The Interactive Effects of Mood, Emotional Intelligence and Neuroticism on Cognitive Performance

Amsyar, Mohd. Khair (Department of Psychology, HELP University) & Tee, Eugene Yu Jin (Department of Psychology, HELP University)
mohdkhairamsyar@gmail.com

Abstract

According to the instrumental approach in emotional regulation, individuals seek emotions that are consistent with their personality in order to elevate levels of cognitive. Past studies have shown that trait-consistent mood states between neuroticism and negative affect could impact cognitive performance (i.e. Tamir, 2005). In this study, we examine how trait neuroticism and emotional intelligence (EI) interact in predicting cognitive performance. We hypothesized that there is an interactive effect between emotional intelligence (EI), trait neuroticism and negative mood in influencing cognitive performance. 101undergraduate psychology students participated in an experiment in which negative mood was induced in participants, before they were required to complete a cognitively-demanding anagram task. In examining the three-way interaction between negative affect, neuroticism and EI, we found partial support that EI is useful for both high and low-neurotic individuals in positively influencing cognitive task performance. Results also showed that EI also enhances cognitive performance of neurotic individuals in low negative affect conditions. This suggests that emotionally intelligent neurotic individuals could regulate their emotions to a more negative state in order to perform better in a cognitively-demanding task.

Key words: trait-consistent mood state, neuroticism, emotional intelligence

The Interactive Effects of Mood, Emotional Intelligence and Neuroticism on Cognitive Performance

Both positive and negative mood play a vital role in influencing cognitive performance. Positive emotions have been shown to aid in enhancing creativity and to also help facilitate divergent thinking (Isen, Daubman & Nowicki, 1987). Conversely, negative emotions can boost individuals' attention towards details and threats, as well as an enhancing ingredient for deductive reasoning (Palfai & Salovey, 1993). These findings suggest that emotions are an important contributor in affecting performance in a cognitively-demanding task. However, recent research has found that the relationship between affective states and personality is a lot more complex than previously assumed (Tamir, 2005).

Trait neuroticism, in particular, influences an individual's predisposition towards negative affect (Tellegen, 1985). The authors found that individuals who scored high on negative affectivity are describe as individuals who are most likely to feel negative emotions, distress and aversive mood states (Watson, Clark & Tellegen, 1988). Neuroticism thus, can be defined as individuals' elevated reactivity towards stressors (Bolger & Shilling, 1991). Thus, neurotic individuals tend to feel more negative emotions (eg. anxiety) when faced with a stressor. This could in turn then lead them to ruminate on their perceived losses, threats and injustice that have happened to their self, thus maintaining the momentary experience of negative affect (Trapnell & Campbell, 1999). Hence, when neurotic individuals perceive a task to be demanding, they might inadvertently self-handicap themselves and thus, do badly in the particular task (Ross, Canada & Rausch, 2002). However, recent findings (Tamir, 2005) suggest that these broad 'self-handicapping' assumptions of the influence of neuroticism and negative mood on cognitive performance should be re-examined under the context of trait-consistent mood states.

Trait-consistent mood state

The term “trait-consistent mood state”, thus, is used to describe individuals’ tendency to gravitate towards a certain mood state due to their personality trait (Tamir, Robinson & Clore, 2002). In situations where individuals are required to make decisions, they are also influenced by such trait-consistent (or inconsistent) mood states. For instance, neurotic individuals have been shown to prefer to be in a negative mood when faced with a cognitively-demanding task, the same way an extraverted individual would prefer to be in a positive mood when attempting the same task (Tamir et al., 2002). This suggests that individuals with their differing personality traits do engage in some form of emotional regulation in order to maintain their trait-consistent mood states. On this matter, studies have found that individuals with high trait extraversion were positively associated to emotional regulation strategies that involve maintaining and amplifying the experience of positive affect, whereas trait neuroticism is positively associated with strategies that either eliminate or increase the experience of negative emotions (Ng & Diener, 2009).

To the best of our knowledge, the only known study that has examined the effect of trait-consistent mood state of neuroticism-negative on cognitive performance was by Tamir (2005), who focused on the negative emotion of worrying. In that study, the author provided some evidence for the instrumental approach to emotion regulation, whereby participants were first asked to state what type of emotional event they would prefer to recall (happy or worrying event) when faced with a cognitively-demanding task and were induced to their preferred mood state. It was found that, participants high in neuroticism preferred to recall an event which elicited worry and this made them perform better in the cognitively-demanding task compared to those with a trait-inconsistent mood state. The present study builds on

Tamir's (2005) study as a foundational support by considering how trait neuroticism interacts with emotional intelligence ability and impacts individual cognitive performance under conditions of negative mood.

Emotional Intelligence

Researchers continue to debate whether EI adds substantial predictive value towards susceptibility to emotion and task performance beyond that of personality. Researchers (Shi and Wang, 2007) have found a moderate negative correlation between EI and neuroticism, but conclude that the two constructs were still distinct as they measure different constructs. In this study, we consider both EI and neuroticism to be distinct psychological constructs in relation to individual differences. As mentioned earlier, the present study conceptualizes EI as abilities which could be improved over time, consistent with Mayer and Salovey's (1997) EI model. Thus, this distinction would meet the conceptual criterion of an intelligence construct rather than a tendency. Conversely, neuroticism is a personality trait that is innate and it represents people's tendencies to act in a certain way across situations and time (Carroll, 1993). With this distinction clarified, we examine the interactive effect of EI and neuroticism and how these two individual factors interact in influencing cognitive performance,

EI and emotional regulation are conceptually intertwined with both fields of research promoting the role of emotion in everyday life. However, when the hedonic approach of emotional regulation is viewed in the terms of the four branched model of EI, it seems as if it is conceptually overlap in only one area as it suggests the usage of the component 'managing emotion'. Suggesting that individuals would manage their emotions as to maximize pleasure and minimize pain. However, in relating the framework of the instrumental approach of emotional regulation to the

ability EI model, it is more likely that all the components would be utilized. For instance in the case of the studies by Tamir (2005), where certain individuals with high neuroticism seemed to prefer negative emotions rather than positive emotions when facing a cognitively-demanding task, it seems plausible to argue that these individuals knew (could be consciously or unconsciously) of the benefits of harnessing negative emotions instead of just following hedonic principles in light of a cognitively-demanding task. Their preference for negative emotion would require them to tap into their ability to not only perceive, but to also be aware that positive emotions are not 'suitable' emotions in this context, and thus acknowledging that negative emotions may be essential in helping them perform effectively in a cognitively-demanding task.. With that, the instrumental approach of emotional regulation may also be partly explained by EI.

In the present study, we thus examine how individuals would fare in a cognitively demanding task when asked to either recall a negative emotion-inducing event. We expect that the individuals' performance would be dependent partly on their personality (neuroticism) and emotional regulation abilities (emotional intelligence) and how these two individual differences interact with current mood states. More specifically, the study looks at how ones' mood (high vs. low negative) state would be moderated by their degree of neuroticism (high vs. low) and EI (high vs. low) in order to facilitate or inhibit cognitive performance. Hence, we posit an interaction effect between mood, trait neuroticism and EI with the following hypotheses:

Hypothesis 1: Emotionally intelligent neurotic individuals will demonstrate better performance in a cognitively-demanding task when they are in a trait-

consistent mood state of worrying than individuals in other conditions (ie. Low EI - Low neuroticism, Low EI – High neuroticism, High EI – Low neuroticism)

Hypothesis 2: Emotionally intelligent neurotic individuals will demonstrate better performance in a cognitively-demanding task at low negative mood than individuals in other conditions (ie. Low EI - Low neuroticism, Low EI – High neuroticism, High EI – Low neuroticism)

Method

Design. The present study is a laboratory experiment. It comprises a 2(Mood state: Negative, Neutral) X 3 (Emotional Intelligence: High, Medium, Low) X 3 (neuroticism: High, Medium, Low) between-subjects design. The dependent variable is cognitive performance, defined as the number of correct answers a participant scores in the anagram task.

Participants. Participants were 101 (25 males and 76 females) psychology undergraduate students at a large private Malaysian university between the ages of 18 and 25 years old. They participated in exchanged for compulsory experimental hours needed to fulfil their course requirement.

*Mood induction***.** A combination of both music and autobiographical memory were used to induce negative (worry) and neutral mood as this method of mood induction the limitation of a single technique may be compensated by the other (Hernandez, Vander Wal & Spring, 2003). More specifically, the music used to induce negative mood was Barber's *Adagio for Strings* (Gerrards-Hesse, Spies & Hesse, 1994) while participants were instructed to recall a worried event. On the other hand, the music used in the neutral mood condition was Faure's *Ballade for Piano and Orchestra Opus 19* (Stein, Goldman & Del Boca, 2000) and participants

were at the same time asked to describe a mundane day-to-day situation (i.e. describe their morning).

Measures

Neuroticism. Participants' neuroticism was measured using Goldberg's (1999) Big Five International Personality Item Pool (IPIP) scale. This involves participants stating their agreement or disagreement with statements on a 5-point scale (1 = very inaccurate; 5 = very accurate) for each statement that is indicative of high or low neuroticism. In the present study, the Cronbach's alpha coefficient is reliable at α = 0.90.

Emotional intelligence. Participants' emotional intelligence level was measured using self-reported 16-item Wong Law Emotional Intelligence scale (WLEIS: Wong & Law, 2002). Participants were asked to give their response to each of the statements on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). This scale was reliable at α = 0.85.

*Affect***.** The International Positive and Negative Affect Schedule short form (I-PANAS-SF: Thompson, 2007) was used. Participants were asked to indicate their 'here-and-now' feelings by rating affect-descriptive adjectives (5 positive and 5 negative) on a 5-point scale (1 = very slightly/not at all; 5 = extremely). The Cronbach's alpha for the items that assesses positive affect is 0.83, while the alpha for the items that assesses negative affect is 0.73.

*Anagram task***.** The task consists of 50 five-letters, single-answer anagrams were chosen from Norvick and Sherman (2003) and Gilhooly and Johnson (1978). Anagram-solving tasks have been found to be a useful experimental stressor and also cognitively demanding (Boyes & French, 2010).

Procedure

At the start of the experiment, participants were given informed consent, in which they signed to indicate their agreement to participate in the study, before completing both the personality and emotional intelligence scales. The mood induction phase followed, whereby participants were given instructions to recall an event from their past (either a worried or neutral event) and externalized it by writing it down. While engaging in this recall task, participants were also exposed to musical pieces selected to induce either a sad or neutral emotions. Thus, the mood induction technique was a combination of both autobiographical memory recall and music, which lasted for 10 minutes. Directly after that phase, participants were required to rate their 'here-and-now' feelings according to the I-PANAS-SF. Following this, participants were given 10 minutes to complete as many anagrams as they could as a test for their cognitive performance. Upon completion of the task, participants rated their post-task mood, and thanked for their participation in the experiment.

Results

Table 1 (Appendix A) presents the bivariate correlation, means and standard deviation of all variables relevant to the present study.

Mood Induction Manipulation Check. Two independent t-test were ran between the participants in the negative mood induction condition and neutral mood induction condition. It was found that participants in the negative mood induction condition ($M = 10.02$, $SD = 4.17$) felt significantly more negative than the neutral mood induction condition ($M = 7.92$, $SD = 3.24$), $t(99) = 2.823$, $p < 0.01$. This suggests the effectiveness of the experimental manipulation in eliciting the negative mood from the participants. On the other hand, the second independent t-test did not reveal any significant effect, $t(99) = 0.204$, $p>0.05$ as the mood inductions did not produce vast differences in the participants' positive mood. In other words, the mood

manipulation was able to manipulate the participants' negative mood but not their positive mood state.

*Hypothesis Tests***.** It is hypothesized that emotionally intelligent individuals would perform better in a cognitively-demanding task if they are in a trait-consistent mood state (ie. when an emotionally intelligent, neurotic individual is experiencing negative mood). To examine this prediction, I entered participants' anagram scores as the criterion variable in a hierarchical multiple regression analysis, across four sequential steps that includes the two-way and three-way interactions based on the recommendations by Dawson and Richter (2006). Firstly, we entered in the covariates of the study which is the participants' age and gender. We then entered to the equation the pre-negative affect, neuroticism and emotional intelligence. As recommended by Cohen, Cohen, West and Aiken (2003), we centered the variables for neuroticism and emotional intelligence. For the third model, we added in the two-way interactions of pre-negative affect x neuroticism, pre-negative affect x emotional intelligence, and neuroticism x emotional intelligence. Lastly, for the final equation we added in the three-way interaction of pre-negative affect x neuroticism x emotional intelligence. Table 2 (Refer to Appendix B) depicts the summary of the output from the hierarchical regression analysis. At a glance, the predictor variable of pre-task mood state negatively correlates with cognitive performance. This indicates that individuals who felt less negative affect were more likely to score higher in the anagram task. In addition to that, the two-way interaction of neuroticism and EI has shown a positively significant relationship. This suggests that regardless of how emotionally intelligent neurotic individuals were (whether it at high or low negative affect) at the moment, they would perform better in the cognitively-demanding task than individuals with low levels of emotional intelligence. Results from the hierarchical regression analyses in Table 2

also indicate that the proposed three-way interaction (Pre-NA X neuroticism X EI) was also significant. To further investigate this relationship, the overall regression equation was then plotted in Figure 1 (Refer to Appendix C) to show the three-way interaction as a function of negative mood state as shown. For the present study, three strategies would be used to probe the three-way interactions which includes on the basis of face validity by merely observing the direction of the slope (Schaubroeck & Merritt, 1997), the pick-and-point approach (Aiken & West, 1991) and through the slope differences test (Dawson & Richter, 2006). On the basis of face validity of Figure 2, participants with high neuroticism-high EI solved more anagrams in both high (+1 SD) and low (-1 SD) negative affect conditions. However, after further examining the interactions using the pick-and-point approach which utilizes the simple slopes analyses have indicated that the slope for low neuroticism and low EI was statistically significant, $t = -2.64$, $p = 0.01$, whereby individuals in the low negative mood state did better than those in the high negative mood state. The other simple slope tests however, found no significant results. Upon further probing, the slope differences tests between the low neuroticism-low EI and the other conditions showed, there were significant differences when it was compared with low neuroticism-high EI ($t = 2.39$, $p < 0.05$) and high neuroticism-low EI ($t = 2.25$, $p < 0.05$). Upon reflecting on deduction from the three techniques, the results indicated that individuals with low neuroticism-low EI did better in the anagram task when they felt less negative affect (vs. high). In comparison with the other individuals of low neuroticism-high EI and also those with high neuroticism-low EI, they did better in the overall performance (without regards to the mood states). To test Hypothesis 1 and 2, Figure 2 and Figure 3 (Refer to Appendix D and E, respectively) were plotted to show two separate two-way interactions at the high negative mood state and low negative mood state, respectively. Based on the face validity of Figure

2, emotionally intelligent neurotic individuals who felt worried demonstrated elevated levels of cognitive performance. However, upon examining the simple slope analysis of individuals with high EI, $t = 0.447$, $p > 0.05$, there was no significant difference in cognitive performance between people with high and low neuroticism. In addition, according to the slope differences test ($t = -0.549$, $p > 0.05$), emotionally intelligent individuals did not perform significantly better in the cognitively-demanding task than those with low EI. Thus, we did not find sufficient evidence to support Hypothesis 1 (two out of three techniques rejects claims for supporting the hypothesis) as the results indicated emotionally intelligent neurotic individuals did not significantly perform better cognitively at high negative mood state than the rest of the conditions. On the other hand based on Figure 3, the face validity indicates that emotionally intelligent neurotic individuals scored the highest in the anagram task amongst the other condition. Further probing through the simple slope analysis of emotionally intelligent individuals ($t = 2.083$, $p < 0.05$) revealed that those who also have high neuroticism perform significantly better that those who have low neuroticism. Moreover, the slope differences test ($t = 3.165$, $p < 0.05$) shows that people with high EI performed significantly better than those with low EI. Evidence from all three techniques has indicated support for Hypothesis 2. Thus it was accepted that in a low negative mood state, emotionally intelligent neurotic individuals performed better in the cognitively-demanding task than the rest of the conditions.

Discussion

In the present study, we examined the possible interaction effect between mood, trait neuroticism and EI in impacting performance on a cognitively-demanding task. To the best of our knowledge, no known research to date has examined the links between EI and trait-consistent mood states on cognitive performance. It was

postulated in Hypothesis 1 that neurotic individuals who felt high negative affect would benefit from high EI by excelling in the cognitively-demanding task. However, initial findings were not sufficient to affirm this prediction, but what can be derived from the three-way interaction between Pre-NA, neuroticism, and EI have (as shown in Figure 2) is that emotionally inept individuals who felt low negative affect were more likely to perform cognitively better if they had low levels of trait neuroticism. As these emotionally inept individuals had no indication of trait-inconsistent mood states (Low neuroticism X High Negative Affect), it is possible that they did have trait-consistent mood states (High extraversion X High Positive Affect), though it is beyond the scope of the present study. An alternative explanation is that these individuals did not have to engage in compensatory efforts to calm their emotions, thus more energy and cognitive effort may have been spent on solving the anagrams. Another significant effect was found from the predictor variable of negative affect which was found to be negatively associated with cognitive performance as it is possible that feeling too much negative emotions would be a stressor and disturbance to people. Conversely, a more pleasant mood state could also enhance performance (Kavanagh, 1987).

In the present study, we used a three-item criterion that must be satisfied in order to have sufficient evidences to support the three-way interaction hypotheses. Each hypothesis would be assessed on the basis of face validity in support of the direction of the slope, analyzing through the slope differences tests and the usage of the pick-and-point approach. Upon further dissection of the three-way interaction, based on the findings from the slope tests (ie. simple slope analyses and slope differences tests), we did not find sufficient evidence to support the statement that individuals who are high in both neuroticism and EI would perform well in the

cognitively-demanding task at trait-consistent mood states (Hypothesis 1). However it should be noted that, Figure 3 provides some evidence which indicated that people may emotionally regulate themselves beyond that of hedonic needs to feel less negative affect when dealing with a task. This can be seen in the case of neurotic individuals being able to solve more anagrams even though they had unpleasant emotions. Suggesting that there is an instrumental approach of emotional regulation, whereby individuals do not necessarily need to feel pleasant emotions as unpleasant emotions are at times beneficial in certain tasks (in this case, a cognitively-demanding task) and it has been demonstrated that the levels of EI influence this regulation.

Interestingly, there were sufficient evidences to support Hypothesis 2 which postulated that emotionally intelligent neurotic individuals (vs. the other conditions) performed better on the anagram task at low negative mood state. Results of the analysis indicate that being skilled in emotional abilities may include having the ability to regulate low negative mood state into a higher state of negative mood, and at the same time heightens cognitive performance. However, some caution is needed when interpreting these results as there must be empirical verification to acknowledge that being high in EI means being able to self-regulate ones' emotions to facilitate task performance. In this case, it is regulating into a trait-consistent mood state by feeling more worried when facing and/or during the task.

Theoretical implications

The idea of the present study was to act as a preliminary research of how certain individuals with their current emotional abilities would perform in a cognitive task when they felt either worried or neutral. We found that how one feels at the point of time is not as important as the interaction between his/her personality and

emotional abilities. Hence even in a negative mood state, the unpleasant emotions do not deter high EI individuals from performing well in the anagram task. It is possible that EI may have been the factor that calmed the negative effects of being worried but an alternative hypothesis could be that people with high EI are able to use these negative emotions to their advantage. This means when people with high EI feel negative, they may be motivated to use their negative affect as an instrumental tool to heighten cognitive performance instead of reducing the unpleasant emotions. Based on the findings of the present study, it is also possible that even when feeling pleasant, an emotionally intelligent individual may purposely self-regulate into a more negative mood instead of maintaining the pleasant emotions as it is more instrumental to the task at hand. In addition, trait neuroticism is generally characterized by the instability in behaviours and experiences (Eid & Diener, 1999). It is possible that EI could help an individual handle negative affect better to compensate for this 'instability'. Theoretically with further empirical verification, EI could be a measure for the instrumental approach to emotional regulation.

The findings here also add a more complex dimension to understanding the links between personality and emotion – one that is also partially dependent on individual ability (i.e. EI) in regulating and managing emotions. On that note, the findings have shown that people can be both high in EI and trait neuroticism. With that, the high levels of EI would be able to compensate for the behavioural tendencies of being neurotic by being emotionally skilled to make use their innate inclination towards negative affectivity and to improve cognitive performance.

Practical implications

As unpleasant as it feels, negative affects are at times necessary in certain situations. Hence, if people know what negative emotions would be useful at what context, this will help them attain their future goals in their own lives. Negative emotions can also be instrumental to goal attainment. We showed that if people know how their personality, mood and emotional abilities interact with each other, they would be able to improve their cognitive performance by increasing key area(s) in this interaction. Methods on how to improve EI includes techniques such as behaviour modelling, training interventions and organizational change (Ashkanasy & Daus, 2002). The idea here is that through EI development, people would be able to develop certain emotional abilities that go in line with subscales of EI. So instead of getting overwhelmed with certain emotions, people could expect using emotions based on their usefulness in certain context, for the case of the present study, worrying to increase cognitive performance. Thus, EI should be looked at as an ability and with that understanding, people would be aware of the benefits from further enhancement and improvement.

Limitations and Directions for Future Research

A number of factors must be taken into consideration in evaluating the present study, in hopes that future researches would overcome these limitations. One of the limitations is that despite taking precautions when running the research, we could not have avoid the social desirability bias of participants as it is one of the main problems with self-report measures of EI (Libbrecht, Lievens & Schollaert, 2010). Thus, performance-based measures such as MSCEIT (Mayer et al., 2003) would be able test their skills in emotion. Future studies should improve on the measurement of EI by developing a rigorous EI test that incorporates both self-reports and

performance-based measures in their research to compensate for each other's weaknesses.

The second limitation of the present study is that there should have been a measure of the individuals' affective state during instead of after the anagram task as it may have given a clue on whether emotional regulation happens at the point of doing the task. As emotional regulation is spontaneous and could happen at any point of time as it is unclear "where an emotion ends and regulation begins" (Davidson, 1998, p. 308). Therefore, individuals may have been in a different mood state during the task to facilitate or inhibit cognitive performance. Thus, the use of independent observers, blind to the experimental conditions, may help provide a more detached, objective assessment of participants' mood to assess emotional regulation at points where self reporting momentarily emotions is not feasible.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. California: Sage.

Ashkanasy, N. M., & Daus, C. S. (2002). Emotion in the workplace: The new challenge for managers. *Academy of Management Executive, 16*(1), 76-86. Retrieved from http://www.fbe.hku.hk/doc/courses/ug/2011-2012/BUSI0075A/Emotion.pdf

Bolger, N., Delongis, A., Kessler, R. C., & Schilling, E. A. (1989). Effects of daily stress on negative mood. *Journal of Personality and Social Psychology. 57*(5), 175–183. doi: 10.1037/0022-3514.57.5.808

Bolger, N., & Schilling, E. A. (1991). Personality and the problems of everyday life: The role of neuroticism in exposure and reactivity to daily stressors*. Journal of Personality, 59*(3), 355-386. doi: 10.1111/j.1467-6494.1991.tb00253.x

Boyes, M. E., & French, D. J. (2010). neuroticism, stress, and coping in the context of an anagram-solving task. *Personality and Individual Differences, 49*(5), 380-385. doi: 10.1016/j.paid.2010.04.001

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York: Cambridge University Press.

Cohen, J., Cohen, P., Aiken, L. S., & West, S. H. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. New Jersey: Lawrence Erlbaum Associates.

Davidson, R. J. (1998). Affective style and affective disorders: Perspectives from affective neuroscience. *Cognition and Emotion, 12*(3), 307-330. doi: 10.1080/026999398379628

Dawson, J. F., & Richter, A. W. (2006). Probing three-way interactions in moderated

multiple regression: Development and application of a slope difference test. *Journal of Applied Psychology, 91*(4), 917-926. doi:10.1037/0021-9010.91.4.917

Eid, M., & Diener, E. (1999). Intraindividual variability in affect: Reliability, validity, and personality correlates. *Journal of Personality and Social Psychology, 76*(4), 662– 676. doi:10.1037/0022-3514.76.4.662

Gerrards-Hesse, A., Spies, K., & Hesse, F. W. (1994). Experimental inductions of emotional states and their effectiveness: A review. *British Journal of Psychology, 85*(1), 55-78. doi: 10.1111/j.2044-8295.1994.tb02508.x

Gilhooly, K. J., & Johnson, C. E. (1978). Effects of solution word attributes on anagram difficulty: A regression analysis. *Quarterly Journal of Experimental Psychology, 30*(1), 57-70. doi:10.1080/14640747808400654

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.). *Personality psychology in Europe*, Vol. 7 (pp. 7-28). Netherlands: Tilburg University Press.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*(3), 271-299. doi: 10.1037/1089-2680.2.3.271

Hernandez, S., Vander Wal, J. S., & Spring, B. (2003). A negative mood induction procedure with efficacy across repeated administrations in women. *Journal of Psychopathology and Behavioural Assessment, 25*(1), 49-55. doi: 10.1023/A:1022252020196

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates

creative problem solving. *Journal of Personality and Social Psychology, 52*(6), 1122-1131. doi: 10.1037/0022-3514.52.6.1122

Joseph, D. L., & Newman, D. A. (2010). Discriminant validity of self-reported emotional intelligence: A multitrait-multisource study. *Educational and Psychological Measurement, 70*(4), 672-694. doi: 10.1177/0013164409355700

Kavanagh, D. J. (1987). Mood, persistence and success. *Australian Journal of Psychology, 39*(3), 307-318. doi: 10.1080/00049538708259055

Larsen, R. J., & Ketelaar, T. (1989). extraversion, neuroticism, and susceptibility to positive and negative mood induction procedures. *Personality and Individual Differences, 10*(12), 1221–1228. doi: 10.1016/0191-8869(89)90233-X

Libbrecht, N., Lievens, F., & Schollaert, E. (2010). Measurement equivalence of the Wong and Law Emotional Intelligence Scale across self and other ratings. *Educational and Psychological Measurement, 70*(6). 1007-1020. doi: 10.1177/0013164410378090

Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In R. J. Davidson, K. J. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 619-642). New York: Oxford University Press.

Matthews, G., Zeidner, M., & Roberts, R. D. (2002). *Emotional intelligence: science and myth.* Cambridge: MIT Press.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2000). Models of emotional intelligence. In R. J. Sternberg (Eds.), *Handbook of intelligence* (pp. 396–420). Cambridge: Cambridge University Press.

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring

emotional intelligence with the MSCEIT V2.0. *Emotion, 3*(1), 97–105. doi: 10.1037/1528-3542.3.1.97

Ng, W., & Diener, E. (2009). Personality differences in emotions: Does emotional regulation play a role? *Journal of Individual Differences, 30*(2), 100-106. doi: 10.1027/1614-0001.30.2.100

Norvick, L. R., & Sherman, S. J. (2003). On the nature of insight solutions: Evidence from skill differences in anagram solution. *Quarterly Journal of Experimental Psychology, 56A*(2), 351-382. doi: 10.1080/02724980244000288

Palfai, T. P., & Salovey, P. (1993). The influence of depressed and elated mood on deductive and inductive reasoning. *Imagination, Cognition and Personality, 13*, 57-71. doi: 10.2190/FYYA-GCRU-J124-Q3B2

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*, 425–448. doi: 10.1002/per.416

Ross, S. R., Canada, K. E., & Rausch, M. K. (2002). Self-handicapping and the Five Factor Model of personality: mediation between neuroticism and Conscientiousness. Personality and Individual Differences, 32(7), 1173-1184. doi: 10.1016/S0191-8869(01)00079-4

Salovey, P. & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185-211. doi: 10.1016/S0191-8869(98)00001-4

Schaubroek, J., & Merritt, D. E. (1997). Divergent effects of job control on coping with work stressors: The key role of self-efficacy. *Academy of Management Journal*, *40*(3), 738– 754. doi: 10.2307/257061

Shi, J., & Wang, L. (2007). Validation of emotional intelligence scale in Chinese

university students. Personality and Individual Differences, 43, 377-387. *doi*: 10.1016/***j***.paid.2006.12.012

Stein, K. D., Goldman, M. S., & Del Boca, F. K. (2000). The influence of alcohol expectancy priming and mood manipulation on subsequent alcohol consumption. *Journal of Abnormal Psychology, 109(1)*, 106-115. doi: 10.1037/0021-843X.109.1.106

Tamir, M. (2005). Don't worry, be happy? neuroticism, trait-consistent affect regulation, and performance. *Journal of Personality and Social Psychology, 89*(3), 449-461. doi: 10.1037/0022-3514.89.3.449

Tamir, M., Robinson, M. D., & Clore, G. L. (2002). The epistemic benefits of trait-consistent mood states: An analysis of extraversion and mood. *Journal of Personality and Social Psychology, 83*(3), 663-677. doi: 10.1037/0022-3514.83.3.663

Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Tuma, & J. D. Maser (Eds.), *Anxiety and the anxiety disorder* (pp. 681-706). New Jersey: Erlbaum.

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of Cross-cultural Psychology, 38*(2), 227-242. doi: 10.1177/0022022106297301

Trapnell, P. D., & Campbell, P. D. (1999). Private self-consciousness and the five factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology, 76*(2) 284–304. doi: 10.1037//0022-3514.76.2.284

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief

measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070. doi: 10.1037/0022-3514.54.6.1063

Wong, C., & Law, K. S. (2002). The effects of leader and follower emotional intelligence on performance and attitude: An exploratory study. *The Leadership Quarterly, 13*(3), 243-274. doi: 10.1016/S1048-9843(02)00099-1

Appendix A

Table 1

Bivariate Correlation Table

Factor	M	SD	1	2	3	4	5	6	7	8	9
1. Gender	0.25	0.43									
2. Age	20.08	1.49	0.09								
3. Emotional Intelligence	5.06	0.68	0.08	-0.25*							
4. neuroticism	2.96	0.66	-0.33**	-0.24*	-0.57**						
5. Pre-Negative Affect	1.80	0.77	-0.22*	-0.03	-0.22*	0.24*					
6. Post-Negative Affect	1.87	0.72	0.12	-0.14	-0.17	0.17	0.42**				
7. Pre-Positive Affect	2.56	0.99	0.05	0.09	0.19	-0.19	0.03	0.04			
8. Post-Positive Affect	2.97	0.99	-0.06	0.04	0.16	-0.05	0.13	0.09	0.56**		
9. Cognitive Performance	0.41	0.18	-0.06	-0.02	-0.02	0.16	-0.11	-0.34**	-0.05	0.24*	

Notes. N = 101 participants

* Correlation is significant at the 0.05 level (2-tailed), **Correlation is significant at the 0.01 level (2-tailed)

Appendix B

Table 2

Summary of the Hierarchical Regression Analysis Assessing Cognitive Performance.

Variable	Step One		Step Two		Step Three		Step Four	
	B	β	B	β	B	β	B	β
Gender	-0.02	-0.06	-0.01	-0.02	-0.01	-0.02	0.00	0.00
Age	0.00	-0.01	0.00	-0.02	0.00	0.04	0.01	0.08
EI			0.02	0.08	-0.05	-0.19	-0.07	-0.24
neuroticism			0.07	0.24	-0.05	-0.19	0.00	-0.01
Pre-NA			-0.04	-0.15	-0.04	-0.17	-0.07*	-0.31*
EIxPre-NA					0.04	0.27	0.04	0.32
neuroticismxPre-NA					0.07	0.50	0.03	0.19
neuroticismxEI					0.09	0.20	0.34**	0.77**
EIxneuroticismxPre-NA							-0.14*	-0.71*
R^2	0.004		0.053		0.092		0.147	
ΔR^2	--		0.050		0.039		0.055*	
ΔF	0.18		1.67		1.31		5.86*	
Dfs	2, 98		3, 95		3, 92		1, 91	

Notes. **p < 0.01; *p < 0.05

Appendix C

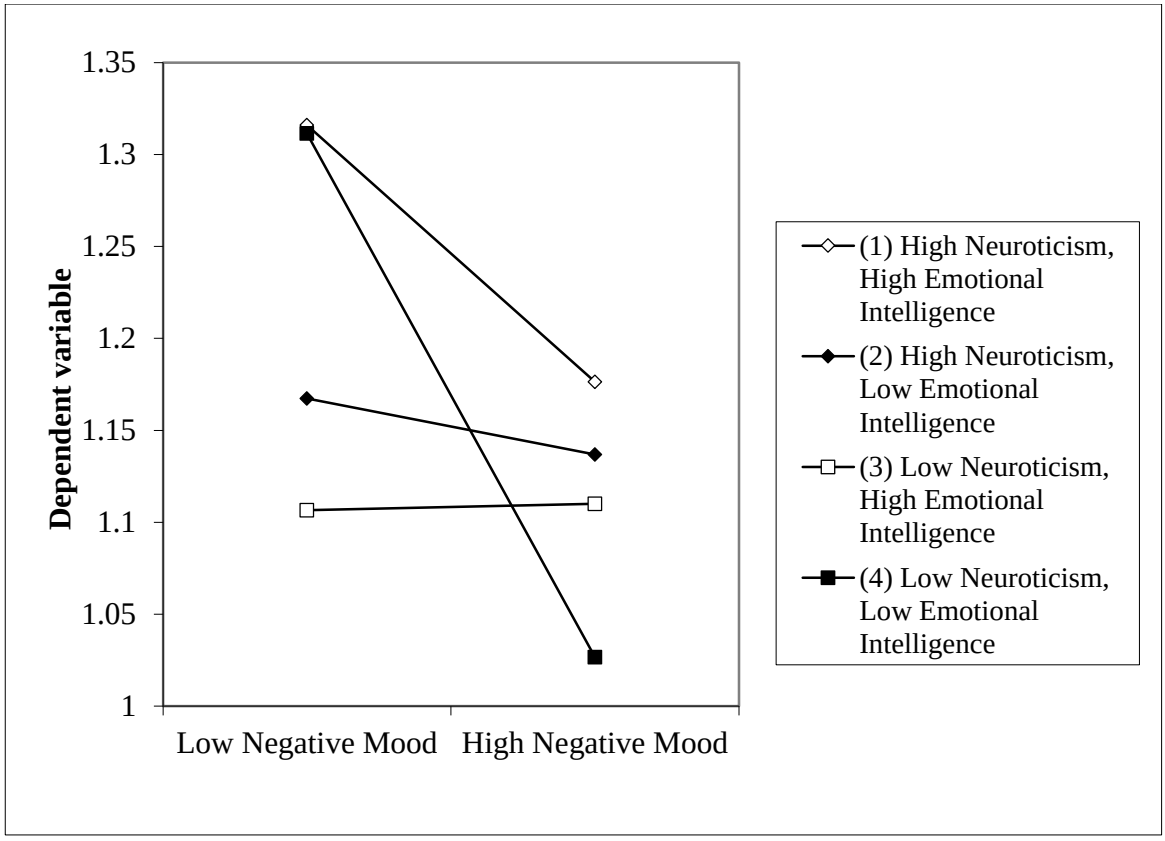

Figure 1. The 3-way interaction graph depicting the relationship between neuroticism, EI and mood states.

Appendix D

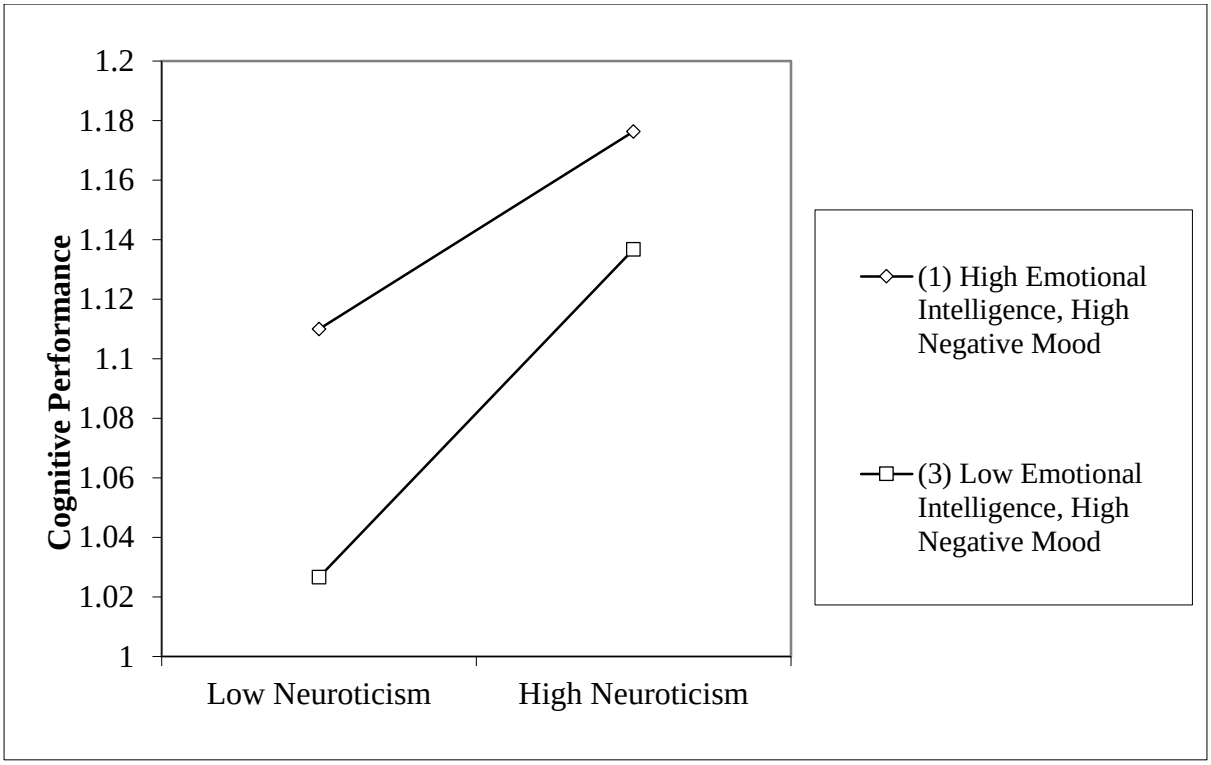

Figure 2. The two-way interaction graph depicting the relationship between neuroticism and EI at high negative mood state.

Appendix E

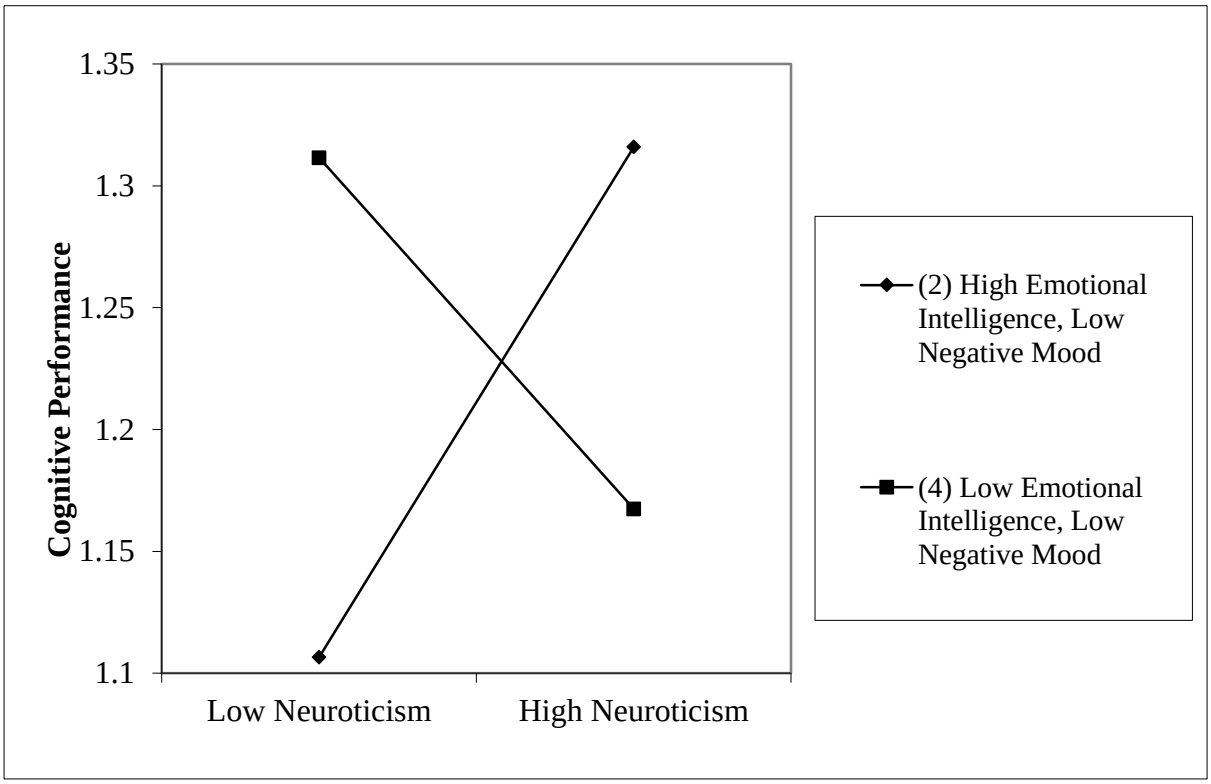

Figure 3. The two-way interaction graph depicting the relationship between neuroticism and EI at low negative mood state

Cite as: Amsyar, M.K. & **Tee, E.Y.J.** (2013). The interactive effects of mood, emotional intelligence and neuroticism on cognitive performance, presented at the ***10th Industrial Organisational Psychology (IOP) Conference***, Perth, Australia.

Author contact details:
Mohd. Khair Amsyar (mohdkhairamsyar@gmail.com)
Eugene. Y.J. Tee (teeyj@help.edu.my)