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Performance differences explained by the neuroticism facets withdrawal and volatility, variations in task demand, and effort allocation

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ABSTRACT

The present study investigated the relationship between two aspects of trait neuroticism, namely withdrawal and volatility, and performance. Sixty-eight participants performed a search task in three difficulty conditions, and rated their invested effort per condition. Results show that the two aspects of neuroticism are differently related to search performance. Especially in a high demanding situation of task difficulty, the relationship between performance and invested effort is negative for high volatility individuals, while for high withdrawal individuals additional effort investment leads to relatively better performance. The discussion focuses on how considering the two neuroticism facets, task demand and effort investment add to the understanding of trait neuroticism, its relationship to performance and the involvement of the (dys) functional regulation of mental resources.

1. Introduction

Studies on the predictive validity of neuroticism on job performance and training success criteria often document bidirectional relations and a considerable amount of unexplained heterogeneity in effect sizes (Salgado, 1997; Tett, Jackson, Rothstein, & Reddon, 1999). Recently, researchers have made an attempt to explain the considerable heterogeneity in the neuroticism–performance relationship by proposing that this relationship is moderated by the regulation of effort allocation (Smillie, Yeo, Furnham, & Jackson, 2006; Wallace & Newman, 1997, 1998, 2008). The underlying idea is that performance, motivation and attention are fuelled by mental effort and that effort originates from a single pool of mental resources with limited capacity (Kahneman, 1973; Kanfer & Ackerman, 1989). This notion includes that effective task performance requires that effort allocation is regulated by a process that also consumes part of the available mental resources (Kanfer & Ackerman, 1989; Kanfer, Ackerman, Sarason, Pierce, & Sarason, 1996). Recent views maintain that the self-regulation of effort allocation may be different in individuals that score high on trait neuroticism in comparison to more stable individuals. For these reasons, researchers argue that research on the relationship between neuroticism and performance should be extended by including mental effort regulation as a moderator.

In their original study, Smillie and colleagues used an anxiety approach of the neuroticism construct that is closely related to Eysenck's interpretation of the neuroticism trait (Eysenck, 1967). Building on this original work of Smillie and colleagues, the present paper extends the anxiety perspective on the neuroticism–effort interaction by adding more detail to the theoretical and empirical interpretation of neuroticism. Recently, it has been suggested that each of the five dimensions of the five factor model comprises two facets (Chapman, 2007; DeYoung, Quilty, & Peterson, 2007; Jang, Livesley, Angleitner, Riemann, & Vernon, 2002; Saucier, 1998; Saucier & Goldberg, 2001). Focusing on neuroticism, two correlated facets have been identified: *withdrawal* and *volatility*. The withdrawal facet (Davidson et al., 2001) refers to a tendency for internal representations of negative affect. High-scoring individuals readily worry and feel easily threatened, are uncomfortable with themselves, have intrusive thoughts and pessimistic views, and tend towards negative interpretations of events. This facet of neuroticism is closely linked to clinical conceptualizations of neuroticism that typically highlight a strong tendency to interpret ambiguous stimuli in a negative way (Luminet, Zech, Rimë, & Wagner, 2000; Rusting & Larsen, 1998). The withdrawal facet also corresponds to the anxiety perspective on neuroticism in the Smillie and colleagues paper (Smillie et al., 2006).

The second facet of neuroticism is labeled volatility and is related to the outward expression of negative affect. Individuals scoring high on this facet have difficulty keeping their emotions under control, are sensitive to stimuli from the environment and become easily angry and irritated (DeYoung et al., 2007; Saucier, 1998). We propose that this facet represents a separate disposition and interacts with effort in a fundamentally different way. In developing our theoretical arguments, we begin by describing Smillie and colleagues' original theoretical ideas regarding the relation

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between withdrawal, effort and performance. We follow up by presenting theoretical assumptions on the relation between volatility, effort, and performance (Smillie et al., 2006; Wallace & Newman, 1997). Such research may have practical implications in that a better understanding of how trait neurotics regulate the allocation of mental effort in job situations that vary in demand, may lead to improved selection, task design, and training procedures in applied settings.

Using an anxiety perspective on neuroticism, Smillie and colleagues argued that the regulation of effort does not function effectively in individuals scoring high on neuroticism (Smillie et al., 2006; Wallace & Newman, 1997). This notion includes the idea that neurotic individuals differ in two ways from stable individuals regarding the regulation of mental energy. First, neurotic individuals are more capable to turn their attention towards relevant signals. Second, neurotic individuals also have a tendency to automatically orient toward task irrelevant cues, which also makes them more vulnerable to distraction (Avila, 1995; Wallace & Newman, 1998). The latter tendency explains why neurotic individuals often focus on negative stimuli and become trapped in circles of dysfunctional regulation of maladaptive cognitions. This idea makes sense as these individuals are often characterized by having persisting negative thoughts and worries. It implies that the automatic orientation that in itself does not consume effort is followed by the effortful mental activity in the form of negative thoughts and worries. This entails a disruption of the functional allocation of effort to the task at hand. In other words, the general view is that neurotic individuals tend to allocate mental effort to task-irrelevant mental processes related to often intrusive negative affect, at the expense of effective task performance (Wallace & Newman, 1997, 1998).

The proposed dysfunctional regulation of effort allocation should vanish in a demanding work situation (Hockey, 1997; Kahneman, 1973; Kanfer & Ackerman, 1989; Wickens & Hollands, 2000). This makes sense as under high demand, all attention is focused on the task and no additional resources are available to be allocated to negative thoughts. It is possible that automatic orientation toward negative thoughts is not entirely prevented, but from a theoretical perspective one would expect that the available resources are insufficient to make this engagement stick. This idea was tested by (Smillie and co-workers, 2006) who indeed found that the performance of individuals who score high on neuroticism/anxiety was related to the effort they perceived to have invested in the task. As the task became more demanding, these individuals improved their performance whereas stable individuals displayed unaltered performance. In other words, anxious individuals could benefit more from the investment of effort than stable individuals. These findings are in line with the theoretical expectations on improved performance of anxious individuals. The mental resources that anxious individuals tend to dysfunctionally allocate to task-irrelevant mental activities, such as worries, are redirected and allocated on-task in order to fulfil the task requirements under higher task demand.

In sum, individuals scoring high on withdrawal should benefit from a more demanding task environment. In such an environment, all effort is allocated to task performance, which prevents the dysfunctional effort allocation to task irrelevant negative cognitions and emotions (Wallace & Newman, 1997, 1998). A practical implication of these theoretical ideas is that organizations can help support persons high in withdrawal by placing them in highly demanding work environments. Building on these ideas, we sought to replicate the findings of (Smillie and co-workers, 2006). Our first hypothesis consequently states that individuals high in the withdrawal facet will perform relatively better when a task is more demanding and they investment more effort.

Although correlated, the two neuroticism facets withdrawal and volatility, refer to different ways in which the trait expresses and how negative affect is perceived and dealt with. Individuals scoring high on volatility are not so much vulnerable to musings and worries but instead tend to be easily irritated by stimuli from the environment (DeYoung et al., 2007). This means that aspects of increased demand posed on the individual by the task environment may, for these individuals, occupy negative connotations and therefore automatically draw proportionally more attention (Wallace & Newman, 1997). If this redirection of attention is followed by effortful engagement, this will lead to the involvement of mental resources in task-irrelevant mental activity. More specifically, this would involve dysfunctional mental activities such as effortful monitoring and other evaluation processes causing only part of the available effort to be invested in on-task mechanisms, as would be the case in withdrawal (Smillie et al., 2006) and stable individuals (DeShon, Brown, & Greenis, 1996; Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994; Kanfer et al., 1996). This may imply that volatility individuals will not benefit from increased task demands as would individuals scoring high on withdrawal. Moreover, increased task demand may prove to have detrimental effects on-task performance in volatility individuals. Practical implications would include that volatile individuals should be involved in less demanding work or may be specifically trained to cope with higher demands. In sum, the second hypothesis contrasts the first by stating that individuals scoring high on the neuroticism facet volatility will not profit from more effort investment when performing a high demanding task, but will instead be impaired by a dysfunction allocation of effort in a more demanding task environment.

2. Method

2.1. Participants and procedure

Sixty-eight students from a Dutch University participated in the study. Average age was $M = 22.3$ ($SD = 5.0$). All participants had normal or corrected-to-normal vision and gave prior informed consent. They first filled out a questionnaire booklet and then worked on a search task at three different levels of difficult. After each level of difficulty, they rated the amount of effort they invested during their work on the task.

2.2. Withdrawal and volatility measures

Participants filled out the NEO-FFI (Costa, McCrae, Archer, & Smith, 2008; Hoekstra, Ormel, & de Fruyt, 1996) comprising 60 questions, with 12 items for each of the five factors. The items pertaining to the two neuroticism facets (volatility and withdrawal) entered further analyses (Chapman, 2007; Saucier, 1998). The withdrawal items (numbers 1, 11, 16, 31, and 46) pertain to negative affect including doubt and fear of failure, and general anxiety. The volatility items (numbers 6, 21, 26, 36, 41, 51, and 56) pertain to irritability and getting angry. In the present study, Cronbach α's for the withdrawal and volatility scales were 0.80 and 0.83.

The two neuroticism facets in the NEO-FFI were found to be replicable across different samples (Chapman, 2007; Saucier, 1998). Confirmatory factor analyses were conducted to investigate whether a two-factor model also adequately represented the dimensionality of the neuroticism measure in the present data. The results of these analyses need to be treated with some caution, as the sample size of our study was smaller than 200, and sample sizes smaller than 200 can lead to bias in χ^2- and fit values for confirmatory factor analyses. To partly address this problem, we used the so-called the Swain correction, which constitutes a recently recommended small-sample correction (Herzog & Boomsma, 2009), and report χ^2- and fit values before and after they were corrected.