
Influence of perceived stress reactivity, gender and age on neuroticism in a sample of Nigerian university undergraduates

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Abstract

In view of the plasticity perspective of personality dynamics in adulthood, influence of stress reactivity, age and gender on neuroticism was examined in this study. Participants were 221 students of Department of Botany, University of Nigeria, Nsukka. They comprised 111 (50.23%) males and 110 (49.77%) females; and age range was 16-30 years with a mean age of 22.60 years. Data were collected using two instruments, namely, Perceived Stress Reactivity Scale and Neuroticism scale of the Symptoms Distress Checklist. Results of a 3-way ANOVA indicated main effects of stress reactivity, gender and age on neuroticism. The effect sizes of the contributions to neuroticism by stress reactivity, gender and age were 2%, 11% and 40% respectively. It was suggested that mental health initiatives which are geared towards preventing or reducing neurotic difficulties among students in higher institutions may benefit from consideration of differential stress reactivity and adopt age/gender-specific approaches in intervention.

Key words: age. gender. neuroticism. personality. stress reactivity.

Numerous studies in personality psychology have focused on personality traits (for review, see Corr & Mathews, 2009). Personality traits are aggregate characteristics and qualities displayed by an individual over time and across different situations. It has also been observed that most people's personality traits evolve throughout their lives based on the plasticity perspective of personality dynamics which is evident in cross-sectional and longitudinal studies (Roberts, Walton & Viechtbaver, 2006; Terraciano, Costa & McCrae, 2006). Hence psychological research continues to make significant advances in the identification of biopsychosocial factors that may account for the variations in personality traits. It is further believed that individual differences in psychological distress and mental health are partly rooted in personality characteristics (Friedman, 1990); and among the primary dimensions of personality, neuroticism is the chief determinant of mental health outcomes (Watson & Clark, 1984).

Neuroticism or negative affectivity is a stable and heritable personality trait that involves a temperamental sensitivity to negative stimuli (Tellegen, 1985). It is the tendency to experience negative emotional states and constitutes an enduring personality trait. Eysenck and Eysenck's (1964, 1975, 1985) personality theory considers neuroticism as one of the three central behavioural attributes which is found in various degrees in a normal population. Neuroticism, according to Eysenck's theory, is based on activation thresholds in the sympathetic nervous system or visceral brain. Neurotic people, who have low activation thresholds, and who are unable to inhibit or control their emotional reactions, experience negative affect (fight-or-flight) in the face of very minor stressors - they are easily nervous or upset. By implication, individuals who score high on measures of neuroticism may be more likely to experience such feelings as anxiety, anger, envy, hostility, guilt and depressed mood. They may be prone to interpreting ordinary situations as threatening and minor frustrations as hopelessly difficult; often self-conscious and shy, and may have trouble with self-regulation. Generally, neuroticism reflects individual differences in behaviour which are thought to be pervasive across different situations. Researchers (Eysenck & Eysenck, 1985; Eid & Diener, 1999) have also observed that neuroticism is associated with more variability in behaviour and experience. Consequently, it is important to consider the role of individual, developmental and

social factors in neuroticism because of neuroticism's significance as a risk factor in psychopathology (For reviews, see Costa & McCrae, 1980; Malouff, Thorsteinsson & Schutte, 2005; Griffith, Zinbarg, Craske, Mineka, Rose, Waters & Sutton, 2009).

The public health and educational relevance of neuroticism have also been demonstrated by studies on the personality-psychopathology association within a network of traits and symptoms (Gainey, 2011; Lahey, 2012, Magee, Patrick & Leonie, 2012). Specifically, high levels of neuroticism have been found to be associated with higher risk of major depression (Fanous, Neale, Aggen & Kendler, 2007), increased risks of psychiatric morbidity among individuals with anxiety and mood disorders (Griffith, et al., 2009), memory problems (Neupert, Mroczek & Spiro, 2008) and poor problem solving (For reviews, see Owen, 2007). A relatively recent study (Cuijpers, Smit, Penninx, de Graaf, ten Have & Beekman, 2010) indicated that the economic costs of neuroticism are more than the costs of mental and physical illnesses not only because neuroticism is associated with those disorders but also due to its contributions to somatoform and personality disorders. Thus, there is need to accumulate further evidences of factors that contribute to neuroticism in order to guide effective interventions. The present study examines the influence of stress reactivity, gender and age in neuroticism in a sample of Nigerian undergraduates.

Perceived stress reactivity is a psychological construct used to explain individual differences in issues of health development, behavioural adaptation and clinical intervention (Lovallo & Gerin, 2003; Buske-Krishbaum, Ebrecht, Kern, Gierens & Hellhammer, 2008). It refers to the tendency of an individual to respond to stressful situations with immediate and long-lasting physiological and psychological reactions. According to Bolger and Schilling (1991), it is the difference in distress associated with a unit change in exposure to and response to stressors. As individual differences in response to stressors, stress reactivity assumes that stress responses within individuals are not only relatively stable over response systems, stressors and time (Cohen, Hamrick, Rodriguez, Feldman, Rabin & Manuck, 2000; Scholtz, Zoccola, Jansen & Schulz, 2011) but also variable depending on previous and current exposure to chronic stressors (Sliwinski, Almeida, Smyth & Stawski, 2009). Consistent with Scholtz's et al.'s (2011) definition, stress reactivity is operationalized in the present study as an individual's perceived typical response intensity aggregated across different potentially stressful situations in everyday life.

The popular view in stress research is that neuroticism leads to distress through greater exposure to stressful events, increasing stress reaction or through some other mechanisms unrelated to environmental events (Bolger & Schilling, 1991; Mroczek & Almeida, 2004; Abbassi, 2011). However, it is possible that stress reactivity may also contribute to neuroticism. Thus as neuroticism has been found to be associated with stress, stress reactivity may also influence the level of one's neurotic characteristics. The interactional or transactional model of stress is a useful approach in understanding the linkage of stress and personality traits (Lazarus & Folkman, 1998). It considers the stressor, the perception of the situation and the response as the fundamental basis of stress. In other words, the model incorporates the stimulus-based model (stressor characteristics) and response-based model (typical stress reactions) as components of the stress experience.

The considerations of person-situation interactions has also become an explicit component of contemporary trait-based approaches to personality as shown by researchers who have adopted the social cognitive approach (see, Bernstein, Penner, Clarke-Stewart & Roy, 2006). Reciprocal determinism of the human personality is the dominant proposition in Bandura's (1999) social cognitive theory of personality. This notion suggests that personality is shaped by the ways in which personal factors (e.g., thoughts, feelings and biological events), situation and behaviour interact and influence one another. For instance, a student's typical response to stressors may lead to exhibition of neurotic traits which creates more neurotic thoughts and feelings. Similarly, the stress reactions may be offensive to other people, thereby creating a mutually threatening environment which may make the student to think and act in a more emotionally unstable way. Thus, as the environment is perceived to be more threatening, a self-fulfilling prophecy ensues.

Situation-behaviour profile as the locus of consistency in personality was further advanced by Cognitive Affective Personality Systems (CAPS) theory of personality dynamics (Mischel, Shoda

& Mendoza-Denton, 2002). This view upholds that learned patterns of thoughts and feelings influence previously stable behaviour, and thus, behaviour and its consequences alter cognitive activity as well as future behaviours. Additionally, possible influence of stress reactivity on neuroticism can be understood within the framework of cognitive continuum theory (Hammond & Summers, 1972) - an adaptive theory of human behaviour that focuses on the dynamic relationship of the organism-environment interaction. It maintains that neurotic behaviour may result from environmental demands and the outcome of the responses to those demands.

Empirical supports for self-reported stress reactivity appear to be quite few and very recent in psychological research. Among the existing studies, there are recent evidences of associations between stress reactivity and neuroticism (Gainey, 2011; Bolton, 2012). Barnhofer and Chittkab (2010) found that stress reactivity moderated the role of maltreatment on emergent dimensions of personality such as neuroticism. Scholtz, et al. (2011) found that a positive association exists between stress reactivity and neuroticism. Other researchers (Vickers, Walton-Paxton, Hergig & Conway, 1992; Pruessner, Gaab, Hellhammer, Lintz, Schommer & Kirschbaum, 1997) also reported that stress reactivity explained some useful variance in neuroticism but the measures of stress reactivity used in these earlier studies, except Scholtz, et al. (2011), fell short of aggregating the typical responses in specified situations of everyday life.

Most of the earlier studies have focused on stress reactivity based on general experiences instead of highlighting typical responses in specific daily life situations. Evidences of conflicting findings regarding the stress-neuroticism association also exist (For review, see Agrigoroaei, Michael & Lachman, 2011). Therefore, in assessing stress reactivity, a relatively recently developed (Schulz, Jansen & Scholtz, 2005) and recently refined (Scholtz, et al., 2011), temporally stable, specific and useful measure of stress reactivity was adopted in the present research. It was hypothesised that there will be no significant difference in neuroticism between students high in stress reactivity and those low in stress reactivity (H_1).

On the possible role of some demographic variables especially gender in neuroticism, the socio-cultural approach upholds that differing distributions of men and women into roles could be seen as the primary origin of sex-differentiated behaviour, although their impact could be mediated by other psychosocial processes (Eagly, 1997). In support of the potential usefulness of this social explanation, Fanous, et al. (2007) did not find a significant difference in the genetic contribution to neuroticism. Among twins, gender differences in neuroticism have been documented (Vickers, et al., 1992). Specifically, several researchers have found that females reported higher mean levels of neuroticism than males (Katz & McGuffin, 1987; Lynn & Martin, 1997; Costa, Terracciano & McCrae, 2001; Goodwin & Gotlib, 2004; McCrae, Terracciano, et al., 2005). The present study seeks to extend the findings of these previous studies in terms of not only whether male and female students would differ in neuroticism but also establishing the magnitude of variance in neuroticism which can be explained by gender. It was hypothesised that female students would report significantly higher levels of neuroticism than male students (H_2).

A number of studies have highlighted the relevance of developmental stage factors in understanding personality (Goldberg, 1992; Viken, Rose, Kaprio & Koskenvuo, 1994; Charles, Reynolds & Gatz, 2001). A key factor in most developmental considerations of neuroticism is age, and it appears there is consistent and well-documented evidence of age differences in neuroticism (Costa & McCrae, 1992; Viken, et al., 1994; Caspi & Roberts, 1999). Age was operationalized in this study as the self- indicated number of years a student has lived his/her life. The central question remains whether older students would score higher on neuroticism measure than younger students. According to socio-emotional selectivity theory (Carstensen, 1995), older persons may perceive limited time left in life which increases their motivation to select environments that optimize emotional functioning.

In general, older persons have been found to report lower levels of neuroticism than younger ones (Charles, et al., 2001; Mroczek, 2001; Mroczek & Almeida, 2004; [Chapman, Duberstein, Sörensen & Lyness, 2007](#)). The findings are consistent with the socio-emotional selectivity theory (Carstensen, 1995) which postulates that older persons may perceive limited time left in life which

increases their motivation to select environments that optimize emotional functioning. In other words, they are both motivated and capable of regulating the behavioural attributes of neuroticism. Chapman, et al. (2007) recommended the continuous investigation of age differences in neuroticism among diverse samples. The present research adopts a within-cohort investigation of possible age differences in neuroticism among students who are assumed to be young adults. It was hypothesized that younger students would report significantly higher levels of neuroticism than older students (H_3).

METHOD

Participants

Participants were two hundred and twenty one (221) randomly selected students of Department of Botany, University of Nigeria, Nsukka. Age of the participants ranged from 16-30 years with a mean age of 22.60 years. One hundred and eleven (50.23%) of the participants were males while 110 (49.77%) were females. With respect to year of study, 75 (33.94%) were in first year, 50 (22.62%) were in second year, 56 (25.34%) were third year students and 40 (18.10%) were final year students. Using the mean stress reactivity score (22) as cut off, 94 students (42.53%) were in the high stress reactivity group while 127 (57.47%) were in the low stress reactivity group. They were all Christians. Participants who were above 22 years in age ($M_{age} = 22.60$) were categorized as older while those who were below 22 years were categorized as younger students.

Instruments

Two research questionnaires were completed by the participants: Perceived Stress Reactivity Scale (PSRS) and the neuroticism scale of the Symptoms Distress Checklist (SCL-90).

Perceived Stress Reactivity Scale (PSRS)

The 23-item PSRS was originally developed by Schulz, Jansen and Scholtz (2005) in Deutsch. The English version of PSRS was validated by Scholtz, et al. (2011). It assesses typical stress response intensity aggregated across different potentially stressful situations in everyday life. The responses are scored on a 3-point likert-format ranging from 0-2. Examples of items in the instrument are: When I argue with people, I usually calm down quickly; when I have little time for a job to be done, I usually calm down, e.t.c. Samples from Germany, United Kingdom and United States were used in establishing the measurement invariance, reliability and validity of the PSRS (Scholtz, et al., 2011). The instrument showed a high internal consistency (Cronbach's alpha) exceeding .80 in all the three samples. It also demonstrated divergent validity with social desirability scale (-.27 and -.29) and general self efficacy (-.44 and -.38) for the United States and United Kingdom samples. A moderate reliability (Cronbach's alpha) of .46 was obtained in this study. Since higher scores on the PSRS indicate higher levels of reactivity to stress (Scholtz, et al., 2011), the mean score of 22 was used in categorizing the participants in this present study. Scores higher than 22 indicated high stress reactivity, while scores lower than 22 indicated low stress reactivity.

Neuroticism Scale

This is a scale of the Symptoms Distress Checklist (SCL-90) developed by Derogatis, Lipman and Covi (1977). It consists of 6 items. Respondents indicate their experience of such problems as poor appetite, sleep that is restless or disturbed, thoughts of death or dying, e.t.c., using a 5-point response format ranging from not at all (0) to extremely (4). Derogatis, et al., (1977) reported alpha coefficients which ranged from .70 to .90. Erinoso (1996) reported concurrent validity coefficients of .47 between the neuroticism scale and Omoluabi's (1996) Retirement Stress Inventory.

Procedure

Questionnaire forms, prepared by the researchers, were administered to the students with the aid of 3 trained research assistants. The students were approached in their classrooms and after establishing adequate rapport and explaining the purpose of the visit, the forms were given to those who were willing to participate in the study. There was no reward for participation in the study. Two hundred and fifty (250) questionnaires were distributed but 234 (88.40%) copies were returned and 221 (94.44% of the returned questionnaires) yielded usable data for analysis.

Design/Statistics

The study adopted a cross-sectional design. A 3-way Analysis of variance (ANOVA) was used to analyse the data with two levels of stress reactivity (high and low), gender (male and female), and age (younger and older).

RESULTS

Table 1: Mean (M) and Standard Deviation (SD) of neuroticism scores across the independent variables

Source	Group	n	M	SD
Stress reactivity (SR)	High SR	94	18.28	3.71
	Low SR	127	17.94	3.67
Gender	Males	111	18.20	2.73
	Females	110	15.07	2.65
Age	Younger	115	20.24	2.95
	Older	106	15.85	2.98

Note: n = number of participants by group; M = Mean; SD = standard deviation

The descriptive statistics in Table 1 indicated that participants who were high in stress reactivity had a neuroticism mean score of 18.28 (SD = 3.71) while participants who were low in stress reactivity obtained a neuroticism mean score of 17.94 (SD = 3.67). Male students also obtained a mean score 18.20 (SD = 2.73) and female students obtained a neuroticism mean score of 15.07 (SD = 2.65). Younger students obtained a neuroticism mean score of 20.24 (SD = 2.95) while the mean score for older students on neuroticism was 15.85 (SD = 2.98).

Table 2: ANOVA results of influence of stress reactivity, gender and age on neuroticism

Source	SS	DF	MS	F	Eta sq
Stress reactivity (SR)	40.36	1	40.36	4.84*	.02
Gender	90.70	1	90.70	10.88**	.11
Age	1176.94	1	1176.94	141.22**	.40
SR X gender	4.45	1	4.45	.53	2.50
SR X age	.02	1	.02	.00	1.01
Gender X age	3.69	1	3.69	.44	2.07
SR X gender X age	1.92	1	1.92	.23	1.08
Error	1775.16	213	8.33	.23	
Total	75674.00	221			
Corrected total	2985.93	220			

Note: * $p < .05$; ** $p < .001$; SS = Sum of squares; DF = Degrees of freedom; MS = Mean square; F = F-value; Eta sq = Eta squared (effect size).

The 3-way ANOVA revealed a significant main effect of stress reactivity on neuroticism {F (1, 213) = 4.84, $p < .05$ }, with students in the high stress reactivity group reporting more neuroticism than students in the low stress reactivity group. The partial eta squared (.02) showed that about 2% of the variance in neuroticism was attributed to the influence of stress reactivity. There was significant gender differences in neuroticism {F (1, 213) = 10.88, $p < .001$ } with males reporting higher neuroticism than females. The associated effect size (.11) indicated that about 11% of the variance in neuroticism was explained by gender. There was significant age differences in neuroticism {F (1, 213) = 141.22, $p < .001$ } with younger students obtaining higher scores on neuroticism than older students. The partial eta squared (.40) indicated that age accounted for about 40% of the variance in neuroticism among the students. The ANOVA results did not indicate any significant interaction effects.

DISCUSSION

The purpose of this study was to investigate the influence of perceived stress reactivity, gender and age on self-report of neuroticism in a sample of undergraduates in University of Nigeria, Nsukka. It was expected that there will be a significant difference in neuroticism between participants high in stress reactivity and those low in stress reactivity. This hypothesis was supported by the findings of this study. Previous studies (Vickers, et al., 1992; Pruessner, et al., 1997) have also reported similar findings. The finding supports the views of social cognitive theory (Bandura, 1999), Cognitive Affective Personality Systems (CAPS) theory (Mischel, Shoda & Mendoza-Denton, 2002) and cognitive continuum theory of personality (Hammond & Summers, 1972). Increased reactivity to stress in daily life may precipitate the likelihood of increased levels of neurotic difficulties.

Conceptually, to the extent that neuroticism is similar to negative affectivity - the disposition to experience negative affect even when provoking events are remote or absent (Watson & Clark, 1984) – the low effect size of 2% variance in neuroticism explained by stress reactivity can be due to this similarity of stress reactivity and negative emotionality. Activities that students engage in may be inherently stressful such as examinations and meeting deadlines for submission of assignments and registration processes, but effective self-monitoring and volitional control would diminish the temperamental traits on neuroticism. Generally, perceived stress reactivity appears to be appropriate construct in identifying students who experience negative psychosocial outcomes and psychophysiological problems in the course of their academic pursuits.

There was a significant difference in neuroticism between male and female students. But contrary to our hypothesis, it was found that males reported higher levels of neuroticism than females. This finding is inconsistent with the dominant findings of previous studies which found evidences that females reported higher neuroticism than males (Katz & McGuffin, 1987; Lynn & Martin, 1997; Costa, et al., 2001; Goodwin & Gotlib, 2004; McCrae, et al., 2005). The higher neuroticism in males implies that such findings on gender differences in neuroticism may play a role in the inconsistent reports of gender difference in mood disorders (See Wilhelm & Parker, 1994). Some of the studies available to the present researchers which found that females reported higher neuroticism than males were conducted in western cultures. The current socio-environmental condition may imply that the social roles of male students in contemporary Nigerian society increase the neurotic tendencies. Mental health initiatives that are geared towards preventing or reducing negative affect among students in higher institutions may benefit from consideration of such gender-specific approaches to intervention. The eta squared of 11% obtained in the present study is more than the effect size reported in a previous research (Budaev, 1999) but less than what was reported in some other studies (Costa, et al., 2001; Chapman, et al., 2007).

There was a significant main effect of age on neuroticism. The hypothesis that younger students will report higher neuroticism than older students was confirmed. Previous studies on non-student populations (Viken, et al., 1994; Mroczek & Almeida, 2004) have reported similar findings. The variance (40%) of neuroticism explained by age was moderate but higher than the variance explained by both stress reactivity and gender. It is possible that age, as a developmental factor, contributes more to neuroticism than any of the other variables examined in this study. The present finding supports the socio-emotional selectivity theory (Carstensen, 1995). It could be argued that from early ages, social influences make people develop different ways of coping with life and experiencing the world. Therefore, as people get older, they become more capable of regulating their emotions. The older students may have learnt to be more flexible, motivated, exercise willful control of their emotions and think more clearly and adaptively than the younger students. Interventions to reduce or prevent neuroticism could target people at younger ages than later in life. Efforts should also be made to provide adequate guidance to younger students in the course of their academic pursuits.

The significance of this study was established through the determination of appropriate effect sizes of the variances explained by stress reactivity, gender and age in neuroticism among the sample of students. Although the effect sizes in this study were not high, Dancy and Ridey (2002), observed that small to medium effect sizes are more likely in psychological research. Students who have high

scores on neuroticism could be provided with adequate psychosocial interventions which are tailored to their needs. Another contribution that gives credence to this study is that stress reactivity was assessed with a measure of stress reactivity (Schulz, et al., 2005) which describes a variety of stressful situations encountered in everyday life, and a variety of potential responses to stressful situations was generated because in principle, the individual may achieve that response if the situation occurred. Such stressful situations which apply to students include high work load, social conflicts, negative social evaluation and task failure.

However, the findings of the present study need to be considered in terms of some limitations. Due to the cross-sectional design, causality was not examined. The utilization of integrated single-point self-report of typical stress responses as was adopted in this study is one of the mechanisms for assessment of perceived stress reactivity. But stress reactivity can also be measured by repeated real-time sampling of stress responses. Longitudinal or cross-sequential psychological assessment of stress responses in multiple samples may have also yielded better research outcomes. The convenient sample of participants in this study was drawn from a department in a Nigerian university. Hence, the results cannot be adequately generalized to all students. Future studies need to have a more representative sample of students that cut across the fields of study in the current Nigerian university system which is becoming increasingly dynamic. Newer insights on the linkage between stress reactivity and neuroticism could be revealed if moderating variables are incorporated in such studies. Finally the construct of stress reactivity merits further research interest and attention in relation to psychopathological traits by researchers in Nigeria.

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