

Altered Short-Term Plasticity Within the Working Memory Neural Network: Is It Neuroticism or Is It Depression?

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Abstract: In the present article, we discuss (1) the importance of assessing and statistically considering both clinical and subclinical forms of depression when examining the relationship between neuroticism and short-term plasticity within the working memory neural network, and (2) the hypothesis of an antagonism between neuroticism and conscientiousness in personality research. We suggest that (1) neuroticism and depression should be examined in a *relational* manner, and (2) neuroticism and conscientiousness should *not* be antagonized. *Hum Brain Mapp* 37:1512–1513, 2016. © 2016 Wiley Periodicals, Inc.

Key words: neuroticism; depression; working memory; fronto-parietal network; neural connectivity



In a recent fMRI study, Dima et al. (2015) found that neuroticism (i.e., propensity for negative emotionality) affected task-dependent effective connectivity within the working memory (WM) neural network. Based on these findings, the authors concluded that personality and neuroplasticity within the WM network were mechanistically linked. In our view, these conclusions may need to be considered with caution. Indeed, participants' current depressive symptoms were not statistically controlled for in the authors' study. In this context, whether lifelong traits,

rather than transient states, can be held accountable for the results is unclear. Additionally, we discuss the antagonism between neuroticism and conscientiousness introduced by the authors.

A strong, positive correlation between neuroticism and depressive symptoms has been reported in a number of studies [Everaerd et al., 2015; Farmer et al., 2002; Jylha and Isometsa, 2006]. Depressive symptomatology thus constitutes a potential confounding variable in neuroticism research [Bianchi and Laurent, 2016; Lahey, 2009]. Because they did not control for current depressive symptoms, the authors cannot establish that neuroticism independently affects neuroplasticity within the WM network. In other words, the authors cannot determine whether neuroticism explains variance in WM network neuroplasticity that is not accounted for by current depressive symptoms.

Dima et al. (2015) mention that the study participants had no history of mental or medical disorders and did not take any prescribed medication. However, these inclusion criteria do not exclude the presence of subclinical levels of depressive symptoms—whose adverse consequences on individuals' health are well-known [Cuijpers et al., 2013; Gotlib et al., 1995]—, leaving the raised problem unresolved. Importantly, both clinical and subclinical forms of depression have been associated with abnormalities in

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WM functioning and fronto-parietal network connectivity [Buckholtz and Meyer-Lindenberg, 2012; Gotlib and Joormann, 2010; Kaiser et al., 2015; Kleider et al., 2010; Liston et al., 2009; Vasic et al., 2009]. This state of affairs makes the control of depressive symptomatology even more justified when studying this type of alterations.

Furthermore, the authors propose a rather antagonized perspective on neuroticism and conscientiousness in their paper, based on the observation that neuroticism and conscientiousness are related to WM network neuroplasticity in opposite directions. The antagonism introduced by the authors, however, is open to question. In past research, the strength of the correlation between neuroticism and conscientiousness at a between-individual level has been found to be only moderate [e.g., Steel et al., 2008]. Moreover, it is noteworthy that high levels of neuroticism and conscientiousness can coexist within the same individuals [see Turiano et al., 2013; see also Beckmann et al., 2010], confirming that these two personality variables should not be viewed as the two ends of a common continuum. By providing a more accurate estimation of the implication of neuroticism in WM network neuroplasticity, a control of current depressive symptoms may subsequently help clarify the nature of the relationship between neuroticism and conscientiousness.

The absence of assessment and/or statistical consideration of depression has become a problem in neuroticism research [e.g., DeYoung et al., 2010; Kapogiannis et al., 2013]. As studies on the relationship between neuroticism and cerebral alterations accumulate, it is urgent to resolve this problem, to prevent the sedimentation of theoretical generalizations arising from potentially biased analyses. We suggest that neuroticism and depressive symptomatology should be examined in a relational rather than in an isolated manner, to allow firm conclusions to be drawn.

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