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THE NEUROTIC WANDERING MIND AND SELF-EFFICACY DURING TRAINING

by

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I dedicate this work to all the people that struggle with mental health issues.
Abstract
Personality is complex and dynamic, and because this attribute consists of a cluster of different distinctive traits, successfully predicting how personality predisposes individuals to different reactions and feelings during a learning activity is an equally complex and challenging task. For this thesis I will focus on the personality trait of low emotional stability, or neuroticism. Previous research has shown that people with lower emotional stability have a predisposition to be more stringent with self-perceptions across different domains of behaviors and feelings. Self-efficacy influences people’s confidence in their ability to exert control over their own behavior and impact their environment, all with the ultimate goal of specific performance attainments. Therefore, in this thesis we test the idea that people with lower emotional stability will also have lower self-efficacy. I am also interested in learning more about antecedents to self-efficacy and will explore the possibility that individuals may resort to mind wandering to avoid dealing with the negative feelings that arise during learning—a potentially stressful and challenging environment. We propose a mind wandering mediation between low emotional stability and self-efficacy, and a possible moderating effect from the particular sequence of the ATC trial (i.e., Low-High; High-Low). Participants (N = 137) completing Air Traffic Control simulator training were randomly assigned to one of two conditions counterbalancing training trial difficulty sequencing: Low-High or High-Low. The results demonstrated a negative relationship between mind wandering and self-efficacy on both trials. Training design sequencing did not moderate these relationships.

Keywords: emotional stability; self-efficacy; mind wandering; predisposition.
The Neurotic Wandering Mind and Self-Efficacy During Training

If we were to take either a formal, or an informal survey of what is it that makes us unique and different from each other, we will very likely find “personality” among the top responses. Personality is complex and predisposes us to act and feel in predictable ways (Judge & Ilies, 2002). These individualities also influence self-perceptions (Thomson, 2015). One important domain where personality differences manifest is in the learning environment (Gully & Chen, 2010). You may have noticed how people think, feel, and act differently when learning new things, and personality may be one way to account for this. But precisely how personality traits influence important learning outcomes in complex skills training, and what if anything can be done to alleviate potential learning challenges for individuals with different personality profiles, is less clear (Gully & Chen, 2010). Here, I focus on the personality attribute of neuroticism in the training environment because of how important of an influence anxiety and negative emotionality may be during learning (Koy & Yeo, 2008). Indeed, neurotic or anxious people may be predisposed to worry more than emotionally stable individuals about how quickly they are learning or progressing, feel more irritated and frustrated with errors, and thereby more likely to suffer and give up when attempting to learn new things. This is consistent with research showing that people who are more neurotic have more negative self-perceptions and more strict self-expectations than those with more emotional stability, even when such negativity is unwarranted (Thomson, 2015). Clearly, neuroticism during training may introduce challenges to individual and organizational learning.

Therefore, in this study, I investigate the link between neuroticism and self-efficacy during training, and propose mind wandering, or off-task thought, as a possible mechanism to account for the negative self-evaluations of neurotic learners. Since the link between self-
efficacy and neuroticism remains unclear, exploring a model that includes mind wandering as a possible mediator between these two constructs may help us find evidence to explain more of the mechanisms at work when neurotic minds feel uneasy over a challenging task or training session. I also test training difficulty sequencing as a possible moderating variable that could impact the extent to which neurotic individuals engage in mind wandering, indirectly influencing their post-training self-efficacy. This gives trainers a possible method to combat the distracting fears of more neurotic people who lose focus during training by presenting training difficulty in a particular manner so they do not lose focus and internalize the difficulty of trying to learn too much too soon. In the sections that follow, I present theory and empirical evidence to support these propositions, with the hope that these findings may be used to support the learning experience for all trainees, whether neurotic or emotionally stable.

Theoretical Background & Hypothesis Development

Emotional Stability and Self-efficacy

As mentioned previously, neuroticism is one of the widely known and researched Big Five. This personality trait predisposes individuals to experience an array of negative effects that include irritability, anxiety, and even depression, among others (Robinson et al., 2017). Additionally, individuals low in emotional stability have a predisposition to respond differently in environments where they feel frustration, feel threatened, and/or experience feelings of loss (Lahey, 2009).

Self-efficacy refers to an individual’s self-perception of his or her ability to execute behaviors necessary to produce specific performance attainments. This is reflected in an increased confidence in one’s ability to exert control over one’s motivation, behavior, and even social environment (Bandura, 1997). At the core of this definition, we find self-perception which
could represent a link between more generalized self-perceptions and the personality trait of neuroticism. This is the argument made by Thomson (2015), who found support for the idea that neurotic people are more likely to form biased negative self-perceptions, that manifest as a greater discrepancy between ideal and actual self-perceptions across different domains of behaviors and feelings. This could mean that neurotic individuals are more likely to evaluate their capabilities during training more negatively than those who are more emotionally stable.

Although there is a vast amount of research that has looked at these two constructs and their relationship with each other and other outcomes of interest, there is scarce evidence looking into the mechanisms that account for neurotic individuals’ negative self-evaluations in a learning environment, which is further addressed in this paper. However, before delving too deeply into the mechanisms, I first discuss why I expect that neuroticism should be related to self-efficacy.

There has been previous research linking the Big Five personality traits and self-efficacy. For example, conscientiousness facilitates task engagement and effort, which in turn foster beliefs of self-efficacy. Conversely, and more to the point of this paper, low emotional stability, which promotes anxiety, in turn will foster lower perceptions of self-efficacy (Judge & Ilies, 2002; Chen et al., 2001; Stajkovic et al., 2018). Notwithstanding the previous research, the way personality traits influence self-efficacy beliefs remain inconclusive and continuing research to expand the literature regarding this topic is encouraged (Judge et al., 2007).

In an influential study by Seo & Ilies (2009) one of the relationships of interest was between affective states and performance, where they found support for a mediating effect of self-efficacy. In other words, feeling bad harms performance because you evaluate your capabilities more negatively when you are feeling bad. Later, Bandura (2012) praised the design of this study, reinforcing this notion of “if I’m feeling good while performing the task, then I
must be doing well on it.” Thus, our self-efficacy is informed by how we feel. But what about when there is a predisposition to feelings of an opposing (i.e., negative) nature? If people low in emotional stability are predisposed to negative affect, could this also mean they are predisposed to have lower self-efficacy? If positive affect while performing a task increases the likelihood of higher perceived self-efficacy, and negative affect increases feelings of subpar competence, then individuals with low emotional stability may be predisposed to have lower self-efficacy during training. This raises a whole new set of questions about whether people with lower emotional stability have an added disadvantage to the typical worries that individuals with higher emotional stability often have regarding training performance such as performance anxiety, fear of testing, or uneasiness about the unknown, and whether these in turn impact self-efficacy or not (Robison et al., 2017).

If research has shown that individuals low in emotional stability are stricter at self-evaluating due to neurotic tendencies like apprehension, self-consciousness, and anxiety, it stands to reason that these insecurities will impact the way a person thinks of him or herself and their ability to be able to control their erratic thoughts and behaviors for the purpose of learning (Thomson, 2015). Moreover, the essence of self-efficacy involves the self-perceived ability to control our behavior in order to perform better. If we consider the neurotic mind with its tendencies for tougher self-perceptions, and we consider its predisposition to negative affect, then equally in essence, negative self-perceptions during training by emotionally unstable people may predict the opposite, a self-perceived lack of ability to execute the necessary behaviors (i.e., control my negative feelings and thoughts during training) to reach the desired performance goals (Bandura, 1997, 2012; Judge & Ilies, 2002; Chen, et al., 2001; Schmitt, 2008). The reality of things is that nobody is perfect and most of us have to get up in the morning and make the best
of our conditions in spite of all our imperfections—and nothing makes imperfections more obvious than learning! Therefore, because learning can promote anxiety and negative feelings, I hypothesize that:

**Hypothesis 1**: People with low emotional stability have lower perceptions of self-efficacy after learning a new task.

**Emotional Stability and Mind Wandering**

One way to test the validity of this theory linking neuroticism and self-efficacy—that feeling anxious and emotionally unstable while learning leads to negative self-evaluations—is by examining what learners are actually thinking about during the learning task, including the degree of off-task thought or mind wandering. Although there has been an interest in mind-wandering for a few decades, in the last few years this interest has increased significantly. Originally, it was disciplines such as cognitive psychology and cognitive neuroscience leading the way, yet, this interest has permeated other dimensions of psychology, including I/O Psychology (Randall et al., 2014). We are additionally interested in the link between our personality trait of choice, neuroticism, and mind wandering.

Mind wandering is defined as the shift in attention away from a primary task to the processing of other/personal goals that often occurs without intention or awareness (Smallwood & Schooler, 2006). An interest in how personality traits, or the commonly known Big-Five, relate to mind wandering gave way to influential studies that have advanced research in this topic. This includes research demonstrating a moderate, negative relationship between emotional stability and mind wandering (e.g., Robison et al., 2017). Although research has already established that individuals with higher levels of neuroticism tend to report more mind wandering, we are reviewing this relationship to propose a new model where mind wandering
partially mediates the relationship between trait-low emotional stability and post-hoc perceptions of self-efficacy.

Consider the tendency of individuals with low emotional stability to foster negative emotions in stressful situations; now consider a new training scenario that such individual has never seen or been part of before. This could trigger negative emotions for emotionally unstable individuals that lead learners’ thoughts away from the learning task at hand to become preoccupied with performance anxiety and fears of being competitive enough with other peers that will be required to complete the same training (Koy & Yeo, 2008). We believe that neuroticism could therefore be an antecedent to mind wandering during learning and that these individuals will have more trouble self-regulating their attentional resources because of neurotic tendencies fostering more intrusive negative thoughts and feelings (Robison et al., 2017). Another possible theoretical path from neuroticism to mind-wandering during a complex training session could be that individuals with such neurotic tendencies have legitimate delicate personal issues that they are currently going through, and due to their predisposition to worry, escaping the primary training task at hand to worry about ongoing personal problems may seem like an impossible task. In sum, I expect that:

Hypothesis 2: People with lower emotional stability mind wander more in a learning environment than people with higher emotional stability.

Mind-wandering and Self-efficacy

The confidence in one’s capability of performing successfully in a given task domain (Bandura, 1997), may be harmed by individual failures of self-regulation (Randall, et al., 2019). Lord et al., (2010) theorized that “when doubts about potential success develop, attention disengages, allowing one to protect the self from more severe disappointment and negative
feedback associated with unexpected failure” (p. 558). This suggests a connection between mind wandering and self-efficacy, with more frequent disengagement a sign of increased difficulty learning, suggesting a negative relationship between mind wandering and self-efficacy. Although there is less support for this relationship in the existing literature than the other relationships investigated in this study, recent research does reinforce the idea that those who mind wander more frequently in a learning environment have lower post-training levels of self-efficacy (Randall et al., In Press). Therefore, I expect that:

**Hypothesis 3: People that mind wander more in a learning environment have lower perceptions of self-efficacy after learning a new task.**

**Emotional stability, Mind wandering, and Self-efficacy**

When we are worried about something we may also struggle more to focus our attention; consequently, a self-awareness of this struggle may hinder the learning experience. During an important learning event such as a company training on a critical new software, it is likely that feelings of anxiety or concern may distract trainees from the task of learning (Lord et al., 2010), further aggravating their lack of self-confidence in reproducing the knowledge learned in training when the opportunity presents itself in the real world (Randall et al., In Press). For individuals with lower emotional stability whom due to their tendency to foster negative affect, the fear of failure due to their inability to self-regulate these feelings and emotions may be more pronounced, therefore, it is reasonable to think they could resort more to mind-wandering as a disengagement resource in order to protect themselves from severe disappointment in a learning environment (Randall, et al., 2019). This could be explored as a chain that represents causality from a personality tendency to worry, which in turn takes effect in the shape of a failure to
control our attentional resources, and ultimately results in a decreased perception of self-efficacy during training. Therefore, I hypothesize a partial mediation:

*Hypothesis 4: Mind wandering partially mediates the relationship between low emotional stability and self-efficacy; when emotional stability is low, mind wandering during training increases, resulting in lower levels of self-efficacy.*

**The Impact of Training Design on This Model**

Organizations spend hefty budgets every year improving training strategies to potentially increase the probability of trainees’ transfer of training. Considering the prevalence and unfavorable consequences of self-regulation failures during training, there is a range of methods that have been designed and are used to mitigate these detrimental effects. This selection of methods aimed to help people manage negative emotions and stay focused during training, includes adaptive guidance, self-regulation prompts, planning interventions, metacognitive instructions, and structured reflections (Bell et al., 2017). Despite these efforts to improve self-regulation during training, the fact that emotionally unstable individuals have a tendency to experience more negative affect could lead to bigger and more troubling disappointments during training, altering perceptions of self-efficacy. This suggests that people low in emotional stability need these affect and attention-altering training design features more than those high in emotional stability. If the way a training is designed and presented is expected to have an effect in feelings of frustration or levels of emotional control for the average person (Randall, et al., 2019), we believe that they may even have a greater impact for those with lower levels of emotional stability.

One possible training design choice that may impact the extent to which training difficulty influences trainees’ emotions and following learning is the sequencing, or presentation
order of training difficulty. Previous research has examined how the sequencing of high and low complexity levels of task demand may alter some of the negative emotions and self-regulation failures experienced in training and, ultimately, training outcomes. In their integrative review of how different training design features affect learning development and success, Schimdt and Bjork (1992) discussed how random, as opposed to blocked or progressive, sequencing can facilitate deeper learning. However, they did not discuss the effect that such design choices might have on individuals’ emotional reactions nor their ability to self-regulate affective, cognitive, and behavioral resources during training. Building upon this work, other cognitive psychologists have demonstrated that easy-to-hard, or progressive sequencing during training improves learning beyond random stimulus presentation or anti-progressive (i.e., regressive) sequencing (Ahissar & Hochstein, 1997; Church et al., 2013; Liu et al., 2008; Spiering & Ashby, 2008).

Connecting these ideas with our earlier arguments, regressive sequencing of task difficulty during training (i.e., hard-to-easy), as opposed to progressive sequencing (i.e., easy-to-hard), could influence emotional experiences and self-regulation failures during training. This possibility is supported by Kanfer and colleagues’ theoretical arguments (Kanfer & Ackerman, 1996; Kanfer & Heggestad, 1997) of the relative importance of emotion control and motivation control depending on task difficulty or learning phase. In short, the sequencing or order by which training material is presented could amplify or attenuate negative affect and subsequent self-regulation failures. For instance, completing regressively sequenced training, where one is introduced to harder tasks first, before completing easier ones, might unnecessarily enhance feelings of stress and inadequacy for people that are more predisposed to these types of feelings. Similarly, completing progressively sequenced training, where one is introduced to an easier task
first, before being introduced to harder ones, might lead to a better development in the learning process and reducing mind wandering occurrences.

The sequencing of training trial complexity may be expected to enhance the negative affect predispositions and self-regulation failures experienced by exaggerating the attentional demand of training tasks (Eisenberger, 1992). Unfortunately, we are unaware of research in the extant literature that has examined whether the sequencing of task difficulty influences negative emotional reactions and self-regulation failures during complex training. It is possible that sequencing training difficulty order in ways that will exaggerate the negative emotions and self-regulation failures one experiences (by moving from high- to low-demand instead of low- to high-demand) will also harm training outcomes of self-efficacy and performance. Thus, when first presented with a difficult task first that overwelms one’s capabilities, increasing the predispositions of more emotionally unstable people, trainees are left with fewer resources to deal with unwarranted feelings of inadequacy and mind wandering during a much simpler task.

Based on these ideas, we believe that the partially mediated relationship between individuals with low emotional stability and lower reported post-training feelings of self-efficacy will be enhanced when individuals are presented with a harder training option first, making this a moderated relationship by the partial mediator. There will be two different conditions, both of them including one easy and one hard training block, with the presentation order reversed to be either progressive (low to high difficulty) or regressive (high to low difficulty). We believe that the more demanding that the training task is, by overwhelming trainees with a regressive sequence, the more stressed these individuals will be, increasing the likelihood of mind-wandering escapades from the primary task that will also result in lower post-training perceptions of self-efficacy.
Hypothesis 5: The partial mediation of mind wandering between emotional stability and self-efficacy will be moderated by training sequencing condition, such that the relationships are stronger (i.e., more negative) with regressive (high-low difficulty) as opposed to progressive (low-high difficulty) sequencing.

Method

Participants

Our sample is 148 students from a public university in the Northeastern United States who participated in the study in exchange for research credit. Of the 148 participants, 11 were removed from the dataset prior to analysis for one of two reasons: (a) protocol or software error that precluded evaluation of training sequence (n = 7), or (b) the participant scored less than 20% on a working memory assessment that was delivered at the beginning of the procedure (n = 4; consistent with recommendations for identifying noncompliance and poor data quality; Conway et al., 2005). Participants were randomly assigned to one of two conditions, which determined the presentation order of trial difficulty level. 61 participants from condition 1 (M_{age} = 19.26, SD_{age} = 2.13; 36.5% female, 63.5 % male) and 76 participants from condition 2 (M_{age} = 19.37, SD_{age} = 1.76; female = 46.1%, 54.94% = male) were included in the analysis for a total sample size of 137. A small number of individuals reported extremely low measures of self-efficacy, which skewed the data. Rather than removing these participants as outliers, as their data were deemed to not be errors, a 90\(^{th}\) percentile Winsorization was applied to the self-efficacy data. Data points falling above and below the 95\(^{th}\) and 5\(^{th}\) percentiles were imputed to be the value of the 95\(^{th}\) and 5\(^{th}\) percentiles, respectively, as recommended by Aguinis et al. (2013).

Procedure
After having arrived in the lab at their scheduled time, participants completed a battery of individual differences assessments, including personality, followed by a 15-minute guided training on the ATC-Lab Simulator software. The training simulator requires participants to act as an air-traffic controller to ensure safe passage of aircraft through an assigned airspace while avoiding collisions with other objects (e.g., weather spots, other aircraft). Two versions of ATC training trials were created: a low difficulty trial and a high-difficulty trial. Each trial was 45-minutes long. Participants randomly assigned to condition 1 completed the low difficulty trial followed by the high difficulty trial, and those in condition 2 completed the high difficulty trial followed by the low difficulty trial. To manipulate the difficulty levels of the trials, the number and speed of aircrafts and the number of conflicting flight paths were greater in the difficult trial than the easy trial. Furthermore, two weather spots were included in the difficult trial, whereas there were none in the easy trial. Following each trial or training block (easy and hard), participants completed assessments of mind wandering and self-efficacy. There was a five-minute break scheduled between training blocks.

**Measures**

*Emotional Stability*

Emotional stability was assessed using the section for neuroticism from the Mini-IPIP scale from Donnellan et al. (2006), consisting of four items. Trainees responded to statements about generalized feelings and mood stability (e.g., “I get upset easily) using a Likert-format to assess the accuracy of such statement. (1 = Very Inaccurate, 5 = Very Accurate). The internal consistency of this scale is acceptable $\alpha = .70$, considering its reduced length.

*Mind Wandering*
Mind wandering was assessed using an eight-item measure from Randall et al. (2019). Trainees responded to questions about the frequency of various off-task thoughts or mind wandering (e.g., “I thought about other activities for example, assignments, work”) using a Likert-format (1 = Never, 5 = Very Often). The same measure was administered at baseline and following completion of both training trials. Reliability estimates were high: $\alpha = .93$ baseline, $\alpha = .96$ low-difficulty trial, and $\alpha = .98$ high-difficulty trial.

**Self-Efficacy**

Self-efficacy was assessed using a six-item measure with an individual referent adapted from Villado and Arthur (2013), which focused on the ATC-Lab simulator (e.g., “I am confident in my ability to perform well on the ATC-Lab Simulator”). Reliability estimates for this measure were high: $\alpha = .93$ baseline, $\alpha = .93$ low-difficulty trial, and $\alpha = .94$ high-difficulty trial.

**Results**

Descriptive statistics and intercorrelations for all study variables are presented in Table 1. All hypotheses were tested using linear regression, mediation, and moderation analyses in SPSS v.24 (MacOS). The mediation and moderation analyses were conducted using PROCESS v4.1 (Hayes, 2022). The standard errors and confidence intervals for both sets, direct and indirect, and conditional direct and conditional indirect effects, were calculated using 5,000 bootstrapped samples. Moderated mediation regression models were run separately for the low-difficulty and high-difficulty trials since all variables were measured for each trial, allowing for two tests of each hypothesis (in the easy and hard trials). Results from these tests are presented in Tables 2 and 3 and highlighted below for hypothesis tests.

For Hypothesis 1, we found no support for the positive relationship between emotional stability and self-efficacy for the hard trial, $b = 0.24$, $t(132) = 0.65$, $p = .520$, 95% CI [-0.50,
0.10], nor for the easy trial $b = -0.50, t(132) = -1.53, p = .127$, 95% CI [-1.13, 0.14]. Hypothesis 2 predicted that people scoring lower in emotional stability will mind wander more. We found that, although the relationship was in the expected direction, there was no support for this prediction, neither in the hard trial, $b = -0.60, t(133) = -0.93, p = .352$, 95% CI [-1.85, 0.66], nor for the easy trial $b = -0.36, t(133) = -0.62, p = .536$, 95% CI [-0.15, 0.78].

For Hypothesis 3, we predicted that people mind wandering more in a new learning environment will also have lower self-efficacy. For the overall model we found that 30% of the variance on the dependent variable, self-efficacy, was explained by the combination of predictors for the hard trial and 33% for the easy trial. This hypothesis was fully supported since mind wandering negatively predicted self-efficacy in both the hard trial $b = -0.18, t(132) = -3.45, p = .001$, 95% CI [-0.28, -0.08], and the easy trial, $b = -0.11, t(132) = -2.34, p = .021$, 95% CI [-0.21, -0.18]. The indirect effects show a lack of support for Hypothesis 4, that postulated that mind wandering would mediate the relationship between neuroticism and self-efficacy, and more specifically predicted that people with higher neuroticism, will resort to mind wandering more, ultimately reducing self-efficacy. This is demonstrated in Table 2 for the easy trial and Table 3 for the hard trial, where the confidence intervals of the indirect effects for each model overlap zero.

Finally, Hypotheses 5 predicted that the partial mediation of mind wandering between neuroticism and self-efficacy would be moderated by training sequencing condition, expecting the relationships to be stronger when the sequencing was regressive (high-low difficulty), as opposed to the progressive sequence (low-high difficulty). To evaluate this, I examined the index of moderated mediation which tests whether the indirect effect of neuroticism on self-efficacy through mind wandering differs between the two sequencing conditions. This index was non-
significant for both the hard trial: $b = -0.08$, SE = .07, 95% CI [-0.25, 0.04] and the easy trial: $b = -0.04$, SE = .04, 95% CI [-0.15, 0.02]. Thus, Hypothesis 5 was not supported.

**Discussion**

The purpose of this thesis was to investigate the influence that emotional stability has on self-efficacy directly and indirectly by the mediation of mind wandering, to examine the impact that negative or anxious self-directed thoughts might have on important training outcomes. I also investigated the moderating influence of training complexity sequence with the idea that training design could be used to mitigate the harmful effects of off-task thought during a novel learning experience for more neurotic individuals. Although many of these ideas were unsupported in the present study, we did find a significant negative link between mind wandering and self-efficacy. I discuss these results in more detail below, along with study limitations and future directions.

**Neuroticism, Mind Wandering, & Self-efficacy**

Notwithstanding the neurotic mind’s increased tendency to negative affect and more stringent self-perceptions in general, our results showed no support for the idea that individuals who have lower emotional stability experience lower perceived self-efficacy after participating in a novel learning environment. In other words, people with personalities characterized by lower emotional stability may not have to worry about their self-efficacy being affected due to any causal link between these two psychological constructs at the center of this study. For organizations, these results could mean that trainers and other leaders may not have to consider people with neurotic tendencies a liability during training. A possible explanation for this outcome, which we will discuss later, is that people with neurotic tendencies as part of their everyday lives may have also developed coping mechanisms, thereby attenuating the potentially detrimental effects of neuroticism on attention and training self-efficacy. Therefore, anxiety or
negative emotions may not necessarily interfere in the learning process for people who are, by nature, more neurotic. We also must consider that we only investigated the relationship between the personality trait of neuroticism and self-efficacy, but not state anxiety.

Another finding that did not support my prediction and the past literature (e.g., Robison et al., 2017) was that we found no significant relationship between neuroticism and mind wandering. This could be consistent with the idea that people low in emotional stability are used to dealing with negative affect and are still able to maintain focus in spite of it, thereby not always leading to mind wandering.

I also hypothesized that participants who mind wandered more during a new task, or while participating in training, would have lower perceived self-efficacy after such activity. Our results showed support for this idea, on both, hard and easy trials, fully supporting our Hypothesis 3. This has important implications regarding how individuals perceive themselves after having disengaged during training, whether they come to this realization during training or after they finish. Trainees, and consequently organizations, could benefit from the implementation of appropriate methods to mitigate self-regulation failures (Randall et al., 2019). This could also mean that people who manage to pay more attention can increase self-perceptions of their capabilities and positively affect other outcomes such as training performance. This link between mind wandering and self-efficacy should be further investigated.

We should also note that these results were unaffected by individuals’ neurotic personality tendencies, since emotional stability was not related to mind wandering nor self-efficacy and there was no mediation of mind wandering between neuroticism and self-efficacy.

**Task Difficulty Sequencing**
Our study included training sequencing as a moderator of the relationships investigated to examine whether the potentially harmful effects of a lack of emotional stability on trainees’ self-efficacy would be influenced by the presentation order of two training trials that varied in difficulty level. This idea was tested experimentally by randomly assigning participants to two conditions counterbalancing the sequencing of training trials as either (a) progressive: low-difficulty followed by high-difficulty (L-H), or (b) regressive: high-difficulty followed by low-difficulty (H-L). The results indicate no support for the moderating effect of training complexity sequence on mind wandering. This means that the detrimental effects of self-regulation failures, namely mind wandering, were not particularly enhanced by whether participants were presented with the hard training trial first, followed by the easy trial, or vice-versa. One possible explanation of these results could be, that self-reporting mind wandering measures were post-hoc and during neither one of these two conditions mind wandering was assessed while in training.

**Theoretical and Practical Implications**

Since this is an understudied topic in the scientific literature, our results do not unequivocally support the idea that neuroticism has no relationship with self-efficacy. Instead, we propose that the link between neuroticism and self-efficacy may be explored in a different way in the future so that researchers can further investigate the mechanisms at work between these two constructs. That being said, there are at least two important implications from these results. First, the finding that mind wandering and self-efficacy were negatively related holds implications for theory and practice. From the standpoint of training designers and organizational leaders, the possibility of reducing mind wandering occurrences during training by implementing attention self-regulation strategies may translate into positive outcomes for organizations. If these practices can directly influence self-efficacy through decreasing mind wandering episodes,
it means that they can indirectly influence other desirable outcomes such as performance, or
transfer of training.

Second, finding no support for the idea that people with lower emotional stability may
consequently have low self-efficacy may benefit organizations because they do not need to be
concerned by people with neurotic tendencies being a liability during training. That is, training,
including sequencing design may not need to be customized based on emotional stability levels
to help people stay focused. Instead, these results may suggest that individuals high in
neuroticism may be used to performing and self-regulating despite these pervasive feelings and
fluctuating mood states. Perhaps the same goes to the other personality traits and this is a
consequence of years of getting used to one’s own cluster of personality while they learn and
perform. This idea could be explored further to investigate if this is the case.

Study Limitations and Future Directions

One of the limitations of the experiment was to only focus on negative affect derived
from an inherent personality predisposition, rather than exploring state negative affect derived
from the situation. In other words, having feelings of anxiety or apprehension during training
may be more representative of how the ongoing challenge could be having a negative effect on
individuals, without discriminating between personality traits. Testing for state affect will help
understand more of these potential differences and causality. An example of this is Poposki et
al.’s (2009) research which found that state anxiety mediated the negative relationship between
neuroticism and multitasking performance—which one may say shares a lot of features with a
novel learning experience. Thus, including studies of state affect may be an alternative, or even
superior mediator between neuroticism and self-efficacy compared to mind wandering.
Another experimental limitation is that among college students the ATC-simulator could be perceived as a videogame, which in addition to the fact that this training may not have a lot of meaning to them, may not have enough triggering power for the negative emotions that we were investigating. For individuals to participate in a training activity under the assumption that their training performance will have an impact on actual job performance may set the stage for negative affect to surface. Having access to a sample or data from individuals that are somehow invested in training outcomes, like field training, should be more appropriate for the type of observations that we have proposed.

Since mind wandering and self-efficacy were measured at the same time in a linear regression model where mind wandering predicts self-efficacy, is possible that we missed the opportunity to explore a different causality order. In other words, if people that have lower self-efficacy are feeling bad about how poorly they are performing, they could resort to mental disengagement in order to feel better. Asynchronous measures for mind wandering and self-efficacy during a longitudinal study may be a good idea to address this restriction.

Conclusion

In general, this study found no evidence that neuroticism negatively impacted learners’ self-efficacy during training, either directly or indirectly by increasing mind wandering. However, I did find that individuals who mind wander more also have lower perceived self-efficacy during training, reinforcing the idea that self-regulation failures may be a way to avoid feeling bad about one’s capabilities. A training strategy that includes germane methodology to decrease self-regulation failures could have an impact on self-efficacy, above and beyond all the other potential benefits of improved self-regulation of attention, such as better performance and
transfer of training. However, training difficulty sequencing order may not be that method.

Future research can investigate other ways to help people stay focused during training.
References


Table 1

Descriptive Statistics and Intercorrelation Matrix of Variables of Interest

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Neuroticism</td>
<td>2.43</td>
<td>0.66</td>
<td>.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Mind Wandering – E</td>
<td>-0.01</td>
<td>1.36</td>
<td>.11</td>
<td>.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Mind Wandering – H</td>
<td>-0.06</td>
<td>1.47</td>
<td>.12</td>
<td>.41**</td>
<td>.98</td>
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</tr>
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<td>4. Self-Efficacy – E</td>
<td>-0.03</td>
<td>0.81</td>
<td>-.04</td>
<td>-.25**</td>
<td>-.21</td>
<td>.93</td>
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<tr>
<td>5. Self-Efficacy – H</td>
<td>-.02</td>
<td>0.91</td>
<td>.03</td>
<td>-.18**</td>
<td>-.30**</td>
<td>.66**</td>
<td>.94</td>
</tr>
</tbody>
</table>

Note. N=137. E = Easy trial; H = Hard trial; Cronbach’s alpha reliabilities are along the diagonal in italics. *p < .05, **p < .001
Table 2

*Moderated Mediation Results for Easy Training Trial*

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>B</th>
<th>SE B</th>
<th>CI-L</th>
<th>CI-U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predicting Mind Wandering</strong></td>
<td>.07*</td>
<td>-0.36</td>
<td>0.58</td>
<td>-1.50</td>
<td>0.78</td>
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<tr>
<td>Neuroticism</td>
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<td>-0.36</td>
<td>0.58</td>
<td>-1.50</td>
<td>0.78</td>
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<tr>
<td>Condition</td>
<td></td>
<td>-0.32</td>
<td>0.89</td>
<td>-2.09</td>
<td>1.44</td>
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<tr>
<td>Neuroticism*Condition</td>
<td></td>
<td>0.37</td>
<td>0.34</td>
<td>-0.30</td>
<td>1.05</td>
</tr>
<tr>
<td><strong>Predicting Self-efficacy</strong></td>
<td>.11*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism</td>
<td></td>
<td>-0.50</td>
<td>0.32</td>
<td>-1.13</td>
<td>0.14</td>
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<tr>
<td>Condition</td>
<td></td>
<td>1.06</td>
<td>0.50</td>
<td>-2.05</td>
<td>-0.08</td>
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<tr>
<td>Neuroticism*Condition</td>
<td></td>
<td>0.30</td>
<td>0.19</td>
<td>-0.08</td>
<td>0.68</td>
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<td>Mind Wandering</td>
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<td>0.05</td>
<td>0.05</td>
<td>-0.21</td>
<td>-0.20</td>
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<tr>
<td><strong>Indirect Effects for Condition 1 (Easy-Hard)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism → Mind Wandering → Self-efficacy</td>
<td></td>
<td>0.00</td>
<td>0.03</td>
<td>-0.07</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Indirect Effects for Condition 2 (Hard-Easy)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism → Mind Wandering → Self-efficacy</td>
<td></td>
<td>-0.04</td>
<td>0.03</td>
<td>-0.12</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Note.* Sample size, $N = 172$. T1 = Time 1, T2 = Time 2. CI-L = lower-bound 95% confidence interval around the standardized estimate. CI-U = upper-bound 95% confidence interval. All parameter estimates, standard errors, and confidence intervals are unstandardized. Standard errors and confidence intervals are based on 10,000 bootstrapped resamples. *$p < .05$, **$p < .001$
### Table 3

**Moderated Mediation Results for Hard Training Trial**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>$B$</th>
<th>$SE$ $B$</th>
<th>CI-L</th>
<th>CI-U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predicting Mind Wandering</strong></td>
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<td>-0.59</td>
<td>0.63</td>
<td>-1.85</td>
<td>0.66</td>
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<td>Neuroticism</td>
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<td>Condition</td>
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<td>1.22</td>
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<tr>
<td>Neuroticism*Condition</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Predicting Self-efficacy</strong></td>
<td>.09*</td>
<td>0.24</td>
<td>0.38</td>
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<tr>
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<td>0.58</td>
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<td>-0.15</td>
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<td>0.29</td>
</tr>
<tr>
<td>Neuroticism*Condition</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mind Wandering</td>
<td></td>
<td>-0.18*</td>
<td>0.05</td>
<td>-0.28</td>
<td>-0.08</td>
</tr>
<tr>
<td><strong>Indirect Effects for Condition 1 (Easy-Hard)</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Neuroticism $\rightarrow$ Mind Wandering $\rightarrow$ Self-efficacy</td>
<td>0.02</td>
<td>0.05</td>
<td>-0.08</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td><strong>Indirect Effects for Condition 2 (Hard-Easy)</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism $\rightarrow$ Mind Wandering $\rightarrow$ Self-efficacy</td>
<td>-0.06</td>
<td>0.05</td>
<td>-0.18</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Sample size, $N = 172$. T1 = Time 1, T2 = Time 2. CI-L = lower-bound 95% confidence interval around the standardized estimate. CI-U = upper-bound 95% confidence interval. All parameter estimates, standard errors, and confidence intervals are unstandardized. Standard errors and confidence intervals are based on 10,000 bootstrapped resamples. *$p < .05$, **$p < .001$
Figure 1. Moderated Mediation Model from Neuroticism to Self-Efficacy through Mind Wandering - Easy Trial
Figure 2. Moderated Mediation Model from Neuroticism to Self-Efficacy through Mind Wandering - Hard Trial

* = $p < .05$