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Research article

The extraversion-neuroticism and geriatric depression relations: do social engagements and social supports have roles to play?

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ABSTRACT

Evidence on the social pathways by which personality traits associate with depressive feeling is lacking. This study assessed the mediating roles of social engagements and social supports on the associations of extraversion and neuroticism with depressive symptoms among 465 older adults ($Mean_{age} = 74.18 \pm 9.42$) recruited from the senatorial districts of Ekiti State, Nigeria. Major assumptions were tested in structural equation modelling framework. High extraversion influenced both high engagements in social activities and perceived social supports, and then low depressive symptoms. High neuroticism predicted both low social engagements and social supports, and then increased depressive symptoms. While a full mediation was established between extraversion and depression, a partial one was found between neuroticism and depression. The total effect of neuroticism on depression surpassed that of extraversion. Psychotherapeutic interventions targeting depression from high neuroticism may aim frequent social engagements and seeking family and non-family supports.

1. Introduction

There is overwhelming evidence that personality traits have significant roles to play in depressive symptomatology across the life span (Distel et al., 2015). Even in ancient times, Hippocrates and subsequently Galen, already linked personality to depression by positing that specific "humors" accounted for particular personality types and manifestation of psychopathology (Klien et al., 2011). The impact of personality on affective states such as depression can be attributed to the dynamic, stable and overarching influence of traits on both temperament and character. While temperaments have strong biological and genetic foundations, character is more determined by experience. According to the dynamic precursor model, early temperamental tendencies provide a baseline risk for onset of depression but later modified by experience to produce "personality liability to depression" (Klien et al., 2011, p.5). Likewise, the dynamic predisposition model (Ormel et al., 2001) recognises the exchange between personality and experience in determining depression is such a way that adverse life events not only lead to depression but predisposes vulnerability of personality to depression (Middledorp et al., 2008).

Among the "Big Five" personality traits (John and Srivastava, 1999), extraversion and neuroticism are demonstrated to have consistent link with depressive symptoms. For example in a very recent study, increase in neuroticism trait predicts greater level of depression among older adults (Chen et al., 2020). Similarly, Elliot et al. (2019) demonstrated that elevated scores on neuroticism are associated with high scores on depressive symptoms in a sample of community older adults. Nouri et al. (2019) also provide evidence that high neuroticism constitutes significant risk factor to depressive manifestation. In contrast, studies show that extraversion is a buffer against depression. Extraversion does not only predict lower depression scores, it also plays a significant role in mitigating the influence of neuroticism on depressive symptoms (Klinger-König et al., 2018). Extraversion and neuroticism are respectively protective and risk factors of depression, however, the effect of neuroticism may go beyond that of extraversion (Lee et al., 2018; O'Shea et al., 2017).

Given the significant relations of extraversion and neuroticism with depression among older adults, it becomes necessary to determine the pathways through which these associations occur. For instance, Chen et al. (2020) showed that rumination partially mediated the relationship between neuroticism and depression. That is, neurotic trait predicted increase in rumination and then, increase in depressive symptoms. Asides rumination, it is demonstrated that self-efficacy and aging perception are significant mediators of the

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influences of extraversion and neuroticism on depression. While increase in extraversion predicted low depressive symptoms through high self-efficacy and positive aging perception, high neuroticism was found to relate with low self-efficacy and negative aging perception to determine greater level of depression (O'Shea et al., 2017). High neuroticism can predispose bitterness revival, emotional discharge and use of avoidance coping styles which may in turn lead to presentation of depression among institutionalized older adults (Fernández-Pérez et al., 2020).

One steady pattern in these studies is that they investigated the mediating roles of internal or cognitive factors in the relationship between extraversion/neuroticism and depression without considering external mediators. In addition to the existing knowledge on the mediating roles of person-level factors in the personality-depression link, there is need to understand the external or environmental pathways to this relation given that behaviour is also determined by social level variables as postulated in the Kurt Lewin Field Theory (Burnes and Cooke, 2013).

In this regard, two key social variables that have been linked with personality and depression in the gerontological literature are social engagements and social supports. Social engagement - the involvement in social and productive activities - is shown to be influenced by personality factors at old age. For example, extraversion is predictive of higher likelihood of participating in exercise and socializing (Newton et al., 2018). Also, older adults with high composition of agreeableness trait are more engaged in community services and overall social engagements (Lodi-Smith and Roberts, 2012). Studies documenting the association between neuroticism and social engagement is almost non-existent, however, Segel-Karpas and Lachman (2018) noted that the individuals with high neuroticism might consider social contact as stressful, and thus, may engage in less social activities. On the other hand, there is abundance of literature linking social engagement with depressive feeling. The direction of this relationship is consistently a negative one where increase in social engagement predicts low symptoms of depression or negative affect (Hao et al., 2017; Park et al., 2013).

As an outcome of social engagement (Tang et al., 2017), social support is conceptualized as the overall provision of emotional and material resources by significant other, friends and family members (Zimet et al., 1988). Liu et al. (2020) documented that friend, family and government support associated with lower depressive symptoms among community older adults in China. In a systematic review of 75 studies, Worrall et al. (2020) also reported social support as one of the protective factors against depressive symptoms in later-life. Further, the relationship between personality trait and reception/perception of support is evident in the study of Lee and Martin (2019). While extraversion predicted increase in spousal support, neuroticism was found to be associated with low support from spouse. Respectively, extraversion and neuroticism were found to correlate positively and negatively with reception of affective and emotional support in a sample of oldest-old adults (Etxeberria et al., 2019).

Considering the established links among social engagements, social support, extraversion/neuroticism and depression, this study aims to examine the individual and the successively mediating roles of social engagements and social support perception in the extraversion-neuroticism and depression relations. Hence, we hypothesized that the associations of extraversion and neuroticism with depression will be individually and successively mediated by social engagements and social support. Outcomes will broaden the existing knowledge on the mechanism through which personality traits influence depressive symptoms by considering the multiple mediating roles of social engagements and social supports.

2. Method

2.1. Sample and procedure

In this study, a cross-sectional data of 465 community older adults comprising 294 women and 171 men with $mean_{age}$ 74.18 ± 9.42 were recruited by means of multi-stage sampling technique. Sampling was done in three stages. First, using the balloting technique, we randomly selected six local government areas (LGAs) out of the three senatorial districts of Ekiti State, Nigeria. The next stage involved a random selection of three communities from four out of the six selected LGAs. One community was chosen from each of the two remaining LGAs because of the homogeneousness of their population. Finally, participants were selected for face-to-face interviews in their homes by means of quasi-systematic random method which involved inclusion of participants whose house and street addresses were assigned odd numbers. In all, our sample covered 14 communities in the State. Other inclusion criteria were being cognitively intact (which was determined at the initial rapport), aged 60 years and over, and ability to communicate in English or Yoruba language. This study was approved by the institutional review board of Ekiti State University, Nigeria. Verbal or written informed consents were obtained from community Kings and participants before interview. Participants were rewarded with airtime for voice call for taking part in the study.

2.2. Instruments

2.2.1. Dependent variable

We assessed depression by utilizing the Geriatric Depression Scale (GDS-5 items) developed by Rinaldi et al. (2003). The scale is evaluated on a "No (0)" or "Yes (1)" answer format. The authors reported the GDS-5 items to be equally as effective in measuring geriatric depression as the GDS-15 items (Sheikh and Yesavage, 1986). Olawa et al. (2020) showed the GDS- 5 items to be psychometrically appropriate in measuring depression in the present sample. The higher the scores, the more depressive symptoms reported.

2.2.2. Independent variable

We measured personality by means of the 10-item Big Five Inventory (Rammstedt and John, 2007). Similar to previous BFI versions, the BFI-10 assesses personality from five domains: neuroticism, openness, extraversion, conscientiousness and agreeableness. The extraversion and neuroticism domains were only analysed considering the purpose of this study. A satisfactory two-week test-retest reliable coefficient and factorial validity have been provided for the BFI-10 using the present sample (Olawa and Idemudia, 2019). Higher scores represent high composition of traits in each domain.

2.2.3. Mediating variables

We assessed social engagement by utilizing an adapted version of the social engagement measure developed by Mendes de Leon et al. (2003). The adaptation process can be found in a previous work (Olawa et al., 2019) that utilized the current sample of older adults. Activity engagements cover 8 items which include visitation to children and other family members, attendance of traditional ceremonies, attendance of religious meetings, engagement in grass-root political activities, going out and drinking with friends, involvement in unpaid and paid works, and game playing. Responses to these items except for religious attendance range from *never* (0) to *often* (2). Response format on religious attendance range from *never* (0) to *four times or more in a week* (4).

Social support was measured using the social support subscale of the Duke Social Support and Stress Scale (Parkerson et al., 1989). Consisting of 12 items assessed on a three-point scale (*none* [0] to *a lot* [2]), the

social support subscale measures perception of social support from non-family and family members. Olawa et al. (2019) reported the validity and reliability of the social engagement measure and the Duke Social Support subscale using the present sample.

2.2.4. Control/socio-demographic variables

We also asked questions regarding age, sex, widowhood status, education and status of employment and bereavement.

All instruments were *transadapted* using internationally recommended guidelines (International Test Commission, 2017).

2.3. Statistical analyses

Descriptive statistics and Pearson's correlation were conducted in IBM® SPSS® version 20.0. Structural equation modelling (SEM) were performed in IBM® SPSS® version 26 using the maximum likelihood estimation method. Model fit was assessed using both absolute (χ^2 statistics) and common relative fit indices such as the standardized root-mean-square residual (SRMR), root-mean-square of approximation (RMSEA) and comparative fit index (CFI). For the absolute fitness, the χ^2 value must be non-significant (i.e. $p < .05$) while the CFI must be greater than .90, SRMR and RMSEA less than .06 for relative fitness (Kline, 2011). Data distributions on all continuous variables were moderately normal given that kurtosis and skewness scores were between -1 and 1 (Blanca et al., 2013). Since less than 15% of cases on each continuous variable were missing, we replaced missing scores with mean values (Hair et al., 2010).

3. Results

3.1. Bivariate relationships between socio-demographics and continuous variables

Descriptive statistics and correlations among study variables are displayed in Table 1. Sex and education were significantly associated with extraversion, neuroticism, social engagements and social supports. Specifically, being female and having less education were associated with high extraversion and neuroticism while being of the male gender and having more education were associated with high social engagements and support. Also, age, family type, widowhood and employment status were significantly related with social engagements and supports. Lower age, monogamy, and not being a widow were associated with high social engagements and support while being self-employed was correlated with high social engagements and supports, and low depressive symptoms. However, depression was not significantly associated with sex, family type, widowhood and education.

3.2. Bivariate relationships among continuous variables

As shown in Table 1, depression was negatively related with extraversion ($r = -.12$, $p = .01$), social engagements ($r = -.16$, $p < .001$) and social supports ($r = -.17$, $p < .001$) but positively associated with neuroticism ($r = .26$, $p < .001$). Surprisingly, extraversion was not significantly related to social engagements ($r = .06$, $p = .18$) but positively associated with social support ($r = .16$, $p < .001$). Neuroticism was found to be negatively associated with both social support ($r = -.20$, $p < .001$) and social engagements ($r = .16$, $p < .001$).

3.3. Preliminary analyses

In non-mediation models, preliminary results showed that extraversion ($\beta = -.10$, $p = .02$), neuroticism ($\beta = .26$, $p < .001$), social support ($\beta = -.17$, $p < .001$) and social engagements ($\beta = -.16$, $p < .001$) were significant on depression. Extraversion predicted both social engagements ($\beta = .09$, $p = .03$) and social supports ($\beta = .18$, $p < .001$). The influence of neuroticism on social engagements ($\beta = -.15$, $p < .001$) and social supports ($\beta = -.17$, $p < .001$) were also significant. We further tested the influence of all socio-demographics on the endogenous variables of social engagements, social support and depression in an initial SEM model in order to determine their inclusion as controls in the final analysis. Outcomes showed that family type, widowhood and education were not significant on all endogenous variables and thus, were excluded from final analysis. Employment was found to be significant on social engagements ($\beta = .18$, $p < .001$) but was added as control in the final model because it is a component of social engagement. Age ($\beta = -.27$, $p < .001$) and sex ($\beta = -.12$, $p = .008$) were significant on social engagements but not on social supports and depression. Hence, we regressed age and sex not only on social engagements but also on social support - the second mediator variable - in order to achieve an improved model fit.

3.4. Mediation analyses

The mediation model with standardized estimates are displayed in Figure 1. The model satisfied the criteria for both absolute and relative fits, χ^2 (3) = 3.11, $p = .37$; SRMR = .02; CFI = 1.00 and RMSEA = .01 [90% CI = (.00, .08)]. The direct paths from extraversion to social support ($\beta = .15$, $p < .001$) and social engagement ($\beta = .09$, $p = .046$) were significant while the path to depression was not ($\beta = -.08$, $p = .06$). All the direct paths from neuroticism to social support ($\beta = -.14$, $p < .001$),

Table 1. Descriptive statistics and bivariate relationships.

Variables (N = 465) % [n]/M(SD)	1	2	3	4	5	6	7	8	9	10	11
1. Sex (*Male*, 37 [171] vs. *Female* 63 [294])											
2. Age (*60*-69yrs, 31 [143]; *70*-79yrs, 34 [158]; *80*+, 35 [164])	.003										
3. FT (*Monogamy*,44 [207] vs. *Polygamy*, 56 [259])	.20**	.15**									
4. WS (*Widowed*, 48 [223] vs. *Not widowed,* 52 [242])	.56**	.25**	.16**								
5. EDU(*Primary*, 76 [355] vs. *Secondary/post-secondary*, 24 [110])	-.31**	-.12**	-.13**	-.30**							
6. ES (*Self-employed*, 57 [263] vs. *Unemployed*, 43 [202])	.02	-.42**	-.09	-.11*	-.07						
7. BRV (*No*, 64 [298] vs. *Yes*, *36* [167])	-.06	-.14**	-.10*	-.05	.03	.24**					
8. Depression, 1.09 (.94)	.03	.09**	.004	.09	-.02	-.10*	.002				
9. Extraversion, 8 (1.82)	.10*	.04	.04	.03	-.14**	.08	-.03	-.12*			
10. Neuroticism, 4.8 (1.83)	.15**	.02	.06	.07	-.16**	-.05	-.05	.26**	-.07		
11. Social engagement, 7.51 (2.89)	-.15**	-.35**	-.12**	-.20**	.09*	.30**	.06	-.16**	.06	-.13**	
12. Social support, 11.44 (5.31)	-.12**	-.21**	-.13**	-.15**	.13**	.16**	-.09	-.17**	.16**	-.20**	.36**

$^{**}p < 0.001$, $^{*}p < .05$ (2-tailed).

FT = Family type; WS = Widowhood status; EDU = Education; ES = Employment status; BRV = Bereavement.

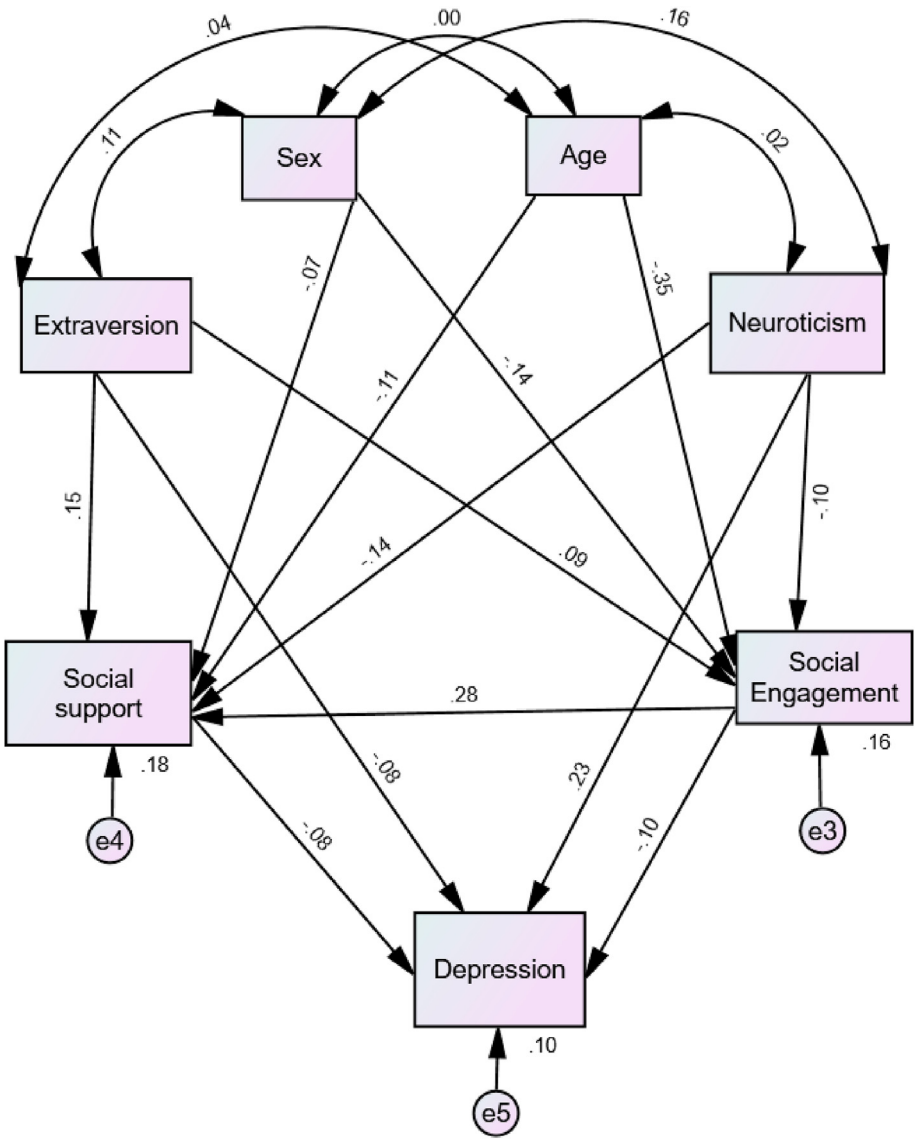

Figure 1. Mediation model with standardized estimates.

social engagement (β = -.10, p = .026) and depression were significant (β = .23, p < .001). The paths from social engagements to depression was significant (β = -.10, p = .03) while that from social support was not (β = -.09, p = .11). Finally, the direct path from social engagement to social support was significant (β = .28, p < .001).

Mediating effect is established at the statistical significance of both indirect and total effects (Preacher and Hayes, 2004). Table 2 presents the values for standardized total effects, and standardized indirect and unstandardized specific indirect effects using the 90% bias-corrected confidence intervals (BCa CI) with 10,000 bootstrap samples. The total effects of extraversion (β = -.11, p = .017) and neuroticism (β = .25, p < .001) on depression were significant. It is observed that the total effect of neuroticism on depression was greater than that of extraversion (β = -.11 vs. β = .25). Similarly, the indirect effects of extraversion (β = -.022) and neuroticism (β = .023) were significant since beta values did not pass through zero (see Table 2). Thus, our mediation hypotheses were confirmed. While a full mediation occurred between extraversion and depression as evident in the non-significant p-value for the direct path, a partial mediation was observed between neuroticism and depression given the significance of the direct path. An examination of the specific indirect effects showed that social engagements and social support both mediated the associations of extraversion and neuroticism on depression given that beta values did not pass through zero. However, the successive or two-step mediating effects of social engagement and social support were not significant because the beta values passed through zero.

4. Discussion

Studies have investigated the mediating links between extraversion/neuroticism and depression (e.g. O'Shea et al., 2017; Chen et al., 2020). However, only person-level variables have been considered to explain the pathways through which these relationships occur. Based on the evidence that behaviour is determined not only by internal/cognitive variables but also through social or environmental pathways, this study examined the mediating roles of social engagements and social support in the extraversion/neuroticism and depression relations.

Preliminary results showed that depressive symptoms were significantly predicted by extraversion, neuroticism, social engagements and social supports. While increase in extraversion, social engagements and social supports predicted decrease in depressive symptoms, increase in neuroticism predicted an increase in depressive symptoms. Further, extraversion was found to predict increase in social support perception and

Table 2. Direct, indirect, specific indirect and total effects and model fitness.

	β (SE)	10,000-sample bootstrapping	Model fitness				
		b (90% BCa CI)	χ^2 (df)	p value	SRMR	CFI	RMSEA (90% CI)
Direct effects			3.11 (3)	.37	.02	1.0	.01 (.00, .08)
Extraversion→Social engagements	.09* (.07)						
Extraversion→Social supports	.15** (.12)						
Extraversion→Depression	-.08 (.02)						
Neuroticism→Social engagements	-.10* (.07)						
Neuroticism→Social supports	-.14** (.12)						
Neuroticism→Depression	.23** (.02)						
Social engagements→Depression	-.10* (.02)						
Social support→Depression	-.08 (.01)						
Social engagements→Social support	.28** (.08)						
Specific indirect effects							
EX → SS →Depression		-.006 (-.015, -.001)					
EX → SE →Depression		-.012 (-.012, -.001)					
EX →SE → SS→ Depression		-.001 (-.003, .000)					
N → SS →Depression		.006 (.001, .014)					
N → SE →Depression		.005 (.001, .012)					
N →SE → SS→ Depression		.001 (.000, .003)					
Indirect effects							
Extraversion - Depression		-.022 (-.042, -.007)					
Neuroticism - Depression		.023 (.009, .043)					
Total effects							
Extraversion → Depression		-.11**					
Neuroticism → Depression		.25**					

engagement in social activities, whereas neuroticism predicted decrease in perception of social support and social engagements. Also, more involvements in social activities predicted greater perception of supports. These outcomes fully corroborate previous findings that reported extraversion (Lee et al., 2018; Klinger-König et al., 2018), social engagements (Park and Sok, 2020; Chen et al., 2020) and social supports (Etxeberria et al., 2019; Worrall et al., 2020) as protective factors of depression among older adults, and neuroticism (Nouri et al., 2019; Chen et al., 2020) as a risk factor. The result showing social engagement as a predictor of social support perception also attests to previous finding (Tang et al., 2017). This is expected because involvement in social activities can promote continual interactions with individuals in the family and the community, which may further create enabling conditions for seeking help and assistance from others when the need arises (Dong et al., 2014).

Moreover, this study established an association between extraversion and social engagements. High level of extraversion was found to predict more social engagements although at a weak level. Since extraversion is associated with higher likelihood of socializing (Newton et al., 2018), it was anticipated that extraversion would predict social engagements at a stronger level. However, this was not so. In contrast, the association between extraversion and social support was positive and stronger. Again, given that extraversion predisposes one to be talkative, outgoing, humorous and interesting, individuals high on extraversion are more likely to position themselves for receiving social support (Lee and Martin, 2019) or express their need for help. Contrasting with extraversion, results showed that neuroticism negatively predicted both social engagements and social support. In other words, high neuroticism was associated with low involvements in social activities and perception of supports. These outcomes are not surprising because individuals high in neuroticism feel inadequate and liable to holding negative perception of others (Dyrenforth et al., 2010) and as such, may consider social contact stressful, shun social activities (Segel-Karpas and Lachman, 2018) and then perceive less social support (Lee and Martin, 2019).

Our one-step mediation hypotheses were also confirmed. Outcomes showed that social engagements and social support mediated the extraversion/neuroticism and depression relations. While a full mediation was confirmed between extraversion and depression, a partial mediation was established in the association between neuroticism and depression. Specifically, we found that the negative relationship between extraversion and depression can be fully explained by social engagements and social supports. That is, high extraversion predicts increase in engagement in social activities and greater perceive social support, which in turn influence low depressive feelings. These imply that extroverted individuals usually report lower depressive symptoms because they engage in more social activities and receive greater support from family and friends. On the contrary, high neuroticism predicts reduced social engagements and low social support perception, which in turn impact greater depressive feelings. The implication of this finding is that, individuals high in neuroticism may be highly susceptible to depression because they seem to experience low support from others and get involved in less social activities.

Contrary to our expectations, we failed to confirm the two-step mediation hypotheses. Social engagement and social supports did not sequentially mediate the associations between extraversion/neuroticism and depression. In other words, neuroticism/extraversion were not predictive of depression successively through social engagements and social supports. Hence, social engagement may not predict perception of social support from extraversion/neuroticism to influence depression. However, in agreement with previous work the total effect of neuroticism on depression was greater compared to extraversion (O'Shea et al., 2017). This suggests that negative impact of neuroticism on depression is more profound compared to the positive influence of extraversion. Also, result may imply that neuroticism has stronger genetic foundation compared to extraversion.

Although study findings are novel and have important implications, it is essential to interpret them with caution because of some limitations. Our cross-sectional survey data does not permit inferring cause-effect relationships among variables in the SEM frame-work. Related future studies may consider a longitudinal design. Also, our sample comprises more of rural older-adults and those with no more than six years of

education. As a result, generalizing results to older adults living in urban centres and those with tertiary education may be limiting. Prospective studies considering the replication of finding may need to employ sample with wider characteristics in terms of geographical location and education.

5. Conclusion

This study established that depression is predicted negatively by extraversion, social engagements and social supports, and positively by neuroticism. Also, social engagements and social supports mediated the association of extraversion and neuroticism with depression. Specifically, high extraversion predicted high social engagements and increased social supports, which in turn led to report of low depressive symptoms. Divergently, high neuroticism predicted low social engagements and reduced social supports, which in turn led to greater level of depression. While a full mediation was established between extraversion and depression, a partial mediation was found between neuroticism and depression. Psychotherapeutic interventions targeting depression from high neuroticism may be aimed at frequent social engagements and seeking support from family and friends.

Declarations

Author contribution statement

B. Olawa: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

E. S. Idemudia: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data included in article/supplementary material/referenced in article.

Declaration of interests statement

The authors declare no conflict of interest.

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References

Blanca, M.J., Arnau, J., López-Montiel, D., Bono, R., Bendayan, R., 2013. Skewness and kurtosis in real data samples. Methodology 9, 78–84.

Burnes, B., Cooke, B., 2013. Kurt Lewin's field theory: a review and re evaluation. Int. J. Manag. Rev. 15 (4), 408–425.

Chen, X., Pu, J., Shi, W., Zhou, Y., 2020. The impact of neuroticism on symptoms of anxiety and depression in elderly adults: the mediating role of rumination. Curr. Psychol. 39, 42–50.

Distel, L.M.L., Shepard, J., Malone, J., Waldinger, R.J., 2015. Life span trajectories of depressive symptomatology and personality functioning. J. Am. Psychoanal. Assoc. 63 (3), NP10–NP14.

Dong, X., 2014. Addressing health and well-being of U.S. Chinese older adults through community-based participatory research: introduction to the PINE Study. J. Gerontol. Series A, Biol. Sci. Med. Sci. 69 (Suppl 2), S1–S6.

Dyrenforth, P.S., Kashy, D.A., Donnellan, M.B., Lucas, R.E., 2010. Predicting relationship and life satisfaction from personality in nationally representative samples from three countries: the relative importance of actor, partner, and similarity effects. J. Pers. Soc. Psychol. 99 (4), 690–702.

Elliot, A.R., Gallegos, A.M., Moynihan, J.A., Chapman, B.P., 2019. Associations of mindfulness with depressive symptoms and well-being in older adults: the moderating role of neuroticism. Aging Ment. Health 23 (4), 455–460.

Etxeberriaa, I., Etxebarriab, I., Urdanetac, E., 2019. Subjective well-being among the oldest old: the role of personality traits. Pers. Indiv. Differ. 146, 209–216.

Fernández Pérez, D., Ros, L., Escribano, F., Serrano, J.P., 2020. Reminiscence, personality, coping and mood state in institutionalised older adults: a cross-sectional study. Psychogeriatrics 20, 310–320.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., 2010. Multivariate Data Analysis, seventh ed. Prentice Hall, Englewood Cliffs.

Hao, G., Bishwajit, G., Tang, S., Nie, C., Ji, L., Huang, R., 2017. Social participation and perceived depression among elderly population in South Africa. Clin. Interv. Aging 12, 971–976.

International Test Commission, 2017. The ITC Guidelines for Translating and Adapting Tests, second ed.

John, O.P., Srivastava, S., 1999. The Big Five Trait taxonomy: history, measurement, and theoretical perspectives. In: Pervin, L.A., John, O.P. (Eds.), Handbook of Personality: Theory and Research. Guilford Press, pp. 102–138.

Klein, D.N., Kotov, R., Bufferd, S.J., 2011. Personality and depression: explanatory models and review of the evidence. Annu. Rev. Clin. Psychol. 7, 269–295.

Kline, R.B., 2011. Principles and Practices of Structural Equation Modelling, third ed. Guilford.

Klinger-Königa, J., Hertela, J., Terockb, J., Völzkec, H., Van der Auweraa, S., Grabea, H.J., 2018. Predicting physical and mental health symptoms: additive and interactive effects of difficulty identifying feelings, neuroticism and extraversion. J. Psychosom. Res. 115, 14–23.

Lee, K., Martin, P., 2019. Who gives and receives more? Older couples' personality and spousal support. Pers. Relat. 26, 429–447.

Lee, S.A., Jeon, J.Y., No, S.K., Park, H., Kim, O.J., Kwon, J.H., Jo, K.D., 2018. Factors contributing to anxiety and depressive symptoms in adults with new-onset epilepsy. Epilepsy Behav. E&B 88, 325–331.

Liu, D., Xi, J., Hall, B.J., Fu, M., Zhang, B., Guo, J., Feng, X., 2020. Attitudes toward aging, social support and depression among older adults: Difference by urban and rural areas in China. J. Affect. Disord. 274, 85–92.

Lodi-Smith, J., Roberts, B.W., 2012. Concurrent and prospective relationships between social engagement and personality traits in older adulthood. Psychol. Aging 27 (3), 720–727.

Mendes de Leon, C.F., Glass, T.A., Berkman, L.F., 2003. Social engagement and disability in a community population of older adults: the new haven EPESE. Am. J. Epidemiol. 157 (7), 633–642.

Middeldorp, C.M., Cath, D.C., Beem, A.L., Willemsen, G., Boomsma, D.I., 2008. Life events, anxious depression and personality: a prospective and genetic study. Psychol. Med. 38 (11), 1557–1565.

Newton, N.J., Pladevall-Guyer, J., Gonzalez, R., Smith, J., 2018. Activity engagement and activity-related experiences: the role of personality. J. Gerontol. B Psychol. Sci. Soc. Sci. 73 (8), 1480–1490.

Nouri, F., Feizi, A., Keshteli, A.H., Roohafza, A., Afshar, H., Adibi, P., 2019. Personality traits are differently associated with depression and anxiety: evidence from applying bivariate multiple binary logistic regression on a large sample of general adults. Psychiatr. Danub. 31 (4), 448–456.

Olawa, B.D., Idemudia, E.S., 2019. Later-life satisfaction with adult children's achievements: does parents' personality matter? Heliyon 5, e02406.

Olawa, B.D., Adebayo, S.O., Mokuolu, B.O., Umeh, C.S., Omolayo, B.O., 2020. Physical health burdens and emotional distress in later life: the mediating effects of self-rated health. Aging Ment. Health 24 (1), 15–21.

Olawa, B.D., Omolayo, B.O., Azikiwe, J.C., 2019. Gender influence on loneliness and family and nonfamily support among older adults: the confounding role of widowhood. J. Women Aging 1–20. Advance online publication.

Ormel, J., Oldehinkel, A.J., Brilman, E.I., 2001. The interplay and etiological continuity of neuroticism, difficulties, and life events in the etiology of major and subsyndromal, first and recurrent depressive episodes in later life. Am. J. Psychiatr. 158 (6), 885–891.

O'Shea, D.M., Dotson, V.M., Fieo, R.A., 2017. Aging perceptions and self-efficacy mediate the association between personality traits and depressive symptoms in older adults. Int. J. Geriatr. Psychiatr. 32 (12), 1217–1225.

Park, N.S., Jang, Y., Lee, B.S., Haley, W.E., Chiriboga, D.A., 2013. The mediating role of loneliness in the relation between social engagement and depressive symptoms among older Korean Americans: do men and women differ? J. Gerontol. B Psychol. Sci. Soc. Sci. 68 (2), 193–201.

Parkerson Jr., G.R., Michener, J.L., Wu, L.R., Finch, J.N., Muhlbaier, L.H., Magruder-Habib, K., et al., 1989. Associations among family support, family stress, and personal functional health status. J. Clin. Epidemiol. 42, 217–229.

Preacher, K.J., Hayes, A.F., 2004. SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behav. Res. Methods Instrum. Comput. 36 (4), 717–731.

Rammstedt, B., John, O.P., 2007. Measuring personality in one minute or less: a 10-item short version of the Big Five Inventory in English and German. J. Res. Personal. 41, 203–212. Retrieved from. http://www.westmont.edu/_academics/departments/psychology/documents/Rammstedt_and_John.pdf.

Rinaldi, P., Mecocci, P., Benedetti, C., Ercolani, S., Bregnocchi, M., Menculini, G., Catani, M., Senin, U., Cherubini, A., 2003. Validation of the five-item geriatric depression scale in elderly subjects in three different settings. J. Am. Geriatr. Soc. 51 (5), 694–698.

Segel-Karpas, D., Lachman, M.E., 2018. Social contact and cognitive functioning: the role of personality. J. Gerontol. B Psychol. Sci. Soc. Sci. 73 (6), 974–984.

Sheikh, J.I., Yesavage, J.A., 1986. Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. Clin. Gerontol.: J. Aging Mental Health 5 (1-2), 165–173.

Tang, F., Chi, I., Dong, X., 2017. The relationship of social engagement and social support with sense of community. In: The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 72, pp. S102–S107.

Worrall, C., Jongenelis, M., Pettigrew, S., 2020. Modifiable protective and risk factors for depressive symptoms among older community-dwelling adults: a Systematic Review. J. Affect. Disord. 272, 305–317.

Zimet, G.D., Dahlem, N.W., Zimet, S.J., Farley, G.K., 1988. The multidimensional scale of perceived social support. J. Pers. Assess. 52 (1), 30–41.