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## Language and hope in schizophrenia-spectrum disorders

Kelsey A. Bonfils<sup>a,\*</sup>, Lauren Luther<sup>a</sup>, Ruth L. Firmin<sup>a</sup>, Paul H. Lysaker<sup>b,c</sup>, Kyle S. Minor<sup>a</sup>, Michelle P. Salyers<sup>a</sup><sup>a</sup> Department of Psychology, Indiana University-Purdue University Indianapolis, 402N. Blackford St., Indianapolis, IN, United States<sup>b</sup> Psychiatric Rehabilitation and Recovery Center, Roudebush VA Medical Center, 1481W. 10thSt., Indianapolis, IN, United States<sup>c</sup> Department of Psychiatry, Indiana University School of Medicine, 340W. 10th St., Indianapolis, IN, United States

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## ABSTRACT

Hope is integral to recovery for those with schizophrenia. Considering recent advancements in the examination of clients' lexical qualities, we were interested in how clients' words reflect hope. Using computerized lexical analysis, we examined social, emotion, and future words' relations to hope and its pathways and agency components. Forty-five clients provided detailed narratives about their life and mental illness. Transcripts were analyzed using the Linguistic Inquiry and Word Count program (LIWC), which assigns words to categories (e.g., "anxiety") based on a pre-existing dictionary. Correlations and linear multiple regression were used to examine relationships between lexical qualities and hope. Hope and its subcomponents had significant or trending bivariate correlations in expected directions with several emotion-related word categories (anger and sadness) but were not associated with expected categories such as social words, positive emotions, optimism, achievement, and future words. In linear multiple regressions, no LIWC variable significantly predicted hope agency, but anger words significantly predicted both total hope and hope pathways. Our findings indicate lexical analysis tools can be used to investigate recovery-oriented concepts such as hope, and results may inform clinical practice. Future research should aim to replicate our findings in larger samples.

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## 1. Introduction

Hope, often defined as the belief that one's goals can be met, is thought to consist of multiple elements, including pathways and agency cognitions. Pathways cognition involves an appraisal of the possible strategies one could use to accomplish goals; agency cognition involves personal motivation to put these strategies to action (Snyder et al., 1991, 1998). Hope has been identified as an integral factor in recovery for people with schizophrenia (Deegan, 1996; Noordsy et al., 2002; Resnick et al., 2005) and has been described as the most basic step to recovery, in that one must believe recovery is possible and begin to look to the future with optimism (Jacobson and Greenley, 2001). Greater hope has also been associated with reduced symptoms, improved social functioning, a greater sense of personal recovery, greater activation in psychiatric treatment, and better quality of life in people diagnosed with schizophrenia (Kukla et al., 2013a, 2013b; Lysaker et al., 2004, 2008; Mashiach-Eizenberg et al., 2013; Oles et al., 2015).

Despite the integral role of hope in recovery and its importance

for other outcomes, research has yet to shed light on how hope manifests for those with schizophrenia-spectrum disorders. Lexical qualities of speech offer insight into our internal states and play a key role in how others interpret our emotional condition (Wierzbicka, 2009); for example, speech characteristics such as expressivity, complexity, and self-reference have been used to identify and predict emotions and clinical severity among persons with schizophrenia (Hong et al., 2015). Thus, analysis based on lexical qualities may be one way to investigate hope in people with schizophrenia. Although word choice has been and continues to be of interest for mental health professionals in fostering a recovery-oriented, hopeful environment (e.g., see Jensen et al. (2013)), we have yet to focus on clients' lexical qualities and their associations with hope. Behaviorally-based assessment tools (e.g., analysis of speech samples) provide a possible avenue through which to investigate this relationship, and may help overcome inherent limitations in typical pencil and paper measures of hope and recovery (e.g., varied response biases, dependence on respondents' introspective abilities, etc.).

Computerized lexical analysis is a behavioral measure that matches words to predetermined categories reflecting underlying constructs (e.g., emotions) or specific functional groupings (e.g., pronouns). In recent years, computerized lexical analysis has become a popular method with which to conduct in-depth

\* Corresponding author.

E-mail address: [kbonfils@iupui.edu](mailto:kbonfils@iupui.edu) (K.A. Bonfils).

examinations of word usage. This type of analysis has been used to compare lexical qualities in people with and without schizophrenia (Junghaenel et al., 2008; Lee et al., 2007; Leichsenring and Sachsse, 2002; St. Hilaire et al., 2008) and differences are typically detected in emotional categories (though not always, see St. Hilaire et al. (2008) for an exception). More recently, lexical analysis been used to examine correlates of characteristics within schizophrenia samples, such as emotions, symptoms, and functioning. For example, Cohen et al. (2009) linked anhedonia and negative emotion words in schizophrenia, and Minor et al. (2015) linked negative emotion and social words to symptoms, metacognition, and general functioning in this population. Buck et al. (2015) furthered work with anhedonia by investigating anticipatory and consummatory pleasure and lexical qualities, with findings indicating past-words and first-person plural pronouns (e.g., we, our) are associated with both types of pleasure in this population.

Lexical analysis has not yet been used to investigate recovery-oriented concepts such as hope in people with schizophrenia. However, hope and related constructs could influence lexical qualities. In fact, in one popular lexical analysis program, Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2007), several word categories exist that we might expect to directly reflect hope. In their original dictionary (from the 2001 program; Pennebaker et al., 2001), an “optimism” category was available, assessing words such as “hope,” “accept,” and “determined.” The optimism category is available in subsequent versions of the program and will likely capture direct use of hope words. Although hope and optimism are distinguishable constructs, with hope reflecting more affective qualities while optimism is a general cognitive belief in positive outcomes (Scioli et al., 1997), measurement paradigms for hope and optimism are often highly correlated (Scioli et al., 1997; Steed, 2002), supporting our expectation that self-reported hope scores will be correlated with use of optimism words. Some further categories exist that may reflect similar relationships – namely, the “achievement” and “future words” categories. The achievement category contains words like “accomplish,” “confident,” and “opportunity.” These words may reflect goal attainment, or discussion of ways to attain goals, both of which are central to the concept of hope (Snyder et al., 1991). We would also expect hope to be associated with the “future words” category, as many conceptualizations of hope include the anticipation of something good in the future (Kylmä et al., 2006; Snyder et al., 1998), and many hope measures place great emphasis future expectations (Steed, 2002). Considering Snyder's conceptualization of hope, one's perceptions that goals are attainable represents an ability to think about the future and how one's goals may be achieved.

Another area where we may expect associations between lexical qualities and hope is with social words. For example, in schizophrenia samples, social relationships are positively related to hope (Lysaker et al., 2004), and social phobia is negatively related to hope (Lysaker and Salyers, 2007). Further, clients with schizophrenia as well as clinicians have identified supportive relationships as key to instilling hope (Kirkpatrick et al., 1995, 2001). The frequency of social word usage (e.g., “everyone”, “friend”) as measured by lexical analysis may be an indirect measure of social connections (Pressman and Cohen, 2007). Thus, we can expect positive correlations between hope and the “family” and “friend” word categories in the LIWC program.

In addition to social activity, individuals with greater hope tend to display high levels of positive affect and low levels of negative affect (Snyder et al., 1996). Some specific categories in the LIWC program map onto these constructs, including positive emotion words and anger, anxiety, and sadness words. Hope is considered a positive emotion by some (sometimes in response to something bad, as in hoping for improvement) or as a positive or adaptive coping mechanism in the face of adversity (Lazarus and Lazarus,

1994; Scioli et al., 1997), suggesting a possible relationship with increased positive emotion words. There is also considerable work linking increased hope with decreased symptoms of anxiety (Carretta et al., 2014; Feldman and Snyder, 2005; Snyder et al., 1991) and depression (Mathew et al., 2014; Priester and Clum, 1993; Snyder et al., 1991) in healthy samples. Although this work is not as developed in people with schizophrenia, one study showed lower hope to be associated with symptoms of anxiety in this population (Lysaker and Salyers, 2007), and another showed lower hope to be associated with increased depression (Schrack et al., 2014). Thus, a respondent's level of hope may be manifest in speech through examination of these word categories.

One final area where we may expect to see associations with hope is pronoun use. There is a fairly robust literature showing that increased use of first-person singular pronouns (I, me, my) is associated with increased depression or suicidality (Fineberg et al., 2015; Stirman and Pennebaker, 2001; Zimmermann et al., 2016), indicating we may expect to see a negative association between hope and this type of pronoun. Conversely, there is some literature to show use of first-person plural pronouns, such as “we,” could indicate a sense of social connectedness (Tausczik and Pennebaker, 2010), giving reason to expect a positive association with this type of pronoun. Research is less clear in guiding our expectations of associations with hope for second person (you, your) and third-person singular (she, he) and plural (they) pronouns, but studies have shown differences in the use of pronouns across categories in people with schizophrenia as compared to healthy controls and people with depression (Fineberg et al., 2015; Hong et al., 2015; Lee et al., 2007). Thus, while we had hypotheses for first-person singular and plural pronouns, analyses examining other types of pronouns were considered exploratory.

Considering the link between hope, recovery, and improved symptoms and functioning for individuals diagnosed with a schizophrenia-spectrum disorder, further investigation of hope and its assessment are needed. Investigation of hope using lexical analysis has potential to demonstrate clinical utility of this measurement tool and inform clinicians of speech content that may be related to hope and could be used to inform intervention choices. Given the paucity of research examining hope and word usage, this study aimed to examine how these concepts are related in a schizophrenia-spectrum sample. We hypothesized that greater use of words categorized as optimism, achievement, future, positive emotion, or social words (family, friend) would have a positive relationship with hope and its subcomponents (pathways and agency) and that negative emotion words (anger, anxiety, and sadness) would be inversely associated with hope and its subcomponents. We further hypothesized that use of first-person singular pronouns would be negatively associated with hope, while first-person plural pronouns would be positively associated with hope. Finally, we conducted exploratory analyses to examine associations with other pronoun categories: second person, third-person singular, and third-person plural. As our goal was to provide preliminary evidence of clinical utility for the LIWC tool, or to point to clinical applications of language findings, a final goal was to examine associations with hope and its components using multiple regression analyses. Use of multiple regression enables examination of which predictor is the strongest; in busy clinical settings, simplifying language findings to indicate the lexical category with the strongest predictive capabilities is of the utmost importance. We did not have hypotheses regarding which predictor would be the strongest; thus, regression analyses were also considered exploratory.

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