagnosed with a bipolar disorder, it is therefore possible that their relatively better executive functioning and processing speed (which, as described above, may underly verbal fluency) explains our sample's apparent strengths in executive functioning and phonemic fluency. In other words, despite the suggestion that they should be included in the schizophrenia spectrum, by including individuals with bipolar disorder, the cognitive functioning of our sample may have appeared better than expected and, therefore, limited our understanding of the strengths of emerging adults with just FEP. It should also be noted that when studies have compared the QoL of individuals with bipolar disorder and SSDs, the findings have been mixed regardless of the state of symptoms (Atkinson et al., 1997; Brissos et al., 2008; Çelik et al., 2022; Latalova et al., 2011; Sum et al., 2015). Unfortunately, this limits the ability to infer how differences in the QoL across diagnoses in our sample may have contributed to our findings.

Within the conventional schizophrenia spectrum, differences also exist between diagnoses, which may have impacted our findings. For example, a meta-analysis of 31 studies comparing the cognitive functioning between diagnoses along the schizophrenia spectrum found that individuals with schizoaffective disorder (n=1685) experienced less severe cognitive deficits than individuals with schizophrenia (n=3357) (Lynham et al., 2022). Similarly, another study found that the cognitive functioning of individuals with substance-induced psychosis (n=13, mean age = 20.5 years) also experienced less severe deficits relative to participants with schizophrenia (n=52, mean age = 19.2 years) (Fitzgerald et al., 2004). Together, participants with schizoaffective disorder and substance-induced psychosis comprised approximately 27% of our sample, which is very comparable to our number of participants with schizophrenia (26.8%). As

a result, like with bipolar disorders, the inclusion of schizoaffective disorders and substance-induced psychosis may contribute to our sample's unexpectedly higher scores on measures of executive functioning and verbal fluency. Therefore, by including all SSDs in our sample, caution should be taken when generalizing the results to all emerging adults with FEP.

With regard to our procedures, many participants who received cognitive testing were selected for their interest in returning to work or school, which may have filtered out emerging adults who were struggling with their cognitive functioning and suggests our sample may be biased towards higher functioning. Furthermore, as a naturalistic study, though it is a strength to examine services as they are typically delivered in a clinical setting, the procedures were also not controlled (e.g., cognitive testing was not performed at the same time relative to program enrolment for each participant) and suggests the results should still be interpreted cautiously. Relatedly, our cognitive data was collected using dated measures (e.g., WAIS-III and WRAT-III) that perhaps did not precisely capture the intended cognitive domains as well as a more updated version, which may have influenced our findings and selection of clusters. Similarly, subscales of the QLS, such as Interpersonal Relationships, are not perfect proxies of milestones like establishing social connections, which limits forming accurate interpretations.

With regard to the analyses, the large number of regressions tested risks Type I error and suggests some results may be artifacts of the data. In addition, though mentioned above, it should be emphasized that our small sample size and high attrition rate may have underpowered our analyses risking Type II error, particularly between variables in the second year. Lastly, because we could not proceed with assessing generalized linear mixed models, we cannot identify or comment on longitudinal patterns in the data.

Future Directions

Following an EDA framework, this study intends to provide several possible avenues for future confirmatory data analytic research. First, future studies should directly compare the cognitive functioning, symptomatology and QoL of emerging adults to adolescents, young adults and adults with FEP to confirm these groups' similarities and differences. For example, a study may seek to confirm if executive functioning predicts productivity QoL in the first year of treatment in both emerging adults and young adults with FEP. This research, likely requiring mediational analysis, could inform early interventions on how to best support different age groups in meeting their academic/occupational milestones. To more effectively compare these age groups by their schizophrenia-spectrum diagnoses, these studies would need to account for the diagnostic uncertainty associated with younger age groups with psychosis. Researchers may consider waiting to use a participant's final diagnosis provided at the end of programming.

Among emerging adults with FEP, future longitudinal studies may consider examining the factors that predict functioning and QoL at specific intervals (e.g., one, two and three years following onset). For instance, while our study shows that executive functioning and letter fluency domains predict productivity QoL one year into treatment, perhaps another cognitive domain predicts productivity QoL two and three years into treatment. Illuminating this timeline and trajectory may help determine when specific domains may serve best as assets for emerging adults with FEP and guide resource allocation and intervention planning to help them meet their milestones. For example, by examining these domains at select intervals during treatment, researchers may be able to understand how these domains mediate or moderate responses to different therapies or the uptake of specific skills. This knowledge could then inform treatment plans in order to maximize the therapeutic benefits and subsequently support milestone attainment. Furthermore, considering participants did not receive cognitive testing at a set time in

our study, examining the predictive power of executive functioning and verbal fluency at onset and other precise intervals on later functioning would help confirm when these domains are the strongest assets to emerging adults with FEP. This avenue of research would be beneficial given the current literature on the impact of baseline cognitive functioning on future functioning, which has been fraught with methodological issues (Allott et al., 2011).

Future research should also probe other cognitive domains not tested in this study. These other domains could potentially be assets for emerging adults with FEP and, therefore, should be capitalized on to help them meet their milestones. For example, it may be worth investigating non-declarative memory since it has been shown to be less impaired among people with schizophrenia-spectrum disorders (Reichenberg & Harvey, 2007; Schérer et al., 2003). Assets outside of cognitive functioning should be considered as well. For example, examining the relationship between specific aspects of psychological QoL (e.g., empathy) and future functioning (e.g., social functioning) may be worthwhile, as empathy has been shown to be less impaired in individuals with FEP compared to those with chronic schizophrenia (Achim et al., 2011). Identifying assets may depend on how they are operationalized in each study. For example, empathy might be defined as Theory of Mind, which has been shown to predict social functioning in people with FEP (Pennou et al., 2021). Furthermore, given that positive symptoms did not predict any area of QoL in the first year, potential moderating or mediating variables that may be assets preventing these baseline symptoms from harming QoL in the first year should be studied. Some literature indicates that the severity of positive symptoms eventually does negatively impact QoL in later years, suggesting the first year may be a unique protected period that may serve to be clinically important (Addington & Addington, 1999; Addington et al., 2005; Hofer et al., 2005; Thorup et al., 2010). Once assets are more firmly established, it may also be

valuable to examine if they are context-specific (i.e., if a strength only protects against the risks posed by FEP or against risks from other possible challenges) and how demographic variables may be related to specific assets.

Moreover, given the growing evidence (e.g., Hopkins et al., 2020; Meredith, 2017; Nguyen et al., 2022; Peck, 2020) suggesting individuals with FEP are receptive to and perceive benefits from peer support work (i.e., service providers with lived-experience of the condition or situation the client is experiencing), future research may wish to explore if this type of service may help facilitate interpersonal, academic and occupational milestones. For example, it may be worth examining if social skills training provided by trained peer support workers is more effective at improving the social functioning of emerging adults than when provided by psychotherapists (Breitborde et al., 2019). Ultimately, any of these lines of research would improve our understanding of the developmental needs and assets of emerging adults with FEP.

Conclusions

This study advanced our understanding of FEP by examining this condition through both developmental and strengths-based lenses. By focusing on emerging adulthood, this study was able to take into account the key psychosocial and neurocognitive milestones of this period that are critical for future outcomes. Recognizing that FEP can severely disrupt reaching these milestones and thus thwart successful outcomes presented a clear need to explore how early intervention programs can help emerging adults with FEP meet their milestones. To address this need, this study examined how emerging adults with FEP are consistent and inconsistent with the wider FEP literature using data on their cognitive functioning, symptomatology, and QoL. Generally, emerging adults with FEP appear to align well with the available FEP literature describing the first two years following psychosis onset. However, the absence of a relationship

between baseline negative symptoms and productivity QoL one year into treatment distinguishes emerging adults from the FEP population reported on in the literature. This first step contributed to learning how emerging adults with FEP are similar to and distinct from others with FEP. This step was crucial for supplying early intervention programs with evidence directly applicable to individuals 18-25 years old with FEP so that they may tailor their services to help meet emerging adults' milestones.

Examining this sample through a strengths-based lens was the second approach taken in this study in an effort to address the need to help emerging adults with FEP meet their milestones. To the author's knowledge, this is the first time Resiliency Theory has been applied to individuals with FEP. Emerging adults in our sample seemed to possess cognitive strengths in executive functioning and letter fluency, which may protect them primarily from risks to their academic and occupational milestones imposed by FEP in the first year. This second step contributes to the ongoing literature on cognitive strengths in individuals with FEP (e.g., Allott et al., 2020; Bryce et al., 2022; Steele et al., 2021) and may aid early interventions with supporting emerging adults with milestone attainment by infusing these strengths into assessment and capitalizing on them in treatment. We hope this study also contributes to widening researchers' and clinicians' perspectives of individuals with FEP beyond their deficits and symptoms. Given the nature and limitations of this exploratory naturalistic study, there are many avenues for future confirmatory research to elevate our understanding of FEP and strengths in emerging adults as it relates to milestone attainment. Specifically, it is recommended that researchers delve deeper into the assets identified here and other possible strengths to help this group meet their milestones. Ultimately, it is the hope that this study contributed to building towards

developmentally-informed, strengths-based early interventions so that emerging adults with FEP

can meet their milestones and follow a prosperous and fulfilling trajectory.

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Appendix A

Glossary of Terms Used in Dissertation

Schizophrenia-Spectrum Disorder (SSD) – A severe mental illness characterized by experiencing positive symptoms, negative symptoms, disorganized thinking, and/or disorganized behaviour.

Positive Symptoms – Symptoms that add onto or distort a person's experience of reality (i.e., delusions and/or hallucinations).

Delusions – Firm beliefs that endure despite conflicting evidence.

Hallucinations – Involuntary stimulation of one or more of the senses without any actual external stimulus.

Negative Symptoms – Symptoms that detract from or diminish a person's experience of reality (i.e., diminished affect, alogia, avolition, asociality, and anhedonia)

Diminished Affect - Stunted verbal and non-verbal displays of emotion such as eye contact, facial expression, hand and head motions and speaking pace.

Alogia - The use of minimal words when speaking.

Avolition – Lacking motivation or drive.

Asociality – Reduced interest in socializing and interacting with others

Anhedonia – Struggling to feel pleasure from one's environment and activities.

First-Episode Psychosis (FEP) – The clear onset of a schizophrenia-spectrum disorder in which psychotic symptoms are most severe, cognitive difficulties becomes most apparent, and functional challenges peak.

Prodromal Phase – A period characterized by a departure from one's typical behaviour and functioning alongside the emergence of broad, indistinct symptoms that become more distinct and escalate until the first episode.

Premorbid Phase – The period before any symptoms are present.

Emerging Adulthood – Individuals between the ages of 18 and 25 years-old living in modern and industrialized areas.

Executive Functioning – A cognitive domain that coordinates input from the environment, the body, and other cognitive domains (e.g., attention, working memory, set-shifting) to enable people to strategize, think abstractly, problem-solve, multi-task, adjust to changes, regulate behaviour, and follow procedures.

Verbal Fluency – The efficiency with which one produces words.

Letter (Phonemic) Fluency – The efficiency with which one produces words based beginning with a specific letter.

Categorical (Semantic) Fluency – The efficiency with which one produces words based on a specific category (e.g., Animals).

Quality of Life Scale: Interpersonal Relations Subscale (Social QoL) – The quality of one's social experience including the frequency of their social participation, the depth of their engagement with others, and tendencies when interacting with people.

Quality of Life Scale: Instrumental Role Subscale (Productivity QoL) – The quality of one's occupational functioning including their level of achievement and fulfillment from their work.

Quality of Life Scale: Intrapsychic Foundations Subscale (Psychological QoL) – The quality of one's psychologica status including their motivation, curiosity, volition, empathy, sense of enjoyment, and emotional capacity.

Resiliency Theory – A strengths-based conceptual framework used for conceptualizing youth development that seeks to identify what strengths a youth has, in terms of the promotive factors (i.e., assets and resources), that help towards healthy development when exposed to risk factors that could lead to adverse outcomes.

Risk Factors – Anything a youth may be exposed to or engage in that can lead to harmful or adverse outcomes or trajectories.

Promotive Factors – Anything that helps a youth minimize, evade or eliminate the negative consequences of exposure to a risk factor.

Assets – Characteristics within an individual, such as motivation, that allow them to manage risk exposures.

Resources (in the context of Resiliency Theory) – External sources of support, such as family support, that assist an individual with managing risk exposures.

Appendix B

Samples of Plots from the Selected Clusters during the Data Visualization Stage
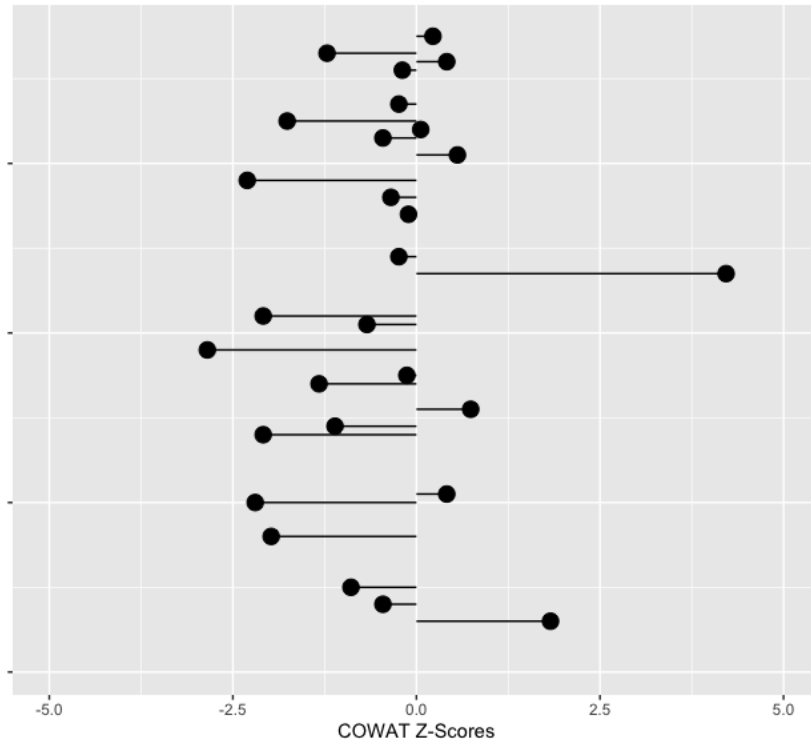
Figure B1

Executive Functioning Cluster Visualization
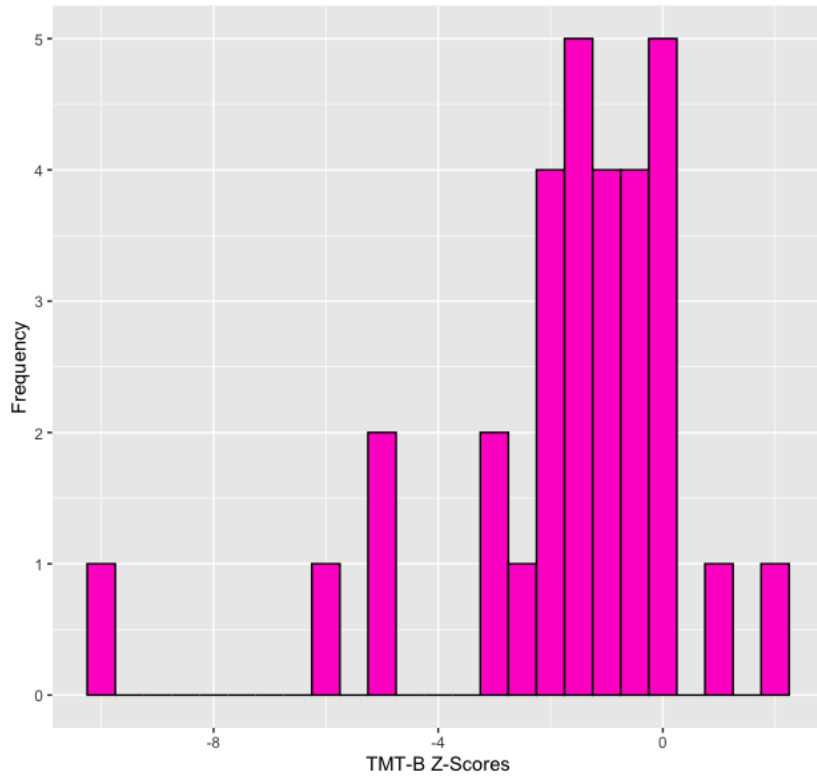
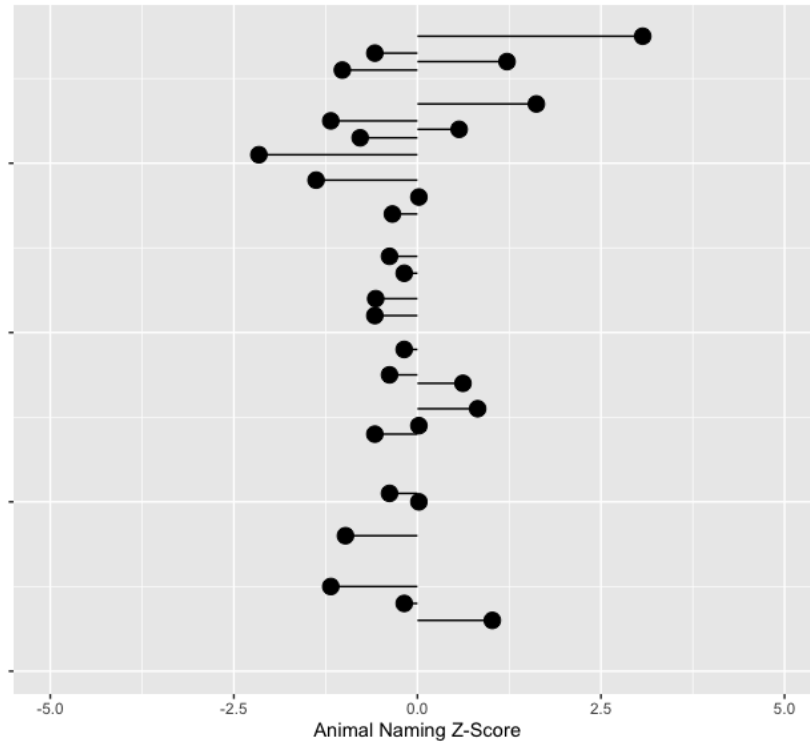*Note.* TMT-B = Trails Making Test B.

Figure B2

Verbal Fluency Cluster Visualization – Letter (Phonemic) Fluency

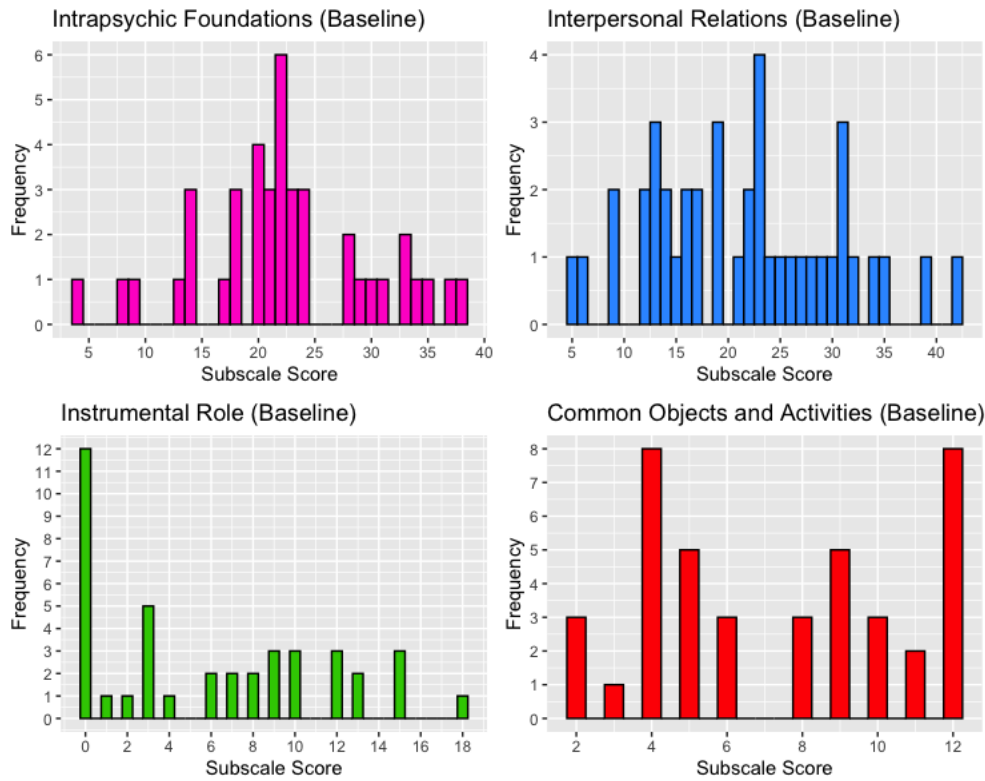*Note.* COWAT = Controlled Oral Word Association Test.

Figure B3

*Verbal Fluency Cluster Visualization – Categorical (Semantic) Fluency*

Figure B4

Baseline Psychological Quality of Life Cluster Visualization

Note. On the Quality of Life Scale, the Intrapsychic Foundations subscale (scale range 0-42) was used to approximate psychological QoL. The Interpersonal Relations subscale (scale range 0-48) was used to approximated social QoL. The Instrumental Role subscale (scale range 0-24) was used to approximate productivity QoL. The Common Objects and Activities subscale ranges from 0-12. Higher scores indicate grater QoL. QoL = Quality of Life.

Figure B5

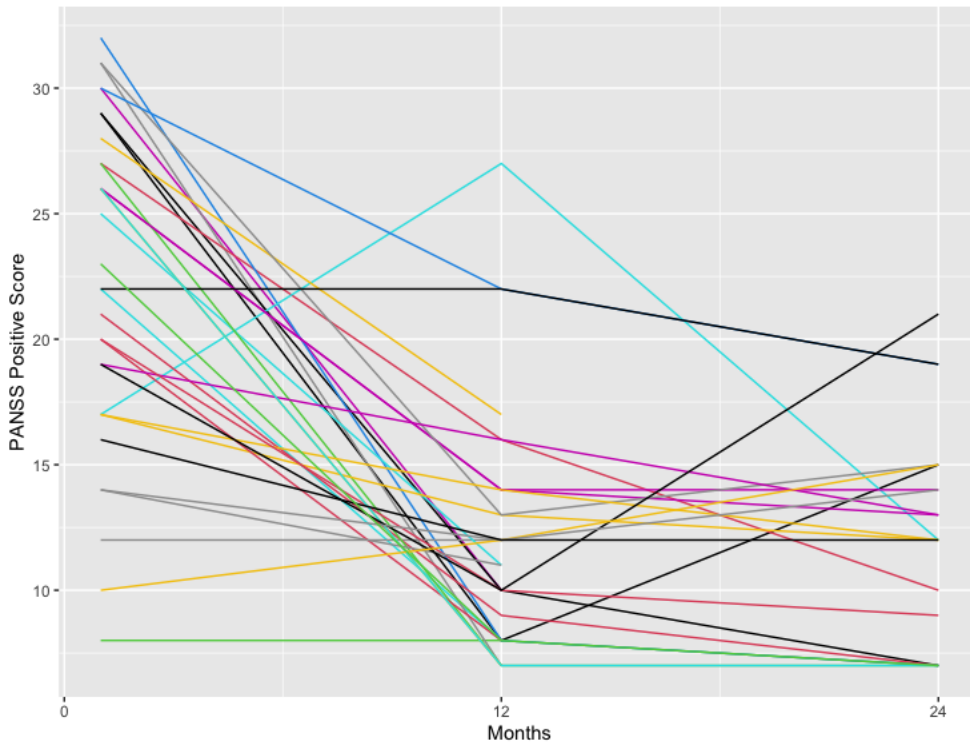*First Year Symptoms Cluster Visualization – PANSS Total Score*
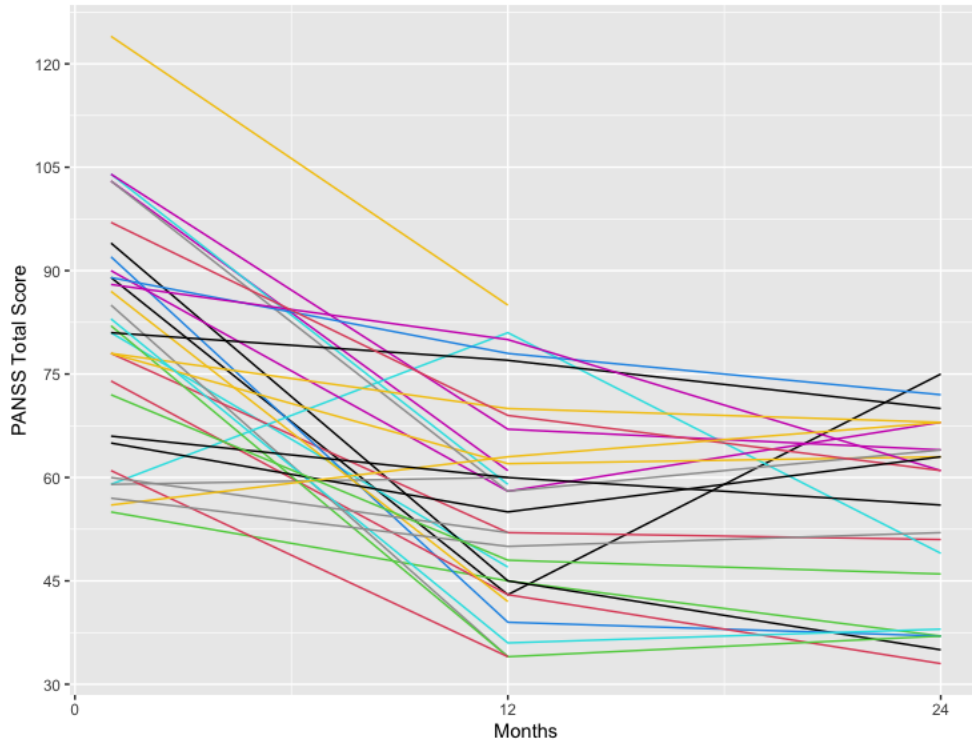
Note. PANSS Total Scale ranges from 30-210. Higher scores indicate more severe symptoms.

PANSS = Positive and Negative Syndrome Scale.

Figure B6

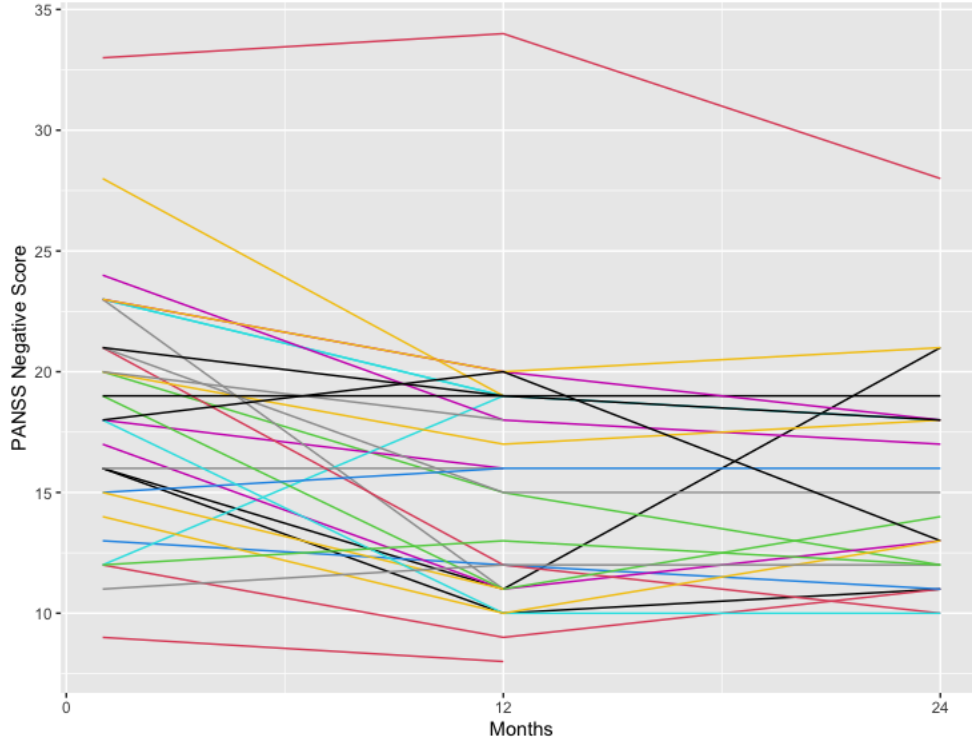*First Year Symptoms Cluster Visualization – PANSS Positive Symptoms*

Note. PANSS Positive Scale ranges from 7-49. Higher scores indicate more severe positive

symptoms. PANSS = Positive and Negative Syndrome Scale.

Figure B7

First Year Symptoms Cluster Visualization – PANSS Negative Symptoms

Note. PANSS Negative Scale ranges from 7-49. Higher scores indicate more severe negative

symptoms. PANSS = Positive and Negative Syndrome Scale.