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Personality Traits Predicting Quality of Life and Overall Functioning in Schizophrenia

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Abstract

Introduction—Clinical symptoms and sociodemographic variables predict level of functioning and quality of life in patients with schizophrenia. However, few studies have examined the effect of personality traits on quality of life and overall functioning in schizophrenia. Personality traits are premorbid to illness and may predict the way patients experience schizophrenia. The aim of this study was to examine the individual and additive effects of two core personality traits—neuroticism and extraversion—on quality of life and functioning.

Methods—Patients with schizophrenia-spectrum disorders (n = 153) and healthy controls (n = 125) completed personality and quality of life questionnaires. Global functioning was assessed during a clinician-administered structured interview. Neuroticism and extraversion scores were analyzed both as continuous variables and as categorical extremes (High versus Normal Neuroticism, Low versus Normal Extraversion).

Results—Quality of life was significantly associated with neuroticism, extraversion, and the neuroticism × diagnosis and extraversion × diagnosis interactions. For patients, a lower neuroticism score (in the normal range) was associated with quality of life scores comparable to controls; whereas high neuroticism scores in patients were associated with the lowest quality of life. For overall functioning, only diagnosis had a significant effect.

Conclusion—Neuroticism modulates quality of life and may provide an important key to improving the life of patients with schizophrenia.

Keywords

Neuroticism; Extraversion; Schizophrenia; Quality of Life

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1. Introduction

Quality of life and overall functioning are important clinical outcomes in psychiatry. They represent crucial benchmarks for a more personalized approach to patient care. While people with psychiatric disorders are generally at risk of poor functioning and poor quality of life, those with schizophrenia are especially affected (Bobes et al., 2007). Quality of life is lower in schizophrenia patients who are younger, have more psychotic symptoms, have less contact with family, are in worse financial situations, and have achieved lower levels of education (Bobes et al., 2007; Gardsjord et al., 2016). Overall functioning is lower in schizophrenia patients with more negative symptoms or are unemployed (Chabungbam et al., 2007; Herbener and Harrow, 2004; Rabinowitz et al., 2012). However, much remains unknown about these diagnosis-specific impairments in quality of life and functioning.

Quality of life and overall functioning in schizophrenia can be predicted by antecedent risk factors of the illness, such as temperament and personality (Barrantes-Vidal et al., 2009; Boyette et al., 2014b; Compton et al., 2015; Herrán et al., 2006; Kentros et al., 1997; Lahey, 2009; Lysaker et al., 1998). For example, neuroticism and extraversion are associated with quality of life and overall functioning in schizophrenia (Boyette et al., 2014b; Lahey, 2009; Lysaker et al., 1998), and the effect on quality of life persists when controlling for symptoms and sociodemographic factors (Boyette et al., 2014b, 2014a; Kentros et al., 1997). Moreover, higher neuroticism and lower extraversion are linked to factors that contribute to quality of life, such as passive, avoidant coping, deficits in intrinsic motivation, and greater emotional discomfort (Lysaker et al., 2004; Lysaker and Taylor, 2007; Vohs et al., 2013). Similarly, neuroticism is negatively associated with overall functioning, while extraversion, agreeableness, and conscientiousness are positively associated with overall functioning (Compton et al., 2015). In addition, higher neuroticism and agreeableness scores predict relapse after first-episode psychosis (Gleeson et al., 2005).

While previous studies have demonstrated the predictive value of personality factors for quality of life and overall functioning in schizophrenia, the potential additive effects of personality factors have yet to be explored. For example, a patient with schizophrenia who has both high neuroticism and low extraversion may be more socially isolated, have more trouble holding a job, and have trouble responding to stressful situations—compared to a patient with only high neuroticism or low extraversion--, leading to poor quality of life and overall functioning. Thus, the combined effect of neuroticism and extraversion may represent a more significant risk profile for patients. Furthermore, previous studies examined personality factors in psychotic patients only, though quality of life and overall functioning can be measured in healthy controls as well. Finally, research to date has examined personality factors as continuous variables, although using categorical measures may be more likely to influence clinical treatment (Kagan and Snidman, 2004).

The present study tested the hypothesis that the personality factors neuroticism and extraversion are associated with overall functioning and quality of life in patients with schizophrenia. We hypothesized that the combination of neuroticism and extraversion would predict quality of life and overall functioning, such that patients with higher neuroticism and lower extraversion would have the poorest quality of life and functioning. We also

hypothesized that categorical methods for defining personality would be better at predicting quality of life and overall functioning, such that those with “high” neuroticism and “low” extraversion would have the poorest overall functioning and quality of life. Ultimately, we hope that these extreme categories could make it easier for clinicians to identify patients with schizophrenia who are at risk of poor subjective quality of life and overall functioning.

2. Methods

2.1 Setting and Sample

Participants were recruited as part of an ongoing research study and included 153 patients with schizophrenia-spectrum disorders (38 schizoaffective, 77 schizophrenia, 38 schizophreniform) and 125 healthy control subjects. Psychosis patients were recruited from the Vanderbilt Psychiatric Hospital; healthy controls were recruited via community advertisements. The Vanderbilt University Institutional Review Board (Nashville, Tennessee) approved the study protocol and all subjects completed informed consent. Subjects were considered for the study if they were between the ages of 14 and 65, had pre-morbid IQ scores greater than 70, were not pregnant or lactating, did not suffer from a chronic medical illness (such as diabetes or heart disease) or a central nervous system disorder (such as multiple sclerosis or epilepsy) that might affect the study results, and did not have a history of traumatic brain injury. Control subjects were included if they did not have a history of a psychiatric disorder and patients were included if they had no substance abuse within the last three months. Participants completed self-report measures of personality and quality of life. Trained research staff performed a Structured Clinical Interview of the DSM-IV-TR (SCID) (First et al., 2001). The SCID was used to confirm diagnoses and symptom experiences in patients and to rule out past or present psychiatric illness in psychiatrically-healthy controls. A Global Assessment of Functioning (GAF) score was assigned to each subject as a measure of current level of overall functioning (see Table 1 for subject characteristics).

2.2 Measures and Rating Scales

2.2.1 Personality: Neuroticism and Extraversion—All participants completed the NEO Five-Factor Inventory (NEO-FFI), a well-validated personality self-report questionnaire commonly used in mental health research (Costa and McCrae, 1992). For this study, we focused on the personality traits of Neuroticism and Extraversion based on past research findings (Camisa et al., 2005; Compton et al., 2015; Dinzeo and Docherty, 2007). Neuroticism and Extraversion scores are continuous, ranging from 0 to 48. In a normative sample, the mean Neuroticism subscale score was 15.77 ± 7.47 and the mean Extraversion subscale score was 28.50 ± 6.26 (McCrae and Costa, 2004). Therefore, in addition to the continuous measure, we created categorical variables for High/Normal Neuroticism and Low/Normal Extraversion using the top/bottom 25% of neuroticism and extraversion scores based on the normative distributions (neuroticism scores greater than 20.8 and extraversion scores less than 24.3). This cut-off was chosen to balance standard cut-offs in extreme groups research (typically ± 1 standard deviation or 15%) and practical constraints of having sufficient sample size in the extreme groups (Blackford et al., 2011; Kagan et al., 1988).

2.2.2 Quality of Life—All participants completed the Quality of Life Enjoyment and Satisfaction Questionnaire, Short Form (Q-LES-Q-SF), which is a self-report measure of perceived quality of life during the past week (Endicott et al., 1993). The reliability and validity of the Q-LES-QSF have been verified in independent studies using both healthy controls and patients with schizophrenia and we found similarly high reliability in both groups in the present study (Rapaport et al., 2005; Ritsner et al., 2005; Stevanovic, 2011). The questionnaire is regularly used to measure quality of life in mental health research and in clinical settings. QLES-Q-SF scores are typically expressed as a percent of the maximum score of 70 and in a normative sample, the mean percent maximum score is 0.83 (Rapaport et al., 2005).

2.2.4 Global Functioning—Participants were evaluated using the Global Assessment of Functioning (GAF), which is the final component of the multiaxial diagnostic categorization scheme used in Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (American Psychiatric Association, 2000). The GAF is rated on a 0 – 100 scale; higher scores represent better overall functioning. The reliability and validity of the GAF scale have been verified previously (Startup et al., 2002). Furthermore, GAF scores are frequently used to measure overall functioning in both clinic and research settings.

2.3 Data Analyses

To determine whether the personality traits of neuroticism and extraversion differed as a function of diagnosis (patients/controls), a binomial logistic regression was performed with neuroticism, extraversion, and the neuroticism × extraversion interaction as predictor variables and diagnosis as the outcome variable. For the categorical personality variables, a Cochran-Mantel-Haenszel test was used to examine the association between diagnosis, high neuroticism, and low extraversion.

To assess the effects of diagnosis, neuroticism, and extraversion on quality of life and functioning, analyses of variance (ANOVA) were performed. Diagnosis (dummy coded), neuroticism, extraversion, and their two- and three-way interactions were included as predictors. Neuroticism and extraversion were centered to remove the inherent collinearity with interaction terms. Separate ANOVAs were performed for quality of life and for global functioning. For the categorical analyses, the categorical variables were dummy coded and analyses were performed with diagnosis, $\text{neuroticism}_{\text{cat}}$, $\text{extraversion}_{\text{cat}}$, and the two- and three-way interactions as predictor variables and quality of life or overall functioning as the outcome.

All analyses were conducted using Stata 13 (StataCorp, 2013).

3. Results

3.1 Patient Characteristics

Patients and controls did not differ with regard to sex, mean age, race, and mean parental education (Table 1). Psychotic patients had significantly higher neuroticism scores relative to controls (β = .25 [95% CI: .03, .47], p = .02) but showed no significant difference on extraversion scores. With the categorical approach, patients were significantly more likely to

be in the high neuroticism group ($Q_{(1)}$ = 68.92, p < .001) and in the low extraversion group ($Q_{(1)}$ = 7.44, p = .01) (Table 1 in Supplement).

3.2 Effects of Diagnosis and Personality on Quality of Life and Functioning

When examining the effect of personality traits on quality of life, we found significant effects of diagnosis ($F_{7,270}$ = 18.23, p < .001, η^2 = .06), neuroticism ($F_{7,270}$ = 53.16, p < .001, η^2 = .16), extraversion ($F_{7,270}$ = 13.30, p = .001, η^2 = .05), and the interaction between diagnosis and extraversion ($F_{7,270}$ = 5.36, p = .02, η^2 = .02) (Table 2). Lower quality of life was associated with a diagnosis of schizophrenia (r^2 = .31), higher neuroticism scores (r^2 = .41), and lower extraversion scores (r^2 = .18). With the categorical approach, the findings were very similar with diagnosis, $neuroticism_{cat}$, and $extraversion_{cat}$ all having a significant effect on quality of life. The diagnosis by $neuroticism_{cat}$ interaction was also significant ($F_{7,270}$ = 6.66, p = .01, η^2 = .02), but the diagnosis by $extraversion_{cat}$ interaction was only significant at trend level (p = .08) (Table 3). A post-hoc regression analysis of $neuroticism_{cat}$ on quality of life by diagnosis showed a stronger effect of $neuroticism_{cat}$ on quality of life in the patients (r^2 = .29) than in the controls (r^2 = .10). A comparison of the quality of life means by diagnosis revealed that healthy controls in the normal $neuroticism_{cat}$ group had the highest quality of life, followed by patients with schizophrenia in the normal $neuroticism_{cat}$ group, healthy controls in the high $neuroticism_{cat}$ group and finally patients in the high $neuroticism_{cat}$ group (Figure 1).

For the outcome measure of overall functioning, the only significant effect was for diagnosis (continuous approach: $F_{7,260}$ = 711.57, p < .001, η^2 = .73; categorical approach: $F_{7,260}$ = 660.83, p < .001, η^2 = .72). Patients had lower overall functioning than controls with diagnosis accounting for more than two thirds of the variance in functioning. Neither personality trait significantly increased the prediction of overall functioning beyond the information provided by diagnosis.

4. Discussion

We studied the effects of neuroticism and extraversion on quality of life and functioning in schizophrenia using two different approaches—a continuous approach using dimensional personality measures and a categorical approach using groups that were high on neuroticism or low on extraversion. We found three strong and independent predictors of quality of life: diagnosis, neuroticism and extraversion. In addition, the effects of extraversion and $neuroticism_{cat}$ on quality of life were moderated by diagnosis. This result can be conceptualized as three separate “hits” on quality of life: a diagnosis of schizophrenia, high neuroticism, and low extraversion. In general, neuroticism and extraversion impacted quality of life for both patients and healthy controls. The results of the continuous and categorical approaches were largely similar, with two exceptions: the interaction between diagnosis and extraversion was only revealed with the continuous approach, whereas the interaction between diagnosis and neuroticism on quality of life was only revealed with the categorical approach. Lower extraversion subjects demonstrated lower perceived quality of life than those with average or higher extraversion. In contrast, designating high versus average neuroticism using normative data, revealed that the patients in the average neuroticism group

had higher perceived quality of life than the healthy controls in the high neuroticism group. The significant effect of neuroticism and extraversion on quality of life is consistent with previous studies of patients with schizophrenia (Boyette et al., 2014b; Kentros et al., 1997). By including a large healthy control group, we were able to test the interaction effect of diagnosis and personality traits. The effects of neuroticism and extraversion differed by group and were stronger in the patient groups.

Patients with schizophrenia and high neuroticism had by far the lowest quality of life. Intriguingly, patients with schizophrenia and average neuroticism had better quality of life than the healthy controls with high neuroticism. These results indicate that personality traits impact quality of life, and should be considered in clinical settings after replication of these results. Patients with schizophrenia and high neuroticism should be observed for signs of dissatisfaction with quality of life, such as suicidal ideation (Kao et al., 2012; Kasckow et al., 2007; Yan et al., 2013). Moreover, patients with high neuroticism may benefit from therapies which have been shown to reduce neuroticism and increase extraversion. This has been demonstrated in patients with depression using cognitive-behavioral therapy, treatment with selective serotonin-reuptake inhibitors (SSRIs), and repetitive transcranial magnetic stimulation (rTMS) (Berlim et al., 2013; Ilieva, 2015; Tang et al., 2009). Similarly, the negative affect and maladaptive response to stress experienced by patients with schizophrenia and high neuroticism may be good targets for treatment with metacognitive and insight therapies (REFs) (Dimaggio and Lysaker, 2015; Hillis et al., 2015). Personality scales such as the NEO-FFI are reliable, valid and feasible in clinical practice. Adding them to the standard clinical assessment of patients with schizophrenia may allow for better treatment planning and prediction of outcome.

In contrast to the quality of life results in this analysis, personality traits did not impact overall functioning; only diagnosis had an effect. Results from previous studies examining personality and functioning have been mixed (Barrantes-Vidal et al., 2009; Compton et al., 2015; Herrán et al., 2006; Jones et al., 2009; Lysaker et al., 1998). One possibility is that the failure to detect effects of personality on functioning resulted from a Type II error. However, we believe this is unlikely given the relatively large sample size of both patients and controls. Another possible explanation is that the effect of diagnosis on overall functioning is so large that it hides any smaller effects that personality traits may have.

Finally, we compared dimensional and categorical approaches with the hypothesis that examining the extreme personality groups of high neuroticism and low extraversion would be more predictive of quality of life and overall functioning. However, the results from the two approaches were largely similar, with the exception of the diagnosis × extraversion interaction (significant in the dimensional analysis) and diagnosis × neuroticism interaction (significant in the categorical analysis). While the statistical significance differed by approach, the effect sizes for the interactions were very similar for the two analyses (ranging from η^2 of .01 - .02), suggesting that the small effects were slightly more detectable with one approach or another, depending on small differences in how variance was accounted for. Given the similar findings of the two approaches, we recommend the categorical cut-offs for high neuroticism and low extraversion as a simple and practical screen in clinical settings.

4.1 Limitations

There are several potential limitations to this study. First, the quality of life measure was self-report, which may introduce self-report bias or may be reported differently in patients with schizophrenia. However, a previous study demonstrated excellent validity and reliability with the quality of life measure in patients with schizophrenia and our study replicated these results (Ritsner et al., 2005). Yet, it will be important for future studies to also examine objective measures of quality of life. Second, the quality of life measure is time-dependent, measuring the subject's perceived quality of life only at the time of questionnaire administration; therefore, it is possible that the relationships between personality traits and quality of life may change over the course of illness. Studies that assess quality of life during the prodrome, first episode, and course of illness will be crucial for further characterizing the impact of personality traits on quality of life.

4.2 Conclusions

Diagnosis, neuroticism, and extraversion exert independent and interactive effects on quality of life in patients with schizophrenia. We propose that assessing neuroticism in patients with schizophrenia can provide valuable information that is relatively inexpensive and easy to collect. Patients with average neuroticism scores have better quality of life and patients with high neuroticism scores might benefit from treatment targeting negative affect and high reactivity, core features of neuroticism.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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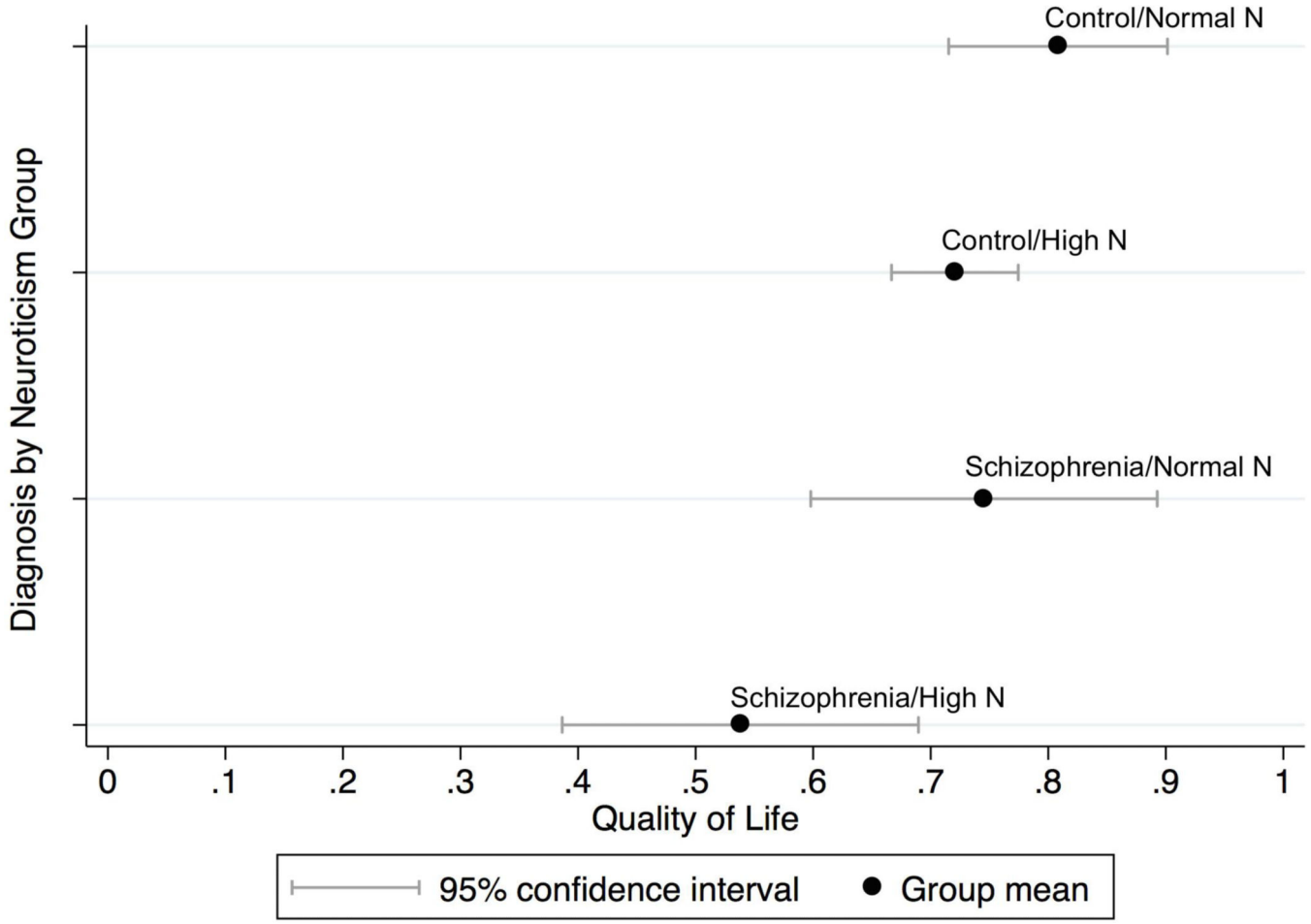

Figure 1.
Mean quality of life for each personality group and diagnosis.

Table 1

Subject demographic characteristics.

	Schizophrenia Patients (N = 153)	Healthy Controls (N = 125)	p-Value
Mean Age	32.35 ± 1.00	30.83 ± 1.03	0.29
Sex			0.16
Male	103	74	
Female	50	51	
Race			0.28
White	93	86	
Black/African American	52	34	
Other	8	5	
Mean Parental Education	13.88 ± 0.28	14.53 ± 0.19	0.05
Mean Age at Onset of Illness	21.08 ± 0.47	--	--
Mean Duration of Illness	10.34 ± 1.19	--	--
Mean Chlorpromazine Equivalent	468.46 ± 26.48	--	--
Mean PANSS Score			
Positive Subscale	18.35 ± 0.54	--	--
Negative Subscale	16.15 ± 0.61	--	--
General Subscale	32.15 ± 0.67	--	--

* significant at α=0.05 level

Table 2

Association between dimensional personality traits, quality of life, and overall functioning.

Quality of Life	Partial Sum of Squares	F	p-Value	Partial η^2
Diagnosis	0.24	18.23	<0.001 *	0.06
Neuroticism	0.70	53.16	<0.001 *	0.16
Extraversion	0.18	13.30	<0.001 *	0.05
Diagnosis * Neuroticism	0.02	1.84	0.18	0.01
Diagnosis * Extraversion	0.07	5.36	0.02 *	0.02
Neuroticism * Extraversion	0.03	2.57	0.11	0.01
Diagnosis * Neuroticism * Extraversion	0.01	0.59	0.44	0.002

Overall Functioning	Partial Sum of Squares	F	p-Value	Partial η^2
Diagnosis	84164.18	711.57	<0.001 *	0.72
Neuroticism	0.51	0.00	0.95	0.000
Extraversion	78.82	0.67	0.42	0.003
Diagnosis * Neuroticism	403.01	3.41	0.07	0.01
Diagnosis * Extraversion	53.09	0.45	0.50	0.002
Neuroticism * Extraversion	91.37	0.77	0.38	0.003
Diagnosis * Neuroticism * Extraversion	9.56	0.08	0.78	0.000

* significant at α=0.05 level

Table 3

Association between categorical personality traits, quality of life, and overall functioning.

Quality of Life	Partial Sum of Squares	F	p-Value	Partial η^2
Diagnosis	0.51	33.63	<0.001 *	0.11
Neuroticism	0.66	43.06	<0.001 *	0.14
Extraversion	0.07	4.33	0.04 *	0.02
Diagnosis * Neuroticism	0.10	6.66	0.01 *	0.02
Diagnosis * Extraversion	0.05	3.08	0.08	0.01
Neuroticism * Extraversion	0.02	1.16	0.28	0.004
Diagnosis * Neuroticism * Extraversion	0.000	0.01	0.92	0.000

Overall Functioning	Partial Sum of Squares	F	p-Value	Partial η^2
Diagnosis	79588.23	660.83	<0.001 *	0.72
Neuroticism	1.38	0.01	0.91	0.000
Extraversion	12.99	0.11	0.74	0.000
Diagnosis * Neuroticism	64.41	0.53	0.47	0.002
Diagnosis * Extraversion	0.36	0.00	0.96	0.000
Neuroticism * Extraversion	30.00	0.25	0.62	0.001
Diagnosis * Neuroticism * Extraversion	221.13	1.84	0.18	0.007

* significant at α=0.05 level