SCHIZOPHRENIA, NARRATIVE, AND NEUROCOGNITIVE PROCESSES

A dissertation submitted
to Kent State University in partial
fulfillment of the requirements for the
degree of Doctor of Philosophy

by
Aubrey M. Moe, Ph.D.

August, 2015
© Copyright
All rights reserved
Except for previously published material
Dissertation written by

Aubrey M. Moe

B.A., University of California, Irvine, 2008

M.A., Kent State University, 2012

Ph.D., Kent State University, 2015

Approved by

_____________________________
Nancy Docherty, Ph.D., Committee Chair, Psychological Sciences, Doctoral Advisor

_____________________________
Jeffrey Ciesla, Ph.D., Departmental Committee Member, Psychological Sciences

_____________________________
Jocelyn Folk, Ph.D., Departmental Committee Member, Psychological Sciences

_____________________________
Mark Bracher, Ph.D., Outside Committee Member, English

_____________________________
Vera Camden, Ph.D., Graduate Representative, English

Accepted by

_____________________________
Maria Zaragoza, Ph.D., Chair, Department of Psychological Sciences

_____________________________
James L. Blank, Ph.D., Dean, College of Arts and Sciences
TABLE OF CONTENTS

LIST OF TABLES......................................................................................................................v

LIST OF FIGURES...................................................................................................................vi

CHAPTER

I  INTRODUCTION..................................................................................................................1

II  METHODS...........................................................................................................................36

III  RESULTS..........................................................................................................................49

IV  DISCUSSION......................................................................................................................55

REFERENCES.........................................................................................................................67
LIST OF TABLES

Table 1. Group Demographics, Symptoms, and Functioning ............................................. 86

Table 2. Narrative Development, Neurocognition, and Social Functioning Variable Descriptives ............................................................... 87

Table 3. Pearson Correlation Matrix for the Narrative Development Variables – All Participants ................................................................. 88

Table 4. Pearson Correlation Matrix for the Narrative Development Variables – Schizophrenia Group ........................................................................ 89

Table 5. Pearson Correlation Matrix for the Narrative Development Variables – Control Group .............................................................................. 90

Table 6. Pearson Correlations for Narrative Development, Neurocognitive, and Social Functioning Variables in the Schizophrenia Group ...................... 91
LIST OF FIGURES

Figure 1. First Mediational Bootstrapping Analysis for Narrative Development ..........92
Figure 2. Second Mediational Bootstrapping Analysis for Narrative Development.................................................................93
CHAPTER 1
INTRODUCTION

Schizophrenia, as currently recognized and conceptualized, is a remarkably heterogeneous disorder characterized by variable manifestations of course, symptom presentation, and outcome (Keshevan, Nasrallah, & Tandon, 2011). In order to better understand the disorder, an increasing number of schizophrenia researchers have begun to focus on more experiential aspects of the disorder, with a specific emphasis on understanding the subjective experiences of patients. In particular, a disruption in sense of self has been investigated as a potentially core feature of schizophrenic pathology (Nelson et al., 2009). Impairments in self-awareness, diminished ability to engage in self-reflection, and disruptions to the experience of self have been historically recognized as important features of schizophrenia (Sass & Parnas, 2003). Additionally, representation of self over time (D’Ambargeau, 2008) and personal narrative (Lyasker, Wickett & Davis, 2005) have more recently been shown to be impaired in patients living with the disorder. Personal narratives are understood to be the “stories” people tell themselves in order to organize their experiences within a meaningful context, and the formation of these personal stories is thought to ultimately be related to the structure and foundations of personal identity – that is, their sense of self (Lysaker, Wickett, Campbell & Buck, 2003; Raffard et al., 2010).

It has been observed that schizophrenia patients demonstrate a significant attenuation in their abilities to completely and coherently narrate their life stories (Lyasker, Wickett & Davis, 2005), with evidence that problems with personal narrative and identity begin in the prodromal
stages of the illness (Hartmann et al., 1984; Nelson et al., 2009). In fact, some researchers feel that difficulties in formation of personal narrative are a fundamental representation of the thought disorder associated with schizophrenic illness (Roe & Davidson, 2005). However, the mechanisms that contribute to deficient narrative in schizophrenia patients are not well understood. Prominent theories of consciousness, cognition, and self (Damasio, 1999 & 2010; Damasio & Meyer, 2009; Sass & Parnas, 2003) form a foundation for understanding the general development of self and narrative identity, and also indicate factors that may contribute to impairments in schizophrenia. Specifically, deficits in neurocognitive functioning associated with schizophrenia may contribute to diminished personal narrative (Gallagher, 2003). These deficiencies involve problems with executive functioning, working memory, and other cognitive domains that may influence one’s ability to attend to important information, integrate this information temporally, and ultimately form a coherent account of one’s experience. Integrating theoretical understanding and empirical studies of self, schizophrenia, and relevant neurocognitive functions within the context of personal narrative is important to improving our understanding of the disorder. Further, given the recent therapeutic application of models of personal narrative and recovery in schizophrenia, research in this area may aid in identifying appropriate targets for psychosocial intervention. The current study will examine relationships between neurocognition, personal narrative, and social functioning in a sample of clinically-stable schizophrenia outpatients and healthy, non-psychiatric controls. The introduction will first define narrative, and review relevant theories of self, consciousness, and schizophrenia. Next, a review of the literature pertaining to narrative and neurocognition in schizophrenia will be provided.

**Defining Narrative**
Narrative, derived from the Latin word narrare (“to tell”) and related to gnarus (“knowing”), refers most basically to the temporally-based sequencing of two or more real or imagined events (McCabe, 1991, p. ix). As this concept applies to our personal lives, narrative describes the way we experience, interpret, and ultimately integrate our experiences into a coherent story of our lives. The development of personal narrative is a crucial process for human existence – it is through narrative that we remember personal experiences, and ultimately how we connect these experiences in a way that allows us to make sense of them (Gee, 1985). From a more social perspective, personal narrative serves a communicative purpose in allowing us to understand and present ourselves to others in a multitude of ways: as a hero, a victim, a survivor, or in any other way we choose (McCabe, 1991).

The development of personal narrative is both a natural and constructive process. That is, human development, culture, and the biological life process provide some inherent structure to an individual’s life (e.g., progressing from being a child to being an adult, rites of passage in given religions or cultures, birth and dying, etc.) (Brunner, 1999). Our biological proclivity to develop and use language is also a major contributor to the development of our personal stories (Dennet, 1988; Gallagher, 2003). However, it is ultimately the task of the individual to configure this general structure, personal experiences, and memories into a coherent and individualized personal narrative (Phillips, 2003). In large part, this configuration involves encoding and integrating memories of past experiences in a meaningful way – a process that also depends heavily on the ability to remember these memories at a level of consciousness amenable to this operation (Conway 2000; Tulving, 1985). Personal narrative is also related to how individuals strive to understand themselves as distinctive, unique entities or selves, and also how an individual creates a sense of self across time (D’Argembeau, Raffard, & Van der Linden, 1998).
However, personal narrative is not composed only of an aggregate of an individual’s memories, but is instead based on a selective collection of personal memories and life events (Raffard et al., 2010). As defined by Robinson & Taylor (1998), a personal narrative is composed of “a set of temporally and thematically organized salient experiences and concerns that constitute one’s identity. These autobiographical memories are private and uniquely your own and by examining [personal] narrative, we gain access to individual’s constructions of their own identity” (p. 126). Personal narrative is then the product of a reflective process that involves both autobiographical memories and an individual’s sense of self more broadly – that is, a process involving perceived connections between past experiences and the self. This process of “meaning-making” (Thorne, McLeane, & Lawrence, 2004), or garnering meaning from memories by distilling relevant information about the self from them, allows us to integrate important events and life lessons into a personal story that we can then generalize to similar events we may experience in the future (Raffard et al., 2010). Thus, the way in which memories and events are selected and subsequently integrated into a personal narrative will influence not only our recollection of the past, but also the way we experience the future - as eloquently stated by Martin (as cited in McCabe, 1991, p. ix), “we are the stories we tell [ourselves].”

Finally, the development of personal narrative is viewed as an ongoing, life-long process. From a developmental perspective, a great deal of the formation of identity, self, and therefore personal narrative is of course achieved in childhood and adolescence (Thorne et al., 2004). Yet given the constructive and reflective processes involved in the formation of personal narrative, it is a task that is never truly completed. Carr (1986) posits that an individual’s entire life is a narrative, and that personal narrative is then a “constant task, sometimes a struggle,” and an achievement for which we strive. In fact, it’s possible that the only true end to personal narrative
comes at the time of one’s death – an ending that would then be “unique in that it is anticipated but not available for retrospective reflection,” in any personal sense (Philips, 2003, p. 327).

**Narrative and Self: Theoretical Underpinnings**

In order to more completely conceptualize personal narrative, it is beneficial to explore relevant theories of consciousness and self. In recent years, researchers from the cognitive and neuroscience domains have begun to investigate psychopathology in terms of its phenomenological aspects – including self and personal narrative. While the subjective components of psychological disorders have classically been addressed from more philosophical perspectives, there is movement towards unifying these areas of research to better understand the neurological processes and cortical structures implicated in subjective experience. Of particular interest to the present review is the phenomenon of consciousness, and how it theoretically contributes to the experience of self, which will be discussed from a neuroscience perspective. Next, consciousness as it applies to schizophrenia and the self will be explored. Finally, these theories will be reviewed within the context of personal narrative in schizophrenia.

**Consciousness: Neuroscience and Phenomenology.**

Just as discussion of the self is critical to understanding personal narrative, understanding of consciousness is critical to understanding the self – and defining consciousness becomes a demanding task in and of itself. In the International Dictionary of Psychology, Sutherland (1995) describes consciousness as “impossible to define except in terms that are unintelligible without a grasp of what consciousness means... Nothing worth reading has been written about it.” Nevertheless, Damasio & Meyer (2009) offer a helpful working definition of consciousness: “[consciousness is] a momentary creation of neural patterns which describe a relation between the organism, on the one hand, and an object or event, on the other,” (p. 6). For the purpose of
the present study, the defining components of consciousness based on subjective experience are of more central importance. According to Damasio (1999; 2010), central to the conceptualization of consciousness – and the accompanying experience of self - is the notion that the body and brain serve as the foundation of the conscious mind. However, studying how the phenomenon of consciousness is created in the mind is extremely difficult, due in no small part to the fact that both consciousness and self are abstract concepts (Bucci, 2002; Sass & Parnas, 2003). Beyond that, our experience of consciousness begins in the way we fundamentally experience the world. Damasio (2010) recognizes consciousness as developing in three nested levels. At the lower levels, we experience, react to, and interpret basic sensory stimuli. These experiences create so-called “primordial feelings” that arise directly from sensory experience (Damasio, 2010) that represent the foundation upon which more complex emotions take place (Panksepp, 1998). The subsequent level of consciousness – known as the core-self – involves “feeling our feelings” (Bosse, Jonker, & Treur, 2008, p. 95), or actually experiencing emotions in response to internal or external stimuli (e.g., happiness, sadness, fear). Additionally, the core-self level of consciousness involves the experience of basic self-awareness that allows for a sense of ownership over our experiences – or, as Damasio would say, this the stage at which “self comes to mind,” for the first time (1999).

At the highest level according to Damasio’s theory (1999, 2010) – and of more relevance to the present study – is autobiographical consciousness. Within this theoretical framework, construction of autobiographical self first requires that substantial groups of defining biographical memories are arranged together in a way that allows them to be treated by the mind as an individual entity (Damasio, 2010). Theoretically, a coordinating mechanism organizes these memories on the basis of their value to the organism, with value assigned on either the
basis of biology (e.g., survival motivations), learning over one’s lifetime, or emotions (Damasio & Grabowski et al., 2000; Watt, 2000). This “stamp of value” is added at the time of the original perception, but is also revived each time the memory is recalled (Damasio, 2010). While it is likely that a variety of brain regions contribute to the process of coordinating autobiographical memories, the posteromedial cortices seem to be particularly involved (PMC; Damasio, 2010). The PMC is comprised of components of the posterior cingulate cortex, the retrosplenial cortex, and the precuneus, though as a single entity the PMC has not yet been studied beyond establishing connectivity between the component regions (Damasio, 2010; Maddock, 1999).

From these limited findings, Damasio (2010) theorizes that the PMC contributes to the formation of consciousness by allowing relevant memories to congregate and interact in a way that creates a sense of self across time. This process is hypothetically accomplished by the PMC being able to access diverse memories of different organism-object interactions related to a personal experience from the brain regions in which they were originally mapped, and then to integrate them in a way that creates a momentary display of knowledge with all memories pieced together in a temporally coherent way (Damasio, 2010). From this process springs our ability to piece together different parts of our experiences into a cohesive entity – or, stated differently, into a personal narrative.

It is also important to further explore the relationship of, and differences between, the core and autobiographical selves. The process of coordination and valence evaluation performed by the autobiographical self differentiates it from the core self, but the two constructs are clearly related. According to Damasio’s (2010) hierarchical structure of consciousness discussed previously, the autobiographical self depends upon the proper functioning of the core self. However, disruptions in autobiographical self can be observed when the core self is otherwise
intact. For example, in some cases of amnesia individuals experience a loss or disruption of memories related to personal experiences from the past, their plans for the future, or even the ability to form new memories (American Psychiatric Association [DSM-IV], 2000; Damasio, 2010). These patients may display typical consciousness in general interactions, yet be entirely unable to conjure their personal biographies. This may occur due to the autobiographical information being lacking in general, not being accessible to recall, or due to some faulty coordination from the level of the core self to the autobiographical self (Damasio, 2010). Though the etiology may be variable, such cases of amnesia provide examples of individuals with relatively intact core selves, but impaired or lacking autobiographical selves. Lack of insight into illness, clinically referred to as anosognosia, is also of interest. In cases of patients with anosognosia, there seems to be a failure to integrate information about their condition or disorder into the ongoing stories of their lives (Rickelman, 2004). For example, some patients who experience paralysis of the arm following unilateral strokes to the right hemisphere will continue to try to move the affected limb despite being informed of their condition and despite numerous failed attempts to move the arm themselves (Damasio, 2010; Orfei et al., 2007). In these cases, there seems to be a disruption of the coordinating mechanism of the autobiographical self in allowing the patients to appropriately integrate information and sensory feedback into their representations of themselves over time. The compromised state of autobiographical self in these patients is then logically related to lack of insight and problems with motivation for treatment more generally.

Self and Schizophrenia: Sass & Parnas

_IPSEITY DISTURBANCE MODEL_
Self, and how the experience of the self may be distorted, has been specifically explored in schizophrenia. One of the most prominent theories about self in schizophrenia is Sass & Parnas’ ipseity disturbance model (2003). The term ipseity comes from the Latin word ipse, meaning “self” or “itself”, and is meant to describe the most fundamental, pre-reflective level of self (Sass & Parnas, 2003). Ipseity forms the basic dimension of subjectiveness, and is seen as the foundation upon which all other experiences are made possible and take place (Parnas, 2000).

Normal human experience involves absorption in activity within a world of both animate and inanimate objects, and this absorption provides a sense of “inhabiting our self in a pre-reflective, tacit, or automatic fashion,” (Nelson et al., 2009). As a function of this process, experiences are interpreted as occurring in a first-person mode of representation (Nelson et al., 2009). For example, when engaging in a normal conversation one does not generally need to recognize or question that one is sitting back and listening while the other person is speaking – instead, an individual has an inherent “mineness” to their experiences that creates a background of pre-reflective self-awareness upon which other conscious activity takes place. Therefore an individual’s awareness of what another person is saying to them takes place against a background of implicitly knowing that they themselves are aware of and listening to the other person speak. A disturbance at this ipseity level would then generate the potential for abnormalities of consciousness at the experiential level of sense of self, as the background on which an individual experiences stimuli and the world would not be properly intact. In essence, the distortions that schizophrenia patients experience in their sense of self are products of distortions that occur at a more fundamental, pre-reflective level of consciousness.

Proponents of the ipseity disturbance model argue that in order to improve our understanding of the pervasive and enduring abnormalities of consciousness that characterize
schizophrenia, consideration of subjective experiences is required (Sass & Parnas, 2003). Based upon what they refer to as “complementary distortions of consciousness,” Sass and Parnas (2003) posit that many of the symptoms and phenomena associated with schizophrenia are ultimately attributable to a disruption in the sense of self. The first concept in this pair of distortions is known as hyper-reflexivity, a term that describes a form of exaggerated self-consciousness involving an individual experiencing the self, or what would normally be experienced as an implicit aspect or feature of the self, as extremely salient (Sass & Parnas, 2003). For instance, the act of breathing is generally tacit for most individuals. In the presence of hyper-reflexivity, however, the normally implicit process would become a focus of acute awareness and would be experienced as especially important and prominent. The complementary process that comprises the disturbance of self is known as diminished self-affection. Within this model, this concept is characterized by the attenuation of one’s basic sense of self-presentation, or a lessening of the “implicit sense of existing as a vital and self-possessed subject of awareness,” (Sass & Parnas, 2003). Diminished self-affection describes difficulties with distinguishing and subsequently understanding features of the self as being components of the inherent self-hood that exists as part of normal human experience. Anomalies of consciousness caused by hyper-reflexivity and diminished self-affection are important in understanding how certain experiences of typically tacit stimuli can become extremely salient for those living with schizophrenia. More specifically, if an individual with schizophrenia has a propensity to assign great valence to experiences that would otherwise be tacitly experienced as part of the self, and also is not able to recognize the “self” as an autonomous entity, it is likely that this individual will experience perceptual abnormalities. For example, the experience of auditory hallucinations (i.e., “hearing voices”) is thought to be related to abnormal perception of internal speech (Frith, 1987). Many
schizophrenia patients report experiencing “running commentary” hallucinations that involve a voice describing the patient’s thoughts or actions as they occur in real-time. According to the ipseity-disturbance model, if a patient fails to recognize the self as the source of the internal speech (diminished self-affection) and also perceives the speech as especially striking or intrusive (hyper-reflexivity), they will perceive this inner speech as being external – in this case, as a commenting voice. This example is relevant in demonstrating how normative human experience – inner speech – can become distorted by means of diminished self-affection and hyper-reflexive awareness (Sass & Parnas, 2003).

**Summary**

Damasio (2010) offers a particularly innovative, integrative theory of consciousness and self, whereby the evolution of consciousness over time led to the eventual experience of the self we now experience. In fact, Damasio argues that the experience of the self – most notably, the autobiographical self – is the essence of what makes us human. Despite the advances of human consciousness and self, according to Damasio’s model our extended/autobiographical selves are still dependent on the more primitive, underlying levels of consciousness from which they evolved (notably, the core-self). This is most clear in understanding the relationship between the core-self and the auto-biographical self, and how disruptions to one’s basic sense of ownership over present experience will influence how one’s self is subsequently represented over time.

Damasio’s notion of a coordinating mechanism tying together experiences at the autobiographical level of consciousness – and how this may go awry – is reminiscent of the way Kraepelin (1919) classically described his view on the problem in schizophrenia being that of “an orchestra with no conductor.” In schizophrenia, all of the pieces may be present, but the ‘conductor’ may be absent in terms of faulty coordination of those pieces into a coherent whole.
Sass & Parnas (2003) put forth a phenomenologically-based theory of the self in schizophrenia, with focus upon the way distortions of consciousness affect the sense of self. More specifically, the authors contend that many of the symptoms and various pathological manifestations of schizophrenia are ultimately attributable to hyper-reflexive awareness to otherwise tacit stimuli and diminished sense of experiencing the self as a coherent, agentic entity. Further, Sass & Parnas contend that these disruptions of consciousness occur at a fundamental, pre-reflective level that they refer to as ipseity.

While these theoretical perspectives have disparate foundations, they also have important parallels. First, Damasio’s conceptualization of core-self is similar to Sass & Parnas’ notion of ipseity. Both concepts describe a pre-reflective, inherent experience of self that involves the processing of external and internal stimuli and assigning of salience. Sass & Parnas’ notion of pre-reflective hyper-reflexivity is thus consistent with Damasio’s idea of potential problems with salience assignment occurring at core-self level processing. Additionally, both theories recognize that disruptions that occur pre-reflectively (either in the core-self or in ipseity) directly influence the more reflective aspects of the self (in either the autobiographical self or in one’s experiential sense of self).

The theories discussed here are both relevant to the self – so how do they apply to the understanding and study of personal narrative? First, Damasio’s conceptualization of the autobiographical self is similar to the concept of personal narrative. Accordingly, personal narrative is influenced by self processes that operate at a pre-reflective level. Stated differently, disruptions in personal narrative begin with disturbances in self that occur at levels of awareness that are not easily tested. So, sense of self is pre-reflective and personal narrative is the reflective manifestation of these pre-reflective contents. The contents of one’s sense of self can be
understood as a complex collection of information that has not yet been entirely unified; the process of forming a personal narrative is what ties this information together into an integrated whole. As personal narrative formation occurs at a reflective level of consciousness, it is also more germane to empirical testing. In this way, personal narrative may not provide a perfect representation of the sense of self, but it does provide an important opportunity to assess aspects of the sense of self that might remain otherwise untestable.

Narrative and Schizophrenia: Current Findings

We have come a long way from the days of forced lobotomies, indefinite confinement, and involuntary electroconvulsive therapy in the treatment of schizophrenia. Despite historically being considered a progressive, deteriorating state of madness, we now know that a good number of patients with schizophrenia will improve significantly with treatment, even to the point of full recovery in some cases (Davidson & McGlashan, 1997; Roe & Davidson, 2005). With the advent of atypical antipsychotic medication, treatment of schizophrenia has focused on the previously neglected aspects of the disorder concerning the experience of the individual – including personal narrative. This movement towards a ‘recovery’ paradigm has given rise to the relatively unexplored territory of what occurs for individuals during the treatment and recovery process – including the exploration and reconstruction of personal narrative (Roe & Davidson, 2005).

However, the presence of empirical research focusing on personal narrative and schizophrenia in the literature remains relatively scant. The predominance of existing research on narrative in schizophrenia comes from the work of Lysaker and colleagues, who over the past decade have been responsible for developing the few currently available assessments of spontaneous personal narratives. In earlier works, Lysaker, Clements, Plascak-Hallberg,
Knipscheer, & Wright (2002) developed the Indiana Psychiatric Illness Interview (IPII). The IPII is a semi-structured patient interview developed specifically to assess personal narrative. The interview has four basic domains that assess an individual’s spontaneous description of their life story, their understanding of their mental illness, how they understand illness as affecting them, and also the patient’s expectations and thoughts about their future. Originally Lysaker and colleagues utilized an assessment called the Narrative Coherence Rating Scale (NCRS; Lysaker et al., 2002) to evaluate personal narratives obtained through the IPII. The NCRS is a brief assessment that scores narratives on historical information, logical connections, and plausibility. Soon after developing the NCRS, Lysaker, Wickett, Campbell & Buck (2003) developed the more thorough Scale to Assess Narrative Development (STAND). The STAND was developed specifically to assess richness of personal narrative, and is rated on four domains: 1) awareness of illness, 2) alienation, 3) personal agency, and 4) social worth. Each domain is scored on a scale of 1 to 5, depending on development conveyed in the personal narrative. Reliability and validity for the STAND were established using transcripts of therapy sessions of patients with schizophrenia, with the domains of the STAND representing specific areas found to be impaired in patients (Lysaker et al., 2003). Scores on the STAND have also been found to be associated with better quality of life scores and higher levels of reported hope and perseverance in schizophrenia patients (Lysaker, Buck, Hammound, Taylor, & Roe, 2006). At this time, the STAND is the most recent and most detailed measure for assessing personal narrative in schizophrenia. In a study using the STAND to assess personal narrative, schizophrenia patients were impaired on all four domains of narrative compared to a clinical group of patients with either depression or legal blindness (Lysaker, Wickett, & Davis, 2005). Of note, no published
studies investigate group differences between schizophrenia patients and non-clinical controls on development of personal narrative.

Lysaker, Lancaster, and Lysaker (2003) also investigated personal narrative transformation as an outcome in the psychotherapy of schizophrenia. Lysaker and colleagues examined a qualitative case analysis of a single patient who was treated for fourteen months using a non-specific, integrative psychotherapeutic approach focusing on reconstruction of the patient’s personal narrative. Over the course of treatment, personal narratives were assessed four times in intervals of several months. Analysis of the narratives demonstrated that changes in the patient’s narrative included gains in “dynamism, complexity, and subtlety” (p. 291). However, Lysaker and colleagues were specific in saying that they did not recognize the changes in personal narrative as creation of a ‘new’ story, but rather as changes in the way the contents were told, managed, and interconnected. Consistent with Damasio’s (2010) theory about the processes involved in autobiographical self, it seems that the patient in this study had the proper information for personal narrative, but had previously been unable to coordinate that content in a logical, integrated way. In a subsequent paper, Lysaker & Lysaker (2002) go on to explain that the goal of therapy oriented towards personal narrative is to allow patients to reconnect experiences related to the self in an organized way. As the authors see it, schizophrenia causes disruptions in identity – especially by means of alterations to one’s sense of agency – that effectively impair links between one’s self and one’s experiences. Lysaker & Lysaker go on to argue that a means of ameliorating this deficit lies in promoting the connection of one’s self to experience, and essentially “recovery of conversation with the self” by reconstructing a coherent personal narrative that promotes ownership of experience (p. 216). The authors argue that
psychotherapy – which naturally involves a dialogue between a client and a therapist – provides a suitable medium for beginning to restore the dialogical processes of self.

Study of personal narrative in schizophrenia has also prompted questioning about the possible link between narrative and insight. Insight, understood as one’s awareness of their illness, has been shown to be deficient in schizophrenia. Schizophrenia patients have a tendency to conceptualize their illnesses in vague or implausible ways, and this lack of awareness has been shown to be related to poorer prognosis (Amador, 1994; McGlashlan & Carpenter, 1981). As explained by Lysaker & Clements, et al. (2005), personal narrative is relevant to assessing insight as awareness of illness is not an isolated cognition that exists in a vacuum. Instead, insight represents one element, interwoven with many others, of an individual’s understanding of their life story. This being so, a more holistic approach to understanding insight in schizophrenia may be warranted. In Raffard et al.’s (2010) study of self-defining memories, it was found that ‘meaning-making’ was especially deficient in schizophrenia. More specifically, schizophrenia patients were comparable to controls in their ability to recall important events, yet had a marked deficit in extracting meaning from these memories. It is precisely this process of extracting meaning from memories that is involved in insight and awareness of illness. Even if one is able to recall memories relevant to understanding their illness, if they are not able to make sense of them and integrate them into their understanding of themselves it is unlikely that insight will develop. As explained by Lysaker et al. (2008), insight is related to “not only the possession of the facts but also how these facts are organized temporally and the extent to which they are linked to historical detail” (p. 1149). In this way, simply having knowledge of illness will likely not contribute to improved outcomes. In fact, recent research findings provide evidence for this way of thinking. Kurtz and Tolman (2011) investigated the relationship between awareness of
illness and subjective quality of life in schizophrenia. Interestingly, they found that insight was actually inversely related to the patients’ reports of wellbeing. Similar findings emerged in previous work (Carroll et al., 1999), and the authors posited that this finding may have been a product of patients with higher levels of insight being more aware of their deficits and functional impairments, and thus reporting decreased quality of life. In this particular study, awareness of illness was assessed using a single item from the Positive and Negative Syndrome Scale for Schizophrenia (PANSS; Kay, Fizbein, & Opler, 1987) to measure insight. This item is interviewer-rated in the context of a larger interview that focuses on overall symptom profile and does not assess personal narrative or meaning-making from personally relevant memories. Perhaps insight into illness alone, without a coherent context for understanding the greater portrait of one’s life, precludes effective integration of illness awareness into a meaningful personal narrative. This finding highlights the need for further investigation into the benefits of treatment approaches focusing on personal narrative and subsequent assessment of insight. If awareness of illness is assessed from personal narrative, it is possible that different relationships between insight and subjective quality of life will emerge.

**Neurocognition in Schizophrenia**

Cognitive deficits have long been recognized as a characteristic feature of schizophrenia (Elvevåg & Goldberg, 2000). More recently, schizophrenia has been recognized as having a fundamental basis in neurocognitive dysfunction (Green & Neuchterlein, 1999), with some prominent researchers arguing that cognitive deficits should be included in the diagnostic criteria for the disorder (Keefe & Fenton, 2007). These deficits include impairments in the broad cognitive domains of attention, memory, and executive function (Torrey, 2006), with schizophrenia patients performing approximately 1 to 2 standard deviations below non-
psychiatric controls in most cognitive domains (Gold, 2004; Green, 2006). In addition, cognitive deficits in schizophrenia are known to be predictive of functional outcome (Bowie et al., 2006) – even more so than psychiatric symptom profile (Green, Kerns, Braff & Mintz, 2000). Further, the cognitive deficits in schizophrenia are inherent to the process of the disease, and for the most part are not products of antipsychotic medication (Aleman, Hijman, de Haan, & Kahn, 1999; Keefe, Silva, Perkins & Lieberman, 1999), nor do they seem to be significantly ameliorated by pharmacological interventions (Keefe, Bilder, Davis, et al., 2007). Cognitive impairment in schizophrenia also appears to be relatively stable over the course of the disease (Bilder et al., 2000; Rund, 1998), and may even be present by the prodromal phase of the illness (Lencz et al., 2006).

Given the evidence of the central importance of cognitive deficits in schizophrenia, cognitive remediation therapies have become increasingly prevalent and studied. In general, cognitive remediation has been defined as “a behavioural-training based intervention that aims to improve cognitive processes (attention, executive function, social cognition, or metacognition) with the goal of durability and generalization,” (Benedict et al., 1994). Most current forms of cognitive remediation intervention involve computerized tasks of cognitive functions (e.g., attention, memory, executive function) that are practiced multiple times (Galletly & Rigby, 2013). While the clear goal is to improve performance on these cognitive tasks over time, the secondary target is to subsequently improve outcome variables (i.e., “real-world” functioning) by means of improved neurocognition (Green, 1993; Medalia & Saperstein, 2013). While these goals are soundly based in empirical findings regarding neurocognition and functioning in schizophrenia, studies examining the impact of cognitive remediation on improving outcome functioning have yielded mixed results in the literature. While gains in performance on cognitive
tasks have been shown to be durable over periods of at least 6 months (Fisher, Holland, Subramanian, & Vinogradov, 2009; Wykes et al., 2003), these changes in cognitive capacities have not been linked consistently to functional outcomes across studies (Galletly & Rigby, 2013; Medalia & Saperstein, 2013; Wykes et al., 2011), with some studies showing no significant benefit (Pilling et al., 2002; Suslow, Schonauer, & Arolt, 2001). While continued efforts to explore and refine the relationship between cognitive remediation and functioning are evident in the literature (Keefe & Vinogradov et al., 2011), other researchers point out the need to adapt a more ecologically-valid approach to cognitive remediation in schizophrenia. More specifically, Silverstein & Wilkniss (2004) posit that consideration of how abnormalities in one’s subjective experience may impact the process of cognitive remediation for schizophrenia patients is necessary to develop more effective approaches. In general, a major criticism of cognitive remediation is that teaching a patient to improve their cognitive test performance (perhaps ability to remember a list of words, or to complete an information processing task more quickly) will not necessarily make them better at navigating a “real-life” situation (e.g., a conversation with a stranger or planning a trip to the grocery store).

**The Relationship between Personal Narrative and Neurocognition in Schizophrenia**

A small number of studies examining the relationships between neurocognition and personal narrative in schizophrenia patients are available. In general, deficiencies in personal narrative development are related to some difficulties in aspects of executive functioning and memory in patients. Specifically, Lysaker, Carcione, et al. (2005) found that schizophrenia patients whose narrative conveyed a more intact understanding of the processes of their own mind (i.e., reflective metacognition) also performed better on neurocognitive tasks of attention, memory, and frontal functioning. The patients in this study with more intact metacognition as
rated from personal narrative also had better awareness of their illness. In addition, Lysaker, Tsai, Maulucci, and Stanghellini (2008) found that overall coherence of narrative (as assessed by the NCRS) was negatively correlated with executive functioning and performance on a simple memory task. In another study, higher scores on domains of personal narrative for schizophrenia patients were related to better executive functioning and negatively correlated with negative symptoms (Lysaker, Wickett, & Davis, 2005).

From a theoretical perspective, problems with neurocognition may negatively impact personal narrative by precluding the proper operation of several processes necessary to its development. According to Gallagher (2003), the generation of personal narrative is dependent on the proper functioning of four major neurocognitive abilities: 1) intact temporal processing and integration, 2) capacity for minimal self-reference, 3) ability to encode and retrieve episodic/autobiographical memories, and 4) capacity for reflective metacognition.

**Temporal Processing & Integration**

Generally, personal narrative involves a temporal structure that requires both an internal time frame and external sense of temporality (Gallagher, 2003). Internal time frame is the basic sense of the serial order of events relative to one another. It is by means of this time frame that we put together pieces of an event, in order, as they occurred – e.g., I stood up from my chair, I walked into the next room, I turned on the television, I remembered what channel my favorite show was on, I tuned in. External time frame describes the temporal relation of the narrator to the events in the narrative (Gallagher, 2003). It is by means of the external sense of temporality that the narrator can determine whether the events happened in the past, are going to happen in the future, or are happening in the present. The sense of external temporality is dependent upon the perspective of the narrator, as whatever the individual uses as a temporal frame of reference
will influence when the events are interpreted to have occurred. It is for this reason that an individual who is incapable of or impaired in maintaining a normal perspectival frame of temporal reference will be impaired in the ability to generate a narrative properly represented across time (Gallagher, 2003).

Empirical evidence indicates that schizophrenia patients demonstrate impairments in both internal and external perspectives of temporal experience. Studies have shown that time-perspective for the future is diminished in schizophrenia, with schizophrenia patients showing significantly greater difficulties in imagining and organizing thoughts related to future events than either healthy controls or patients currently experiencing a depressive episode (Dilling & Rabin, 1967). Additionally, Heerey, Mateeva, and Gold (2011) found that schizophrenia patients showed a foreshortened future time perspective relative to healthy individuals. Further, these schizophrenia patients showed attenuated ability to represent and evaluate outcomes that were distal from the present, though they showed intact reward responsiveness when rewards were available in the present. Similarly, Strauss and Gold (2012) argue that anhedonia - long-conceptualized as a negative symptom of schizophrenia that significantly impairs patients’ abilities to experience pleasure – is more likely an impairment in accessing emotional memories of past experiences (or imagining future experiences) in order to inform current beliefs and actions. D’Argembeau, Raffard, and Van der Linden (2008) also found reduced ability of schizophrenia patients to produce specific mental images of their past or imagined future, likely due in part to a disturbance in the subjective sense of time. Additionally, narratives of schizophrenia patients are often characterized by problems in the proper sequencing of events in such a way that the speech comes across as fragmented and incoherent (Philips, 2003).
Schizophrenia patients are also impaired in integrating information over short periods of time. Dreher et al. (2001) found that schizophrenia patients showed deficits in a task of temporal ordering, and that this impairment was significantly related to an overall deficit in working memory. Working memory involves integrating of temporal experience over very short periods of time (Gallagher, 2003), and deficits in it are apparent in impaired performance on tasks of both visuospatial (Keefe, Lees-Roitman, & Dupre, 1997) and verbal (Wexler, Stevens, Bowers, Sernyak, & Goldman-Rakic, 1998) abilities in schizophrenia patients. In terms of motor actions, schizophrenia patients also tend to misattribute self-initiated movements to an external source when a visual feedback of the movement is delayed. Daprati and colleagues (1997) had schizophrenia patients perform simple wrist and finger movements while these body parts were not within their view. The participants were instructed to watch these movements on a television screen that showed either their actual movements or an alien hand performing the same movements. Patients tended to identify their own hands as alien when the visual feedback was presented with a slight time delay, indicating a deficit in managing slight temporal differences. Impairments in the ability to keep track of recent actions and to anticipate or sequence motor movements in working memory (Gallagher, 2000b) also indicate an overall attenuation in the ability of schizophrenia patients to integrate temporal cues when perceiving their own movement.

Difficulties with temporal integration are also likely related to the problems in semantic binding seen in schizophrenia. Semantic binding is a term used to describe impairments in integrating different parts of an experience into an integrated, coherent whole (Danion, Rizzo, & Bruant, 1999). When patients have an inability or impairment in discerning the temporal
sequence of events in an experience, it is logical that the resulting memory would be disorganized and potentially confusing.

**Minimal Self-Reference**

In order to form a personal narrative, the narrator has to recognize the self as the protagonist of the story. That is, there must be a basic sense of the self and nonself (Gallagher, 2000a). As used here, the concept of minimal self is similar to the way Damasio (2010) conceptualized the core-self experience of consciousness in that it infers a basic, primitive sense of inhabiting one’s self and being the agent of one’s actions. Therefore, minimal self-reference provides us with a fundamental sense of self-awareness that forms a starting point for personal narrative (Gallagher, 2003). In developing our personal narratives, we construct ourselves as an agent, victim, or passive bystander insofar as our understanding of our role in our lives and perceived control (Gallagher, 2003; Ricoeur, 1984).

Studies have shown that schizophrenia patients exhibit impairments in their sense of agency. Psychiatric symptoms – such as auditory hallucinations, thought insertion, and delusions of alien control – are thought to be related to disruption of self-awareness and agency whereby patients do not recognize themselves as owning these experiences (Frith, 1987; Kircher & Leube, 2003). Clara Kean, a woman with schizophrenia, explains that this disruption of agency can also extend beyond positive symptoms. She explains that her experiences of disrupted agency have “nothing to do with the suspicious thoughts or voices; it is purely a distorted state of being. The clinical symptoms come and go, but this nothingness of the self is permanently there, […] my thoughts, my emotions, and my actions, none of them belong to me any more” (2009, p. 1035). When giving narrative accounts of their lives, schizophrenia patients also tend to use a third-person pronoun to refer to themselves rather than using a first-person identifier more than
healthy controls (Gallagher, 2003). Additionally, Moe & Docherty (2014) found that schizophrenia patients demonstrated significantly lower scores on aspects of agency rated from self-descriptive narratives than either healthy controls or patients with psychotic bipolar disorder.

Disruptions in agency are also evident in studies of bodily movement in schizophrenia. In our experience of movement, our intention (or, our sense of agency for initiating the movement) is not represented as separate from the action (Gallagher, 2003), but we instead experience agency for the movement as a tacit feature of the performed action (Gallagher & Marcel, 1999). For example, when we move our eyes about a scene there are pre-motor movements and adjustments required in order for us to maintain our experience of a stable visual field (Panksepp, 2003). However, we are not aware of all of these adjustments or our pre-motor movement intentions – instead, we experience a synchronized visual experience with agency of these movements implied. In fact, studies suggest that these pre-motor processes are more related to our experience of agency over our movements than the actual sensory feedback from the movement itself (Gallagher & Marcel, 1999). Such findings indicate that our agentive ownership of our movements is based on anticipatory, pre-movement motor commands (Gallagher, 2003). In schizophrenia patients, abnormalities of motor movement representation on imaging studies have been found to be related to the experience of passivity phenomena (e.g., delusions of control, thought insertion) (Maruff, Wilson, & Currie, 2003). In a study of sensory stimulation produced externally (by an apparatus) versus by the self, it was found that schizophrenia patients were impaired in their ability to predict the sensory consequences of their own actions (Shergill, Samdon, Bays, Frith, & Wolpert, 2005). Similar results emerged from the so-called “tickle study.” In general, human beings are unable to truly tickle themselves due to neurological mechanisms (namely, from the somatosensory cortex) that anticipate their motor activities pre-
movement, and therefore render their self-tickle attempts as far less powerful than sensory stimulation from an outside source (i.e., another person tickling them) (Blakemore, Wolpert, & Frith, 2000). However, Blakemore, Smith, Steel, Johnstone, & Frith (2000) found that schizophrenia patients with auditory hallucinations or passivity phenomena experienced self-tickling in the same way as tickling from another source, thus indicating a deficit in pre-motor movement intention. Finally, these studies are also consistent with Singh and colleagues’ (1992) finding that schizophrenia patients have abnormal pre-movement brain potentials.

Further, findings from neuroscience suggest that schizophrenia patients do not demonstrate a normative self-referential bias. In general, our brains process information with a high self-relevance in a different way than stimuli that are less relevant to the self. This phenomenon – known as the self-reference memory effect – refers to the comparatively elaborative emotional and cognitive processing given to events with high levels of self-relevance (Northoff et al., 2006). In general, bias enables individuals to process self-relevant information in a more efficient, accurate way - for example, to recognize photographs of their own faces faster and more accurately than they would be able to recognize the face of a significant other (Kircher, Senior, & Phillips, 2001). Interestingly, studies with schizophrenia patients have shown they make more errors than healthy controls in correctly recognizing pictures of their own faces (Kircher, Seiferth, Plewnia, Baar, & Schwabe, 2007). Harvey, Lee, Horan, Oschner, and Green (2011) also investigated self-referential memory in schizophrenia patients. Researchers asked schizophrenia patients and healthy control participants to rate adjectives on structural features, social desirability, and relevance to self (i.e., deciding how much that word described them). Patients and controls were comparable in recognition memory for words rated on structural features and social desirability, but patients performed significantly more poorly than controls on
recognition memory for self-referential words. The results of this study indicate that schizophrenia patients do not benefit from a self-referential memory bias the way that healthy controls do. Taken together, these studies provide evidence for deficiencies in minimal self-reference and self-awareness in schizophrenia patients.

Episodic/Autobiographical Memory

Episodic-autobiographical memory can be defined as having two primary features: the recollection of a specific event occurring in the past, and self-attribution in understanding that the person recalling the event is the one that was involved in the past event (Gallagher, 2003). In this way, episodic-autobiographical memory depends upon the capacity for both temporal integration and minimal self-reference. In a related model of memory, Conway (2001) explains episodic memory as a memory system that holds sensory perceptual knowledge in great detail over short retention periods, and thus is representative of the “experiencing self” in the moment (p. 1375). In this model, episodic memory is thought to not yet be integrated with autobiographical memory. Instead, autobiographical memory involves the retention of knowledge over longer periods of time and is thus representative of the “experienced self” looking back on previous experience (p. 1375). Autobiographical and episodic memory systems interact in that recollecting an experience involves the recollection of autobiographical memory that retains access to relevant episodic memories (Conway, 2001; Conway & Plydell-Pearce, 2000). Given this conceptualization, both autobiographical and episodic memory are relevant in understanding the formation of personal narrative. Episodic and autobiographical memory provide the prior knowledge from which narrative will be formed. In essence, the encoding and retrieval of autobiographical memory is parallel to the encoding and retrieval of personal narrative (Markowitsch, 2003). Additionally, narrative is a constructive process that involves
more than simply recalling past personal events – in this way narrative not only depends on intact autobiographical memory, but also contributes to it when previous experiences and events are reviewed and interpreted in memory (Gallagher, 2003).

Impairment of both episodic and autobiographical memory is found in schizophrenia. Studies of autobiographical memory in schizophrenia have shown that patients demonstrate general impairments compared to healthy controls. Wood and Brewin (2005) found that schizophrenia patients were especially impaired in recalling autobiographical memories from adolescence and early adulthood, and that the observed deficits were not accounted for solely by deficits in working memory. While the timing of the most marked autobiographical deficits in this study coincided with general onset of illness, the authors were specific in stating that the more global deficits in autobiographical memory impairment were in fact observed across the patient’s lifespan (Wood & Brewin, 2005). Further, experimental investigation of self-defining memories in schizophrenia patients has yielded similar results. Raffard et al. (2010) found that schizophrenia patients were impaired in their ability to provide coherent and elaborate accounts of personally important memories compared to non-psychiatric controls. In terms of emotional valence, previous research suggests that schizophrenia patients show more abnormalities in the encoding of memory valence. In particular, they appear to fail to integrate positive emotional experiences in the process of memory consolidation (Herbener, Rosen, Khine, & Sweeney, 2007). Studies of memory in non-psychiatric populations have shown that emotional stimuli are recalled more accurately than stimuli that are neutral (Cahill et al., 1996), whether the stimuli are positively (Dolcos, LaBar, & Cabeza, 2005) or negatively valenced (Taylor et al., 1998). In a study of emotional memory, Herbener and colleagues (2007) found that schizophrenia patients displayed appropriate responses to positive experiences initially, but seemed to have deficits in
generalizing the impact of positive experiences in any long-term fashion. So, while the patients were able to experience the positive valence of the emotional experience in the moment, they did not show the memory enhancement expected for these experiences even 24-hours later. Healthy controls, however, did show enhanced recognition memory for the positive stimuli in this study over the same time period. Interestingly, the schizophrenia patients demonstrated memory enhancement for stimuli with negative emotional valence. In terms of personal narrative, this bias may lead to memories of positive experiences being less well-integrated into patients’ accounts of their lives compared to memories of negative experiences.

Memory deficits in schizophrenia are especially pronounced in investigations requiring that one mentally re-experience personal actions and feelings related to specific events (Danion et al., 1999). This form of remembering is known as autonoetic awareness; it involves having a conscious recollection of an event that “infolers the special phenomenal flavor to the remembering of past events, the flavor that distinguishes remembering from other kinds of awareness, such as those characterizing perceiving, thinking, imagining, or dreaming” (Tulving, 1985, p. 3). In contrast, noetic awareness describes simply ‘knowing’ that something occurred in the past, but with no specific recollection beyond a feeling of familiarity (Tulving, 1985). Studies have shown that schizophrenia patients report lower incidences of autonoetic awareness than controls when retrieving episodic (Danion et al., 1999) and autobiographical memories (Danion et al., 2005). Interestingly, patients in one study demonstrated more pronounced episodic memory deficits for events remembered at an autonoetic level of awareness – that is, those memories recalled consciously – than for noetic memories (Danion, et al. 1999). In this same study, control participants demonstrated an opposite pattern of results, with superior memory performance when they recalled events with autonoetic awareness. In circumstances of autonoetic
consciousness, there is an implied process of semantic binding, or integrating different aspects of an experience into a coherent account of an event. Danion and colleagues (1999) state that these findings are most likely attributable to a deficiency in elaborative processing at encoding for consciously recalled events in schizophrenia patients. More specifically, it seems that when aspects of an experience are remembered consciously in schizophrenia, the different parts of the experience are encoded in a way that leads to increased difficulty in accurately recalling the resulting memory (Frith, 1999). In terms of autobiographical memory, decreased levels of autonoetic awareness would give individuals less specific memories to work with in forming personal narrative. Additionally, deficits in semantic binding related to deficient autonoetic awareness may indicate that the memories being introduced in the formation of personal narrative are aberrant or distorted. This notion is supported by findings from Sonntag and colleagues (2003) indicating that schizophrenia patients are impaired in their ability to regulate contents of autonoetic awareness for relevant versus irrelevant information. More specifically, it is not just an issue of whether or not patients with schizophrenia can remember their personal story – it is also an issue of what content is available. If the contents of autobiographical memory are confused, incomplete, entirely missing, or otherwise misrepresented, these deficiencies will manifest in an equally impaired personal narrative (Gallagher, 2003).

Reflective Metacognition

The process of narrative formation, as previously mentioned, is more than simply the summation of all of one’s autobiographical memories. Instead, personal narrative is shaped and refined through the interpretive process of reflective metacognition (Gallagher, 2003). This process is not assumed to be perfect, as it is not atypical for personal narratives to include alterations of reality or even confabulations that serve to enhance one’s story (Gallagher, 2003).
However, reflective metacognition can be problematic to the development of personal narrative for individuals with schizophrenia for other reasons.

Metacognition is known to be deficient in schizophrenia. Metacognition, broadly defined, is “thinking about thinking,” or monitoring one’s own cognitive processes (Livingston, 1997). Frith (1992) suggests that self-monitoring is deficient in schizophrenia, and studies of source monitoring have provided supporting evidence. Source-monitoring refers to the ability of an individual to accurately identify or recall the source from which information was acquired. Source monitoring is often studied within an experimental framework that requires participants to remember whether a specific piece of information in memory was presented during a task, and then to discern which specific information was obtained from which particular source. Research on source-monitoring in schizophrenia has revealed patient deficits in discriminating between internal (e.g., information generated by the self) and external (e.g., non-self generated) sources of information (Ditman & Kuperberg, 2005; Gallagher, 2004). Relatedly, schizophrenia patients demonstrate deficits in discriminating between information self-generated internally versus externalized. For example, in one study (Keefe et al., 1999), schizophrenia patients had significantly worse performance compared to non-psychiatric controls when discriminating between words they had been instructed to say out loud (externalized) versus words they had been instructed to imagine saying to themselves (internal). This performance discrepancy is consistent with deficits in appropriately discriminating between internal and external information amongst schizophrenia patients (Keefe et al., 2002). In terms of narrative, the metacognitive deficits observed in source-monitoring studies may also influence the reflective processes employed in the formation of a personal narrative.
Alternatively, self-monitoring can become problematic not only if it is lacking, but also if it becomes excessive. In line with Sass & Parnas’ (2003) notion of hyperreflexivity, attentional allocation may be aberrant in schizophrenia in such a way that normally tacit, implicit aspects of experience become especially salient. Recently, self-report measures of aberrant salience have been developed, and have been found to be correlated with measures of psychosis proneness in normative populations (Cicero, Kerns, & McCarthy, 2010). Additionally, states of aberrant salience have been proposed as the driving factor of psychotic experiences (Kapur, 2003). So, problems with self-monitoring in schizophrenia may represent either a lack of metacognitive processes, or an over-monitoring of experience (Gallagher, 2003).

Gallagher (2003) proposes that the self-monitoring abnormalities observed in schizophrenia patients are likely a combination of alternating states of failure in self-monitoring and hyper-reflexive monitoring. More specifically, he contends that failure in self-monitoring may serve to motivate compensatory periods of hyper-reflexivity, whereby patients notice that they have ‘missed something’ or that something is odd about their experience so they then engage in a search for explanation or meaning. Through his work with split-brain patients, Gazzaniga (1995) has found that there are brain processes that compensate for missing or distorted information in narrative. In the case of schizophrenia, discontinuities or discrepancies in the information available for the formation of personal narrative may similarly lead to increased incidences of abstractions, withdrawals, confabulations, or other distortions in interpreting experiences in order to compensate for missing or confusing material (Gallagher, 2003). These abnormalities would then significantly alter the resulting understanding of one’s narrative. In Raffard et al.’s (2010) study of self-defining memories, mentioned in the previous section, schizophrenia patients had notable difficulty in extracting meaning from their past
experiences. Drawing meaning from self-defining memories involves a self-reflective process that links the self to the experience in important ways, and is thus a major process by which personal narrative is developed (Raffard et al., 2010). Quite understandably, then, a deficit in this process would effectively limit the development of personal narrative.

Summary

In sum, deficits in neurocognitive functioning observed in schizophrenia may negatively impact the development of personal narrative by impeding crucial components of forming and understanding one’s own life story – including the ability to process information temporally, the capacity for minimal self-reference, and the ability to encode autobiographical memories. Finally, the capacity for reflective metacognition is also theoretically relevant to understanding how the development of personal narrative may go awry in schizophrenia patients. However, it is important to note that these cognitive processes are likely intricately related to other, more basic cognitive processes – including more general memory, attention, and executive functioning. While theoretical models provide compelling support for the role of these specific higher-order processes, empirical support for their relationship to personal narrative is lacking. For this reason, assessing neurocognition more broadly will allow us to examine the underlying relationships between neurocognitive deficits and the development of personal narrative in schizophrenia.

Social Functioning in Schizophrenia

Deficits in social functioning are well-documented in patients with schizophrenia (Blanchard, Mueser, & Bellack, 1998; Wallace, 1984). Social and/or occupational dysfunction is noted as a defining feature of the disorder in the current diagnostic criteria, with marked deteriorations in work performance, interpersonal relationships, and self-care expected to be present for a
significant portion of the time since the onset of illness (DSM-IV-TR; American Psychiatric Association, 2000). More recently, empirical evidence has indicated that problems in social functioning emerge in the prodromal phases of schizophrenia (Addington, Penn, Woods, Addington, & Perkins 2008; Niendam et al., 2006). Additionally, social functioning has been operationalized as a measure of functional outcome in schizophrenia across multiple studies (Green, 1996).

In terms of the relationship between social functioning and development of personal narrative, lack of coherent life-story has a significant impact on an individual’s understanding of themselves as a historical being (Lysaker et al., 2008) – in terms of both the past and the future. Difficulties in accessing comprehensible, organized accounts of past personal experiences would understandably impact an individual’s ability to use these previous experiences in a way that would inform their current behavior and choices. As previously noted, research findings indicate that schizophrenia patients have difficulties in processing autobiographical memories in a way that allows them to extract meaning (Raffard et al., 2010). In terms of the role of personal narrative in impacting future behavior, it is understandable that problems with identifying past experiences as relevant to informing choices about current circumstances would lead to a diminishment of motivated behavior and an increase in hopelessness, especially given findings that patients tend to focus more on negative memories than positive ones (Herbener et al., 2007). Further, confusion about their own role in their lives and their ability to effectively impact the world around them may contribute to social withdrawal and isolation. Schizophrenia researchers have speculated that the development of a more coherent personal narrative would likely improve patients’ ability to maintain connections with others. Specifically, Lysaker, Lysaker, and Lysaker (2001) posit that focusing on the enrichment and development of one’s personal
narrative would promote recovery from illness by creating a context for greater self-awareness and sense of agency. If an individual has significant deficiencies in self-awareness – especially in terms of distilling meaning from previous experiences highly relevant to one’s sense of self – it is understandable that social functioning would be considerably diminished.

Aims

The purpose of the present study was to assess the relationships between neurocognition, personal narrative, and social functioning in a sample of clinically-stable schizophrenia outpatients and healthy, non-psychiatric controls. Because of the relative dearth of research available on the relationship between cognitive deficits and personal narrative, neurocognition was assessed broadly using a standardized battery. Additionally, we assessed the possibility that the development of personal narrative may mediate the relationship between neurocognitive functioning and social functioning in schizophrenia patients, with the rationale that disparate findings in regards to the relationship between cognitive improvements from cognitive remediation therapy and improved outcome functioning may be inconsistent because the relationship is not direct. More specifically, we wanted to assess whether neurocognition is related to functional outcome only insofar as it impacts the development of one’s personal narrative. Therefore, should personal narrative be found to mediate the relationship between neurocognition and functioning, interventions focusing on the development or recovery of a coherent personal narrative could be helpful in improving social functioning and patient outcomes. In sum, the present study tested the following hypotheses: it was anticipated that (1) development of personal narrative would be deficient in schizophrenia patients compared to healthy controls, (2) development of personal narrative would be significantly related to neurocognitive functioning in schizophrenia patients, (3) level of personal narrative development
in schizophrenia would also be significantly related to social functioning in schizophrenia patients, and (4) Level of personal narrative development would mediate the relationship between neurocognitive functioning and social functioning in schizophrenia patients.
CHAPTER II
METHODS

Participants

Participants (total N=56) included two groups: 1) schizophrenia patients and 2) non-psychiatric controls. Participants in the schizophrenia patient and healthy control groups were identified from the pool of participants previously included in a larger study of language symptoms in schizophrenia (Docherty, 2011). They were contacted using the information they provided when being recruited for the previous study, and those who were interested in returning for this study were invited to participate. Participants in either group meeting any of the following exclusion criteria were excluded from the study: history of epilepsy or seizures, current substance abuse, history of drug or alcohol dependence serious enough to warrant inpatient detoxification, history of traumatic brain injury or history consistent with or indicative of any other sort of organic brain damage, mental retardation, or any history of inhalant use. These exclusion criteria were put in place to exclude participants with cognitive deficits based upon possible brain injury, damage attributable to these types of conditions or psychological states rather than to the conditions of interest.

Schizophrenia Patients

44 patients with schizophrenia were recruited for the present study. Of those participants, five who had previously participated were excluded from the present study due to meeting exclusion criteria in the interim since their original involvement: 1 participant had suffered a stroke, 2 participants reported inhalant use, and 1 had been in an accident and suffered
a probable TBI. The participants who completed the study (final N=39) were outpatients currently receiving treatment at community mental health centers in Akron, Ohio. All participants met Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition, Text Revised (American Psychiatric Association [DSM-IV], 2000) criteria for schizophrenia when assessed in connection with the larger study, and this diagnosis was confirmed in the present study using the abbreviated Schedule for Affective Disorders and Schizophrenia ([SADS-C]; Spitzer & Endicott, 1977). SADS-C interviews were conducted by graduate level psychology students with appropriate backgrounds in the study of schizophrenia and psychosis. Current psychiatric symptoms were assessed and appear in Table 1.

Non-Psychiatric Controls

Control participants (N=17) were originally recruited from Akron, Ohio metro area by means of flyers placed in local churches, community centers, social service agencies, community laundry facilities, and throughout the university campus. Controls were originally administered a diagnostic interview to rule out any history of psychotic symptoms as part of the larger study; The SADS-C was again administered to non-psychiatric controls to assess for any changes.

Procedure

Participants were assessed in a single session lasting approximately 2½ hours. Written informed consent was obtained from all study participants prior to the undertaking of any study related procedures. Participants were paid $50 to compensate them for time spent in the session and also for the cost of travel. Prior to the collection of any data, this protocol was approved by both the Kent State Institutional Review Board and the Research Merit Review Board of the community mental health center where patients were interviewed.
Measures

Narrative Development

Personal narratives were obtained from all participants. Following the method of Lysaker, Wickett, and colleagues (2003), these narratives were obtained using the Indiana Psychiatric Illness Interview (IPII). The IPII involves a simple initial prompt of “I’d like you to tell me the story of your life, in as much detail as you can, from as early as you can remember up to now. If it helps you to organize your story, you can divide it into chapters or sections. Any questions?” Following this prompt, participants were allowed to give a spontaneous narrative of their life story. The overarching theme of the IPII is to allow the participant’s narrative to emerge as it exists, with minimal involvement of the interviewer beyond basic active listening (Lyasker, Wickett, et al., 2003). Therefore, only information brought up by the participant is discussed, and no clarifying questions about missing information (e.g., a participant leaving out a large section of their life when giving their narrative) were asked. The narratives were audio-recorded and transcribed for analysis.

The Scale to Assess Narrative Development (STAND; Lysaker et al., 2003) was utilized to assess the personal narratives of participants. The STAND was developed specifically to assess enrichment of personal narrative, and is rated on four domains: 1) awareness of illness, 2) alienation, 3) personal agency, and 4) social worth. Each domain is scored on a scale of 1 to 5, depending on development conveyed in the personal narrative. Scores on each subscale can be summed in order to create a score of overall narrative coherence. Reliability and validity for the STAND were established using transcripts of therapy sessions of patients with schizophrenia, with the domains of the STAND representing specific areas found to be impaired in patients. Use of the STAND in schizophrenia patient populations has yielded adequate inter-rater reliability as
well as appropriate internal consistency (Lysaker et al., 2003). The Cronbach’s alpha for the STAND scales in the present study was within an acceptable range (α = 0.807). Of note, we chose to complete Illness Awareness ratings for both the schizophrenia patient and non-clinical control groups. This was done in order to 1) provide the same interview prompts for different groups in order to maintain standardization, and 2) operate within the understanding that psychological distress and/or illness are not experiences lived only by schizophrenia patients. As the particular phrasing of the question most related to this rating does not refer to any specific diagnosis or treatment history (i.e., “psychological or mental difficulties”), it was appropriate to investigate this aspect of the narrative in both groups. The STAND ratings were completed by the primary author. A subsample of self-descriptions was also rated by two undergraduate research assistants who were trained in language coding both broadly and specifically for this study. Intra-class correlation coefficients (ICCs) were calculated for each subscale on a subset of fifteen self descriptions to test inter-rater reliability; ICCs yielded good to excellent levels (.814 - .977) of reliability across all variables.

**Neurocognition**

In order to assess neurocognition broadly, we used the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) Cognitive Consensus Battery (MCCB; Neuchterlein et al., 2008). The MCCB is the product of an NIMH initiative to create a standardized, robust measure of cognition in schizophrenia patients participating in drug-development clinical trials (Green et al., 2008; Kerns et al., 2008; Neuchterlein & Green, 2006). Since its inception, the MCCB has also been adapted for use in many empirical studies of neurocognition in schizophrenia (Williams et al., 2008; Young et al., 2009) and other clinical populations (Green, 1996). Research with the MCCB has also demonstrated adequate test-retest
reliability (ICC=0.88), minimal practice effects, and adequate sensitivity to cognitive deficits (Keefe & Fox et al., 2011). The MCCB consists of 10 individually administered subtests that tap seven cognitive domains identified as being impacted in schizophrenia patients (Neuchterlein & Barch, et al., 2004). Performance on each of these domains are converted to T-scores using norms from the MCCB manual (Neuchterlein & Green, 2006) and then summed to create an overall composite score of cognitive performance. The Cronbach’s alpha for the MCCB subscales in the present study was within an acceptable range (α = 0.823).

1. Processing Speed

Three subtests are included to assess processing speed. First, the Brief Assessment of Cognition in Schizophrenia (BACS) Symbol-Coding task is given. This task is timed and involves the respondent using a key to match numbers with nonsense symbols. The total score for this task is the number of symbols correctly coded in a two minute period. Second, a task of semantic fluency is administered. The participant is instructed to orally name as many animals as he/she can in sixty seconds, with the number of identified animals serving as the total score. Finally, the Trail Making Test (TMT-A) is administered to assess organizational sequencing. The participant is instructed to connect a sequence of numbers in ascending order. After completing a brief practice trial, participants are timed while they complete a longer sequencing task. The score for this task is the time to completion in seconds.

2. Attention/Vigilance

The Continuous Performance Test (CPT) - Identical Pairs task is given to assess sustained attention. This task is a measure of selective attention and contextual processing completed on a computer. The participant is asked to click the mouse as quickly and as accurately as possible when they see identical numbers flash on the screen consecutively.
Following a practice session, the assessment is completed in three conditions: two-digit, three-digit, and four-digit pairs. The sensitivity score, d’, is the primary score of interest for this task.

3. Working Memory

Two tasks are administered to assess working memory. First, the Wechsler Memory Scale (WMS) Spatial Span is given. This task is completed using a board on which 10 cubes are spaced. The participant is asked to tap the cubes in the same (or in the reverse order) as the test administrator. The number of correctly completed sequences serves as the total score for this measure. Second, Letter-Number Span task is administered. This is an orally administered test in which participants are asked to mentally rearrange sequences of numbers and letters after they are read by the experimenter. The total score is the number of correct sequences correctly orated by the participant.

4. Verbal Learning

The Hopkins Verbal Learning Test (HVLT) is given to assess verbal learning. This task is a measure of verbal list memory that involves the experimenter reading of a list of words to the participant three times. After each reading, the participant is asked to verbally recall any of the words they can remember. The total score for this task is the sum of correctly recalled words over the three trials.

5. Visual Learning

The Brief Visuospatial Memory Test, Revised (BVMT-R) is administered to assess visual learning. This task involves the experimenter showing the participant a sheet with six simple geometric figures for ten seconds. After the sheet with the figures is taken away, the participant is asked to reproduce the figures from memory. This is completed three times. The score from
the BVMT-R is obtained by assessing both accuracy and proper placement of the figures across the three trials.

6. **Reasoning and Problem Solving/Executive Functioning**

   The Neuropsychological Assessment Battery (NAB) Mazes are administered to assess executive functioning. This test involves the participants completing seven timed mazes of increasing difficulty. For each maze completed by the participant, they are awarded a score depending on how long it took them to successfully complete it. While errors are monitored and corrected by the experimenter, they do not influence the score. The total score is the sum of scores for each maze successfully completed by the participant.

7. **Social Cognition**

   The Mayor-Salovey-Caruso Emotional Intelligence Test (MSCEIT) - Managing Emotions & Description of Social Management subtests are administered to assess social cognition. The MSCEIT is a multiple-choice test that assesses how participants manage their emotions and perform emotional tasks. The researcher reads the individual items to the participant as they read along. The participant is instructed to select the answer they feel is best for each question, and to state that answer out-loud to the researcher.

   While the MCCB represents a broad measurement of neurocognition that is particularly relevant to schizophrenia, we also administered several additional neurocognitive measures that we believed would be related to narrative development.

**Executive Functioning**

   The Trail Making Test B (TMT-B; Army Individual Test Battery, 1944) was administered to assess executive functioning. The participant is instructed to join dots in a specific order by alternating between numbers and letters, and measures the ability of an
individual to shift and maintain cognitive set. After completing a brief practice trial, participants are timed while they complete a longer sequencing task. The score for this task is the time to completion in seconds.

**Narrative Memory**

The Wechsler Memory Scale (WMS) Logical Memory task (Wechsler, 2009) is a measure of immediate and delayed narrative memory. A short story is read out loud to participants, and their recall is noted immediately and then again after a 25-minute delay. In addition, a recognition portion is given following the delayed recall. In the present study, a composite score of performance for narrative memory was calculated by summing scores for immediate recall, delayed recall, and recognition.

**Source Monitoring**

The Source-monitoring Tasks (Nienow & Docherty, 2004) consist of two tests of source-monitoring. In the first task (internal source-monitoring), the participant is shown a series of incomplete sentences, and is asked to think of the correct word to fill in the missing portion. The answers to these incomplete sentences are self-evident (e.g., a five-cent coin is called a _____ [correct response: nickel]; Independence day is celebrated on the 4\textsuperscript{th} of _____ [correct response: July]). The participant is instructed not to say the word out loud, unless the next stimulus in the set instructs them to explicitly do so by displaying the cue, “Answer.” After completing the incomplete sentences, the participant has said eight words out loud (“say” words) and has thought eight words to themselves (“think” words). The participant is then given a list of twenty-four words and asked to identify which words are “say” words (eight items), which items are “think” words (eight items), and which words are “new” – meaning they were not included in the task at all (eight items). Previous research has demonstrated that performance on the source-
monitoring task is associated with schizophrenia and formal thought disorder (Nienow & Docherty, 2004).

In the second task (external source-monitoring), the participant listens to an audio recording of a man and a woman saying eight short sentences each. After listening to the entire audio file, the participant is presented with a list of sentences, and asked to indicate which sentences the man said, which sentences the woman said, and which sentences were not part of the task at all. This task measures the participant’s ability to discriminate between two external sources. Performance on this task is meaningful in assessing auditory memory more broadly. The primary difference between the tasks is that the internal (say/think) source monitoring task specifically requires discrimination of internal versus externalized information. For the purposes of data analysis, the scores on the second source-monitoring task were regressed out of scores on the first source-monitoring task. This allowed for measurement of internal source-monitoring after accounting for differences between subjects on the more general cognitive functions.

Social Functioning

According to Green (2000), the literature on social functioning in schizophrenia has been organized into three primary areas: 1) acquisition of skills via psychosocial rehabilitation, 2) assessment of interpersonal problem-solving using laboratory measures, and 3) aspects of behavior related to activities of daily living and other community-based outcomes. In the current study, we will assess the participants’ community behaviors and daily activities by means of a self-report questionnaire as well as their ability to problem-solve in interpersonal situations by means of a performance-based task. The inclusion of the second performance-based measure is important in providing a more complete assessment of social functioning, as issues related to having a severe, chronic mental illness (i.e., prolonged unemployment and financial problems)
may significantly impact a participant’s ability to engage in many community activities (e.g., going to the movies) assessed via self-report alone.

The performance-based task of social functioning was the Assessment of Interpersonal Problem Solving Skills (AIPSS; Donahue et al., 1990). This task is comprised of 14 video-taped interpersonal interaction scenes (1 demonstration scene followed by 13 test scenes). Participants are asked by the test administrator to identify with a specific person in each scene, and after they watch the clip they are asked whether they feel there was a problem in the scene. Ten of the 13 scenes contain a problem, and three of the scenes are neutral and used to assess response bias. If the participant identifies a problem in a given scene, they are then asked to describe what the problem was. They are then asked to describe what they would do or say in the situation. Finally, they are asked to role-play this reported response with the test administrator briefly. The participant’s responses are scored on their ability to correctly identify and describe problems, as well as on their ability to role-play their response in an appropriate and effective manner. Total scores on the AIPSS range from 0 to 113, with higher scores indicating more developed interpersonal problem solving skills. The AIPSS has been shown to have adequate psychometric properties (Donahoe et al., 1990) and appropriate test-retest validity (Spaulding et al., 1999).

The Social Functioning Questionnaire (SFQ; Tyrer et al., 2005) is an 8 item, self-report scale that was also administered to assess social functioning. The SFQ was adapted from the longer Birchwood Social Functioning Scale (SFS; Birchwood et al., 1990) in order to allow for an abbreviated assessment of social and interpersonal functioning. Scores on the SFQ range from 0-24, with higher scores indicating better social performance. Prior research with the SFQ has demonstrated adequate test-retest reliability (Nur, Tyrer, Murson, & Johnson, 2004) and normal
distributions in a variety of ethnic groups (Tyrer et al., 2005). The Cronbach’s alpha for the SFQ in the present study was within an acceptable range ($\alpha = 0.792$).

Psychiatric Symptoms and Functioning

The schizophrenia patient participants were administered the Positive and Negative Syndrome Scale for Schizophrenia (PANSS; Kay et al., 1997) to assess current psychiatric symptoms. The PANSS is a 30-item interviewer-rated, semi-structured assessment. Separate subscales are present for positive, negative, and general symptoms. Each item is rated on a scale of 1 (“Not Present”) to 7 (“Extreme”). Ratings are obtained for individual items, and then scores for subscales and total scores can be obtained by summing the appropriate items in each section. In our group, we have demonstrated excellent inter-rater reliability for these subscales (intra-class correlations = 0.927 - 0.978).

The Global Assessment of Functioning (GAF) from the DSM-IV-TR was administered to all participants to evaluate current level of functioning. The GAF is a brief measure of psychiatric disturbance and its impact on psychological, social, and occupational functioning. Scores are made from 1 to 100 based upon level of impairment, with lower scores indicating more severe disturbance. Descriptive sentences are provided as anchors for each ten point range.

Analysis

The analysis was completed in four parts. First, to assess the hypothesis that development of personal narrative would be deficient in schizophrenia patients compared to healthy controls, we conducted a group-by-variable MANOVA, with the STAND subscales scores entered as dependent variables. Dependent variables were standardized prior to the analysis. Given that the STAND subscales are conceptually related – and were intercorrelated in the present study – a multivariate analysis approach was appropriate. To assess the specific direction of group
differences, we utilized planned simple contrasts with the schizophrenia patients as the comparison group.

Due to group differences on overall functioning (GAF; see Table 1) between the schizophrenia and control groups, a follow-up group-by-variable MANCOVA was conducted. The standardized STAND variables were entered as dependent variables, and the GAF score was specified as a covariate.

To test the hypotheses that development of personal narrative would be significantly related to neurocognitive functioning and to social functioning in schizophrenia patients, we examined bivariate correlations (Pearson’s r) between the STAND subscale scores and both the neurocognitive tasks and the social functioning measures. To determine the variance in STAND scores accounted for by the neurocognitive variables, we also performed linear regressions with the cognitive tasks entered as predictors.

Finally, we tested the hypothesis that level of personal narrative development would mediate the relationship between neurocognitive functioning and social functioning in schizophrenia patients by assessing indirect effects per the specifications of Kenny (2013). More specifically, previous research has shown that there is a robust association between neurocognitive functioning and social functioning in schizophrenia patients (Addington & Addington, 1999; Green et al., 2000). This relationship is known as the total effect (Kenny, 2013). We tested two mediation models that specified neurocognitive performance as the independent variable, score on social functioning measure as the outcome variable, and level of development of personal narrative as the mediator variable. Bootstrapping analyses were conducted using a macro for SPSS written by Hayes (2012). Traditional methods for testing indirect effects (i.e., Sobel test) have been illustrated to be particularly vulnerable to a lack of
power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) and given our relatively small sample size, the use of bootstrapping was preferable to the use of the Sobel Test in order to reduce the risk of Type-II error (Hayes, 2009; Shrout & Bulger, 2002).
CHAPTER III

RESULTS

Group Demographics and Functioning

Groups were compared on demographic, general level of functioning, and narrative word-count variables. Analyses revealed significant group differences on years of education ($t[54] = 2.476, p = 0.012$) and GAF score ($t[54] = 8.189, p < 0.00$). No significant group differences were noted on participant age ($t[54] = 1.159, p = 0.251$), race ($\chi^2 = 0.952, df = 1, p = 0.329$), gender ($\chi^2 = 0.013, df = 1 p = 0.909$), or narrative word-count ($t[54] = 0.232, p = 0.817$). Descriptive statistics for the other measures utilized in the study appear in Table 2.

Bivariate correlations were obtained to examine the association between demographic and functioning variables found to be significantly different between groups (years of education, GAF score) and the narrative development variables. For the schizophrenia patients, total years of education was not significantly correlated with any of the narrative development variables; GAF score was correlated at a trend level with agency ($r = 0.298, p = 0.066$), social worth ($r = 0.292, p = 0.071$), and the STAND composite score ($r = 0.277, p = 0.088$). For the non-psychiatric controls, total years of education was significantly correlated with social worth ($r = 0.547, p = 0.23$); GAF score was significantly correlated with alienation ($r = 0.505, p = 0.38$).

Symptoms in the Schizophrenia Group

In the schizophrenia patient group, neither the total PANSS symptom score nor the PANSS positive symptom score were significantly correlated with any of the narrative
development variables. However, PANSS negative symptom score was significantly correlated with Illness Awareness (r = -0.520, p = 0.001) and correlated at a trend level with Agency (r = -0.301, p = 0.052). Additional bivariate correlations examining individual negative symptom items revealed that the Passive/Apathetic Withdrawal score (PANSS item N4) was significantly correlated in the negative direction with both STAND composite (r = -0.386, p = 0.015) and Agency (r = -0.370, p = 0.020) and also at a trend level with Illness Awareness (r = -0.293, p = 0.070). Finally, Illness Awareness was also negatively correlated with the Difficulty in Abstract Thinking score (PANSS item N5; r = -0.481, p = 0.002).

STAND Scale Scores

Bivariate correlations for the narrative development scale scores appear in Table 3. Scores tended to correlate positively with each other. Bivariate correlations for the STAND Scale Scores within the schizophrenia patient and control groups were also obtained and appear in Tables 4 and 5.

Multivariate Analysis of Variance for STAND Scale Scores

To examine group differences on the narrative development scale scores, a 2 (group) x 4 (standardized dependent variables) MANOVA was conducted. This model revealed a highly significant multivariate main effect for group (Wilks’ Λ = 0.430, F [4, 51] = 16.899, p < .000, partial η2 = 0.570). Tests of between-subjects effects yielded significant group for illness awareness (F [1, 56] = 4.665, p = 0.035, partial η2 = 0.800), alienation (F [1, 56] = 43.256, p < 0.000, partial η2 = 0.445), agency (F [1, 56] = 36.150, p < 0.000, partial η2 = 0.401), social worth (F [1, 56] = 47.718, p < 0.000, partial η2 = 0.469), and STAND composite score (F [1, 56] = 59.247, p < 0.000, partial η2 = 0.523). Simple multivariate contrasts, with the schizophrenia group as the comparison group, revealed that the observed significant differences were uniformly
in the hypothesized direction (i.e., schizophrenia patients obtained lower scores than non-psychiatric controls).

**Follow-up Multivariate Analysis of Covariance**

To examine differences between the schizophrenia patient and control groups on the narrative development variables when overall level of functioning (GAF) was otherwise accounted for, a 1 (group) x 4 (standardized dependent variables) MANCOVA was conducted. The GAF score was entered as a covariate in the first block of the analysis, with the narrative development scores entered in the second block. With all variables in the model, a significant multivariate main effect for group was observed (Wilks’ Λ = 0.768, F [4, 50] = 3.784, p = 0.009, partial η2 = 0.232). Tests of between-subjects effects yielded significant group effects for alienation (F [2, 56] = 23.335, p < 0.000, partial η2 = 0.468), agency (F [2, 56] = 21.563, p < 0.000, partial η2 = 0.449), social worth (F [2, 56] = 29.540, p < 0.000, partial η2 = 0.527), and STAND composite score (F [2, 56] = 34.065 p < 0.000, partial η2 = 0.562). The group effect for illness awareness was no longer significant in this model (F [2, 56] = 2.289, p = 0.111, partial η2 = 0.080).

**Narrative Development Variables, Neurocognition, and Social Functioning in the Schizophrenia Group**

The four narrative development variables from the STAND were examined continuously with the neurocognitive and social functioning variables using bivariate correlations (Pearson’s r; Table 6). This analysis yielded some significant – yet modest and variable – correlations in the expected direction for some of the neurocognitive and social functioning variables. Scores on the MCCB Social Cognition index were positively correlated with Illness Awareness scores at the trend-level (r = 0.303, p = 0.061). Scores on the Narrative Memory task were positively
correlated with Agency ($r = 0.331$, $p = 0.043$) and the STAND composite score ($r = 0.330$, $p = 0.043$), and also positively correlated at a trend level with Illness Awareness ($r = 0.305$, $p = 0.063$). Performance (time to completion) on Trail Making Test B was negatively correlated with STAND composite score at a trend level ($r = -0.279$, $p = 0.095$). Social Worth was correlated with scores on the SFQ ($r = 0.207$, $p = 0.098$). Contrary to our hypothesis, scores on the MCCB Processing Speed composite were negatively correlated with Alienation scores ($r = -0.285$, $p = 0.079$), meaning that greater levels of isolation or alienation from others was related to more efficient processing speed. The narrative development variables were not significantly related to performance on Source Monitoring, other aspects of the MCCB, or the AIPSS.

Given the limited findings described above, we also investigated whether comparing extreme groups on each of the narrative development variables would yield more meaningful results. The top and bottom quartile of the narrative development variables were formed into high and low groups for Illness Awareness, Alienation, Agency, and Social Worth, and these extreme score groups were then compared on the same dependent variables (neurocognition and social functioning) by means of independent $t$-tests. However these additional analyses elucidated only very limited additional findings: patients in the low Alienation group had significantly lower scores on the SFQ (mean = 14.64, SD = 3.91) than patients in the high Alienation group (mean = 17.20, SD = 2.97); $t[24] = 2.138$, $p = 0.044$). No other significant differences between the extreme groups on any of the narrative development variables were observed.

**Narrative Development as a Mediator between Neurocognition and Social Functioning in the Schizophrenia Group**

1. Higher scores on the TMT-B indicate poorer performance.
2. Of note, low scores on Alienation indicate higher levels of social isolation while high scores on Alienation reflect greater connectedness to others.
Finally, we assessed whether narrative development mediated the relationship between neurocognitive processes and social functioning in the Schizophrenia patient using multiple regression analyses. In order to first assess for mediation when neurocognition was broadly operationalized, the standardized MCCB total composite score was selected. The AIPSS and SFQ scores were standardized and summed into a composite measure of social functioning, and the standardized STAND composite score was entered as the proposed mediator (see Figure 1). No control variables were used in analyses. The standardized regression coefficient between global neurocognition and narrative development was not statistically significant ($B = 0.46, t(37) = 0.2788, p = 0.782$), while standardized regression coefficients between narrative development and social functioning ($B = 0.21, t(37) = 1.6902, p = 0.10$) and global neurocognition and social functioning ($B = 0.21, t(37) = 1.7272, p = 0.093$) were significant at a trend level. We tested the significance of this indirect effect using bootstrapping procedures (Hayes, 2012). Unstandardized indirect effects were computed for each of 5,000 bootstrapped samples, and the 95% confidence interval was also obtained. Results of the mediation analyses revealed that the indirect effect of narrative development ($B = 0.016, CI_b = -0.04, 0.13$) was not significant in this model when bias corrected confidence intervals were examined. These results appear in Figure 1.

Given the associations between the narrative memory task and the STAND composite score discussed previously (see Table 6), the narrative memory score was selected for a second mediation analysis utilizing this specific aspect of neurocognition as the independent variable (see Figure 2). Identically to the previous mediation analyses, the composite score of Social Functioning and the STAND composite scores were entered into the model as the respective dependent and proposed mediator variables. Unstandardized indirect effects were again computed for each of 5,000 bootstrapped samples along with 95% confidence intervals. Similar
to the previously tested mediation model, the indirect effect of narrative development was not significant in this model when considering bias adjusted confidence intervals ($B = 0.045$, $Cl_b = -0.02, 0.19$; See Figure 2).
CHAPTER IV
DISCUSSION

Summary of Findings

The main findings of the present study are: 1) schizophrenia patients scored lower on all of the narrative development variables compared to non-psychiatric controls; 2) these significant differences between groups remained significant when overall level of functioning was included in the model as a covariate; 3) the narrative development variables were related at a low level to some – but not all – aspects of neurocognition and social functioning in the schizophrenia patient group; 4) a composite score of narrative development was not a significant mediator of the relationship between neurocognition and social functioning in the schizophrenia patient group.

Interpretation of Findings

The present study demonstrated significant support for our first hypothesis: schizophrenia patients demonstrated impairments in their level of narrative development compared to healthy controls. Though previous studies have demonstrated that schizophrenia patients have lower narrative development scores when compared to other individuals with significant disabilities (Lysaker, Wickett, & Davis, 2005), this is the first study to our knowledge to demonstrate similar findings when utilizing a non-psychiatric control group. In addition, when global functioning level was otherwise accounted for, all but one of these facets of narrative development (i.e., Illness Awareness) remained significantly different between groups. This finding indicates that observed group differences between schizophrenia and control groups on
most aspects of narrative development are unlikely to be due solely to differences in overall functioning.

Our findings provided limited support for some of our hypotheses regarding the relationship between the narrative development scale scores and the neurocognition and social functioning variables in the schizophrenia patient group. When the narrative development variables were examined continuously, modest relationships were found with certain neurocognition variables. Specifically, better performance on the Social Cognition index of the MCCB was associated with higher levels of Illness Awareness, while higher scores on the Narrative Memory task were related to higher levels of Agency, higher levels of Illness Awareness, and higher levels of overall personal narrative development (STAND composite score). Total time to complete TMT-B – and thus, poorer performance – was associated with lower levels of overall personal narrative development. In terms of the social functioning variables, higher scores on the SFQ – and thus, better social functioning – were related to higher levels of Social Worth. Interestingly, higher scores on the MCCB Processing Speed index were significantly related to lower Alienation scores (i.e., experiencing more social isolation and disengagement). The narrative development variables were not significantly related to performance on Source Monitoring, other aspects of the MCCB, or the AIPSS. Additional analyses examining extreme score groups on the narrative development variables (i.e., bottom and top quartile) yielded only one finding: patients with extremely low scores on Alienation group had significantly lower scores on the SFQ compared to patients with extremely high scores of Alienation.

Unsupported Hypotheses
It is also important to acknowledge the portions of our hypotheses that were not supported by the current study. While the preponderance of the narrative development scales and the total composite narrative development score differed between schizophrenia patients and controls even when differences in overall levels of functioning were accounted for, this was not the case for the Illness Awareness scale. This finding indicates that though schizophrenia patients do demonstrate notable disparities in their understanding of their psychological struggles compared to control participants, this observed difference seems to be most attributable to overall differences in participants’ current level of general emotional distress and/or ability to function and cope in their daily lives. Furthermore, the significant findings related to the narrative development scores and specific scores on the neurocognitive and social functioning variables in the schizophrenia group were limited, with some of these findings originating from secondary, exploratory analyses. Multiple comparisons were also made during the course of data analysis and most results were not significant; the results may contain Type-I error. Finally, performance on the AIPSS and many aspects of the neurocognitive tasks were not significantly related to narrative development scale scores. These results suggest that narrative development is not very strongly related to ability to engage in social problem-solving or to basic domains of neurocognition. It is possible that these processes in patients are not significantly impacted by, or impactful on, impoverishment of their personal narrative, or perhaps that narrative development is more highly related to domains not assessed in the present study – including other aspects of neurocognition.

Additionally, neither of the mediation analyses completed to assess whether personal narrative development may mediate the relationship between neurocognition and social functioning in schizophrenia patients demonstrated a significant indirect effect. Of note, our
current findings did replicate previous research demonstrating an association between neurocognition and social functioning in schizophrenia patients.

*Theoretical Significance of Findings*

The present study demonstrated that the personal narratives of patients with schizophrenia are impoverished compared to those of non-clinical controls across the domains of development assessed by the STAND. The use of a minimally-structured interview to obtain personal narratives allowed participants to respond in a more spontaneous way thus enabling them to respond in a variety of ways as influenced by their own self-understanding. However, the finding that Illness Awareness was no longer significantly different between groups when global functioning was accounted for suggests that the difference initially observed was likely more reflective of general psychological distress and problems with coping than to having schizophrenia more specifically. Alternatively, as the other group differences remained significant, the diminished scores on Alienation, Agency, and Social Worth observed in the schizophrenia patient group do not appear to be explained primarily by general level of functioning and thus appear to reflect differences more attributable to living with schizophrenia.

Further, while most aspects of narrative development were deficient in schizophrenia patients, these same variables were not significantly related to neurocognition as measured in the present study. As discussed in the introduction, The MCCB was selected to assess neurocognition in the present study for several reasons: 1) its specification in measuring aspects of cognition known to be deficient in schizophrenia patients (Green et al., 2008; Nuechterlein, Barch, et al., 2004), 2) a wealth of published research utilizing this battery in clinical research with schizophrenia patients (see Green, Kern & Heaton, 2004), and 3) the lack of previous studies in the literature examining relationships between neurocognition and narrative
development in schizophrenia patients. However it is possible that the general measures of cognition included in the MCCB do not adequately capture the cognitive phenomena related to the development of one’s personal narrative. Of note – and of additional support to this possibility – is the finding that performance on a task of narrative memory was significantly related to narrative development in the hypothesized direction. In interpreting this finding, the aspects of memory theoretically measured by the narrative memory task are of importance.

Previous research on assessment of memory in clinical populations has shown that the narrative memory task is the “purest” measure of episodic memory when compared to other verbal (i.e., HVLT) and visual (i.e., BVMT) tests of memory (Woodard, Goldstein, Roberts & McGuire, 1999). This finding is likely related to the additional organization and syntax required to process, repeat, and later recall the information contained in the stories (Lezak, 2004). In other words, though the narrative memory task may still be a hippocampally-mediated measure of memory, it may also load more heavily on executive/organizational aspects of neurocognition that are possibly more highly related to personal narrative development. Additionally, the deficits in autonoetic awareness observed in previous studies of patients with schizophrenia3 are consistent with this interpretation of the executively-driven aspects of narrative memory. More specifically, Wheeler, Stuss, and Tulving (1997) discuss the role of executive functioning in autonoetic awareness in saying that “the prefrontal cortex plays a critical, supervisory role in empowering healthy adults with autonoetic consciousness—the capacity to mentally represent and become aware of subjective experiences in the past, present, and future. When a rememberer mentally travels back in subjective time to re-experience his or her personal past, the result is an act of retrieval from episodic memory,” (pg. 333). Thus it is possible that the significant association observed between the narrative memory task and narrative development in the present study

3 See Background section, page 35.
emerged in part due to alterations in the executive, organizing properties of autonoetic awareness that also contribute to impairment in narrative structures in schizophrenia patients. Also of importance to giving adequate context to our findings is the time frame utilized for assessing memory. Based on the MCCB battery – and consistent with standard neuropsychological assessment practices (Lezak, 1995) – memory was assessed based on recall and recognition following a 20-30 minute delay. These measures of memory, though known to be deficient in schizophrenia (Neuchterlein & Barch, et al., 2004), may not be reflective of memory processes over longer periods of time (e.g., days, months, years) that may be more highly related to the development of one’s personal narrative.

The finding that higher scores on an index measure of processing speed were associated with more social alienation is more cumbersome to explain. Contrary to this finding is previous research indicating that better processing speed in schizophrenia is actually predictive of better social functioning and vocational outcome (Sanchez, Ojeda, Pena, Elizagarate, Yoller, Gutierrez & Ezcurra, 2009). Other work, however, indicates that social discomfort may mediate the relationship between aspects of neurocognition and functional outcome (Bell, Tsang, Greig & Bryson, 2009). One possible interpretation of our current results is that patients with faster speed of processing may be more attuned to perceived negative interactions with others or social consequences, which may lead to social discomfort and possible avoidance of social engagement as a result. Future work replicating this result and examining this possible explanation more specifically is required before informed inferences can be made.

Further, correlational analyses revealed a significant association between specific negative symptoms and narrative development variables in the schizophrenia patients. First, lower Illness Awareness scores were related to greater difficulty in abstract thinking. This
finding may reflect that patients experiencing symptoms that interfere with their ability to think critically or are prone to concrete thought processes are less able to recognize and understand their symptoms and overall level of mental health. Second, Agency and overall level of narrative development were associated with passive/apathetic social withdrawal. One possible interpretation of this finding is that alterations in one’s personal narrative secondary to schizophrenia – especially by means of alterations to one’s sense of agency – may effectively impair links between one’s self and one’s experiences, thereby rendering them less salient/immediately available in the process of organizing goal-directed behavior. More specifically, the act of organizing behavior toward a goal involves a “set of related processes by which an internal state is translated, through action, into the attainment of a goal” (Brown & Pluck, 2000). This process also involves the referencing of previous experiences within the context of one’s immediate plans, goals for the future, and personal values. This process may be impeded by impairments in an individual’s sense of agency whereby they do not recognize themselves as previously having made significant or predictable personal contributions to outcomes (i.e., they did not feel their behavior actively or meaningfully influenced outcome), thus rendering previous experiences as seemingly irrelevant in behavior organization/selection and manifesting in diminished motivation/appetitive drive. These possibilities may be addressed more specifically in future research.

Finally, the use of the IPII with non-psychiatric controls also represents a novel perspective on understanding psychological processes in non-clinical samples. Despite the movement in the field of psychiatric diagnoses away from binary diagnostic labels toward more dimensional approaches to understanding and diagnosing mental illness (American Psychiatric Association [DSM-5], 2013), psychopathology is often still considered dichotomous in nature.
Future studies may benefit from additional consideration of the normative nature of psychological difficulties that span across diagnostic entities and into populations not generally considered to be afflicted with mental illness (i.e., individuals not in the mental health system). This avenue may be particularly conducive to understanding adaptive integration of psychological difficulties into one’s life story and identifying coping styles that may allow people to navigate their psychological struggles without the need for formal mental health treatment.

**Limitations**

The present study has several notable limitations. First, only stable outpatients were included in the schizophrenia group. Similar work with inpatients in a more acute phase of illness may yield different results. However, the inclusion of stable outpatients allowed us to examine participants with generally lower levels of acute positive symptoms, meaning the personal narratives and ultimately our findings were less influenced by this potentially complicating factor. Additionally, raters could not be entirely blinded to diagnostic status of the participants when coding narratives. No participant information was included on the transcriptions of the narrative interviews, but participants sometimes mentioned their diagnoses or mental health treatment histories when completing the task. However, given the design of the IPII all participants in both the schizophrenia and non-psychiatric control groups were engaged in discussion of any psychological difficulties and thus mention of mental health issues was not inherently identifying. Another important limitation of the current study includes limited statistical power due to the modest sample size. This required the use of bootstrap mediation analyses instead of more sophisticated approaches (i.e., structured equation modeling. It is possible that more significant effects would have been observed with a larger sample. Multiple
comparisons, though guided by a-priori hypotheses, were also conducted with no statistical correction and therefore the results must be interpreted with caution. Of importance, though differences in personal narrative were demonstrated between schizophrenia patients and non-psychiatric controls even when general level of functioning was considered, given the lack of a psychiatric comparison group we were not able to make more specific inferences about whether the observed differences are ultimately attributable to schizophrenia rather than to having a personal experience of major mental illness. Finally, the potential influence of formal thought disorder on the personal narratives was not directly assessed. However, given that the schizophrenia participants were currently being treated as outpatients (i.e., less severe state of illness) and that raters did not generally encounter difficulty in understanding the narratives of the participants, this potential impact was likely not large.

Future Directions

Given the relatively small sample size of schizophrenia patients in the present study, future studies should be conducted with larger sample sizes that allow utilization of more sophisticated statistical analyses that would have increased power to detect smaller effects. In addition, future studies investigating personal narrative development in schizophrenia patients should include a psychiatric comparison group so that additional inferences regarding specificity of any observed deficits may be made. An earlier version of the present study described the inclusion of a comparison group comprised of older adults with mild cognitive impairment in order to make more informed inferences about whether impairments in personal narrative development were attributable to cognitive deficits rather than to schizophrenic disease processes more specifically; however due to logistical difficulties the inclusion of this comparison group was not feasible in the current study. Future studies including either a comparison group with
comparable cognitive deficits (i.e., adults with mild cognitive impairment) or with major psychiatric illnesses (i.e., patients with affective psychoses) could address the issue of diagnostic specificity.

Though the present study provided only limited support for the relationship of neurocognition and personal narrative in schizophrenia patients, the associations that did emerge suggest avenues for further investigation. Future research may investigate the relationship of personal narrative development to different aspects of neurocognition, particularly those that are more executive in nature. The measures of executive functioning included in the present study (NAB Mazes, TMT-B) may not appropriately capture aspects of planning and organization inherent in tasks requiring more sustained cognitive flexibility (e.g., Tower of London, Wisconsin Card Sorting Test) that would theoretically be more involved in the development of personal narrative. In addition, future work may endeavor to assess memory longitudinally, perhaps over sessions with more intervening time in order to assess whether there is disproportionate forgetting over time on the narrative memory task.

Though not specifically probed for or assessed as part of the current study, it was noted that many of the schizophrenia patients discussed previous experiences of trauma in their personal narratives. Previous research has also indicated that there are especially high prevalence rates of sexual and physical abuse histories amongst psychiatric inpatients (Read, van Os, Morrison & Ross, 2005) as well as patients with specific diagnoses of schizophrenia (Morgan & Fisher, 2007). In addition, another previous study indicated that schizophrenia patients with histories of childhood trauma had significantly poorer working memory and episodic narrative memory than patients without trauma history, even after controlling for premorbid IQ and current depressive symptoms (Shannon, Douse, McCusker, Feeney, Barrett, S., & Mulholland,
1999). Given the possible impact of trauma on neurocognition in this population, assessment and consideration of trauma in future studies of personal narrative development will be particularly important.

The current findings also provide insight into possible implications for treatment. Historically, traditional medical treatment approaches have eschewed experiential features of schizophrenia and have instead focused almost exclusively on psychiatric symptoms. In fact, some treatment providers may overlook, inadvertently or not, the importance of putting together a healthy personal narrative within the context of such a disturbing, serious mental illness (Roe & Davidson, 2005). However, we now understand that there is much more to the disorder of schizophrenia than auditory hallucinations and persecutory delusions. Whereas recovery once only described remission of psychotic symptoms, the term now has a much broader definition and more implications for quality of life beyond antipsychotic medication regimens (Bellack, 2006) and calls specifically for client-centered approaches that advocate treatment guided by personal meaning (Frese III, Stanley, Kress & Vogel-Scibilia, 2001; Lieberman, Drake, Sederer, Belger, Keefe, Perkins, & Stroup, 2008). Therapy focusing on reconstructing and understanding personal narrative allows inclusion of the patient’s experiences – beyond only the symptoms of psychosis – in an idiosyncratic way. Of note, though the current study supports the notion that personal narrative is impaired in patients with schizophrenia, it does not provide guidance for the use of any specific therapeutic approach in addressing these impairments as part of treatment. Additional investigation examining how different forms of therapy may influence the development or reorganization of personal narrative may be fruitful in understanding which approaches are most beneficial for patients with schizophrenia. By the same token, building study into treatment is crucial to assess narrative change over time, and also to better explore the
relationship between development personal narrative and other measures of quality of life and patient outcomes.

While the current study is incremental in providing additional insight into the nature of personal narrative impairments observed in schizophrenia patients, other contributions on related subjects have begun to trickle in from a diverse number of fields. Study of consciousness, self, and autobiographical memory systems are all relevant to understanding personal narrative, and these areas have been investigated in studies with divergent foundations: phenomenology, neuroscience, biology, cognitive psychology, and philosophy. Given the complex and enigmatic nature of schizophrenia, improving our understanding of the disorder is best tackled from multiple perspectives. In moving forward, continued integration of these fields is vital, including combining different approaches within single experimental designs. Further, understanding the mechanisms that contribute to personal narrative in schizophrenia ‘going wrong’ may also be potentially informative to understanding normative experiences of consciousness, self, and personal narrative more broadly. In more therapeutic terms, given the highly individual nature of recovery and healing, the continued exploration of how to include personal narrative in treatment is of great importance. As explained by Mehl-Madrona (2010), “how people change and transform cannot be predicted by knowing the allopathic diagnosis from which they suffer. How people can heal is implicit within the unique story of their lives and their illness. We must discover those stories through our interaction and we must cocreate a healing future […] Through the appreciation of the power of story, we can build bridges between the internal and external worlds to create an integration that allows for far more people to be healed.”
REFERENCES


Conway, M.A. & Pleydell-Pearce, C.W. (2000). The construction of


Table 1: Group Demographics, Symptoms, and Functioning

<table>
<thead>
<tr>
<th></th>
<th>Schizophrenia</th>
<th>Controls</th>
<th>Group Difference Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>39</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Mean Age (SD)</td>
<td>42.31(7.78)</td>
<td>39.53(9.25)</td>
<td>$t[54] = 1.159, p = 0.251$</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19 (49)</td>
<td>8 (47)</td>
<td>$\chi^2 = 0.013, df = 1 p = 0.909$</td>
</tr>
<tr>
<td>Female</td>
<td>20 (51)</td>
<td>9 (53)</td>
<td></td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td>$\chi^2 = 0.952, df = 1 p = 0.329$</td>
</tr>
<tr>
<td>African American</td>
<td>26 (66)</td>
<td>8 (47)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>13 (34)</td>
<td>9 (53)</td>
<td></td>
</tr>
<tr>
<td>Mean Years of Education (SD)</td>
<td>11.83(1.39)</td>
<td>13.59(2.09)</td>
<td>$t[54] = 2.476, p = 0.012*$</td>
</tr>
<tr>
<td>Mean GAF¹ (SD)</td>
<td>50.28(10.98)</td>
<td>76.88(11.59)</td>
<td>$t[54] = 8.189, p &lt; 0.00*$</td>
</tr>
<tr>
<td>Mean PANSS² (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>15.56(5.59)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>14.82(4.36)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>29.95(7.77)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mean Word Count for Narratives</td>
<td>1545.10(788.38)</td>
<td>1494.88(624.02)</td>
<td>$t[54] = 0.232, p = 0.817$</td>
</tr>
</tbody>
</table>

¹Global Assessment of Functioning, ²Positive and Negative Syndrome Scale
<table>
<thead>
<tr>
<th>Variable</th>
<th>Schizophrenia</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>Mean STAND(^3) Scores (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illness Awareness</td>
<td>2.67(.701)</td>
<td>3.35(1.693)</td>
</tr>
<tr>
<td>Alienation</td>
<td>2.26(1.044)</td>
<td>4.12(.781)</td>
</tr>
<tr>
<td>Agency</td>
<td>2.87(1.080)</td>
<td>4.53(0.514)</td>
</tr>
<tr>
<td>Social Worth</td>
<td>1.97(.986)</td>
<td>4.00(1.061)</td>
</tr>
<tr>
<td>STAND Composite</td>
<td>9.77(2.887)</td>
<td>16.00(2.52)</td>
</tr>
<tr>
<td>MCCB(^4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Composite</td>
<td>18.44 (11.65)</td>
<td>--</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>28.81(11.14)</td>
<td>--</td>
</tr>
<tr>
<td>Attention/Vigilance</td>
<td>30.22(10.39)</td>
<td>--</td>
</tr>
<tr>
<td>Working Memory</td>
<td>27.03(11.21)</td>
<td>--</td>
</tr>
<tr>
<td>Verbal Memory</td>
<td>31.17(9.40)</td>
<td>--</td>
</tr>
<tr>
<td>Visual Memory</td>
<td>28.25(9.39)</td>
<td>--</td>
</tr>
<tr>
<td>Reasoning</td>
<td>37.28(8.76)</td>
<td>--</td>
</tr>
<tr>
<td>Social Cognition</td>
<td>31.17(12.68)</td>
<td>--</td>
</tr>
<tr>
<td>Source-Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Correct(^5)</td>
<td>13.33(3.57)</td>
<td>--</td>
</tr>
<tr>
<td>TMT-B(^6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>165.25(80.96)</td>
<td>--</td>
</tr>
<tr>
<td>Narrative Memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Composite</td>
<td>-0.28(0.93)</td>
<td>--</td>
</tr>
<tr>
<td>Social Functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIPSS(^8)</td>
<td>44.21(16.81)</td>
<td>--</td>
</tr>
<tr>
<td>SFQ(^9)</td>
<td>15.33(3.93)</td>
<td>--</td>
</tr>
</tbody>
</table>

Notes: \(^1\)n=39, \(^2\)n=17, \(^3\)Scale to Assess Narrative Development, \(^4\)MATRICS Consensus Cognitive Battery, \(^5\)For purposes of data analysis, performance on a more general task of source monitoring was regressed from this total-score to create a more representative measure of self-monitoring, \(^6\)Trail Making Test, Form B, higher scores on this task are reflective of poorer performance, \(^7\)This composite was formed from the WMS-IV Logical Memory Immediate Recall, Delayed Recall, and Recognition, \(^8\)Assessment of Interpersonal Problem Solving Skills, score is total percentage correct, \(^9\)Social Functioning Questionnaire.
<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illness Awareness</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Alienation</td>
<td>.346*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agency</td>
<td>.419*</td>
<td>.702**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Social Worth</td>
<td>.354*</td>
<td>.663**</td>
<td>.672**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Total Composite</td>
<td>.611**</td>
<td>.824**</td>
<td>.881**</td>
<td>.853**</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 4: Pearson Correlation Matrix for the Narrative Development Variables – Schizophrenia Group

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illness Awareness</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Alienation</td>
<td>.286*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agency</td>
<td>.498**</td>
<td>.556**</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Social Worth</td>
<td>.444**</td>
<td>.313*</td>
<td>.441**</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>5. Total Composite</td>
<td>.676**</td>
<td>.744**</td>
<td>.851**</td>
<td>.728**</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 5: Pearson Correlation Matrix for the Narrative Development Variables – Control Group

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illness Awareness</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Alienation</td>
<td>.128</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agency</td>
<td>.294*</td>
<td>.299*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Social Worth</td>
<td>.170</td>
<td>.377*</td>
<td>.458*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Total Composite</td>
<td>.716**</td>
<td>.380*</td>
<td>.577*</td>
<td>.677*</td>
<td></td>
</tr>
</tbody>
</table>
Table 6: Pearson Correlations for Narrative Development, Neurocognitive, and Social Functioning Variables in the Schizophrenia Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ill. Awareness</th>
<th>Alienation</th>
<th>Agency</th>
<th>Social Worth</th>
<th>STAND Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCCB Composite</td>
<td>.114</td>
<td>-.068</td>
<td>-.207</td>
<td>-.116</td>
<td>-.113</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>.006</td>
<td>-.285*</td>
<td>-.104</td>
<td>-.033</td>
<td>-.152</td>
</tr>
<tr>
<td>Attention/Vigilance</td>
<td>.110</td>
<td>.071</td>
<td>-.209</td>
<td>-.111</td>
<td>-.114</td>
</tr>
<tr>
<td>Working Memory</td>
<td>.089</td>
<td>.047</td>
<td>.082</td>
<td>.032</td>
<td>.046</td>
</tr>
<tr>
<td>Verbal Learning</td>
<td>.055</td>
<td>-.247</td>
<td>.061</td>
<td>.087</td>
<td>.019</td>
</tr>
<tr>
<td>Visual Learning</td>
<td>.055</td>
<td>-.225</td>
<td>.080</td>
<td>.086</td>
<td>.009</td>
</tr>
<tr>
<td>Reasoning</td>
<td>.137</td>
<td>-.035</td>
<td>.084</td>
<td>-.019</td>
<td>.046</td>
</tr>
<tr>
<td>Social Cognition</td>
<td>.303*</td>
<td>.138</td>
<td>.221</td>
<td>.081</td>
<td>.234</td>
</tr>
<tr>
<td>TMT-B</td>
<td>-.126</td>
<td>-.226</td>
<td>-.217</td>
<td>-.218</td>
<td>-.297*</td>
</tr>
<tr>
<td>Source Monitoring</td>
<td>.088</td>
<td>.089</td>
<td>.073</td>
<td>.104</td>
<td>.045</td>
</tr>
<tr>
<td>Narrative Memory</td>
<td>.305*</td>
<td>.170</td>
<td>.331*</td>
<td>.209</td>
<td>.330*</td>
</tr>
<tr>
<td>AIPSS</td>
<td>.160</td>
<td>.102</td>
<td>.172</td>
<td>.159</td>
<td>.195</td>
</tr>
<tr>
<td>SFQ</td>
<td>-.059</td>
<td>.200</td>
<td>.178</td>
<td>.272*</td>
<td>.217</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed). tCorrelation is significant at the 0.10 level (2-tailed). TMT-B = Trail Making Test, Form B, AIPSS = Assessment of Interpersonal Problem-Solving Skills, SFQ = Social Functioning Questionnaire, Ill. Awareness = Illness Awareness.
Figure 1. *Results of First Mediational Bootstrapping Analysis for Narrative Development*

Note. Estimates based on 5,000 bootstrap resamples. The indirect effect of narrative development was not significant, \( F(2,36) = 3.0039, CIb = -0.04, 0.13, p = 0.064 \) * \( p < 0.05 \); ** \( p < 0.001 \).
Figure 2. Results of Second Mediational Bootstrapping Analysis for Narrative Development

Note. Estimates based on 5,000 bootstrap resamples. The indirect effect of narrative development was not significant, $F(2,36) = 8.0394$, CIb = -0.0185, 0.1947, $p = 0.0014^*$

$p < 0.05; ** p < 0.001$. 