

THE INTERACTIVE EFFECTS OF PERSONALITY AND GENERAL MENTAL ABILITY
ON PERFORMANCE:

REVISITING THEORY AND METHODOLOGY

by

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(Under the Direction of Nathan T. Carter)

ABSTRACT

Researchers have increasingly investigated qualifiers of the personality-performance relationship. However, very little research to date has considered how general mental ability (GMA) interacts with personality in predicting performance. This paper reviews recent personality research consistent with a personality-GMA interaction—namely situational specificity, trait by trait interactions, and distinguishing performance dimensions—to hypothesize that the personality-performance relationship is strongest among low-GMA individuals. Additionally, this paper reviews earlier work on the topic and argues that methodological limitations (e.g., limited personality scope, FFM-based measurement, and performance operationalization) led to a premature dismissal. The current studies update prior methodology to investigate the role of personality-GMA interactions in task performance (Study 1) and extra-role performance (Study 2). Results support interactions consistent with hypotheses for conscientiousness in predicting task performance and conscientiousness, openness, and extraversion in predicting counterproductive work behavior. Implications for the theoretical relationship between personality, GMA, and performance are discussed.

INDEX WORDS: Personality, general mental ability, performance, interaction

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TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	vii
CHAPTER	
1 INTRODUCTION	1
2 MODERN SUPPORT FOR A PERSONALITY-GMA INTERACTION	4
Situational Specificity	4
Trait by Trait Interactions	6
Task vs. Extra-Role Performance	8
3 PRIOR RESEEARH ON PERSONALITY-GMA INTERACTIONS	11
Motivation-Ability Interaction Theory	11
Empirical Support	14
Methodological Limitations.....	21
4 THE CURRENT STUDIES.....	30
5 STUDY 1: TASK PERFORMANCE	32
Method	32
Data Analysis	35
Results.....	36
Discussion	38
6 STUDY 2: EXTRA-ROLE PERFORMANCE	49

Method	49
Data Analysis	51
Results.....	52
Discussion	54
7 GENERAL DISCUSSION	64
Limitations and Future Directions	66
Conclusion	67
REFERENCES	68

LIST OF TABLES

	Page
Table 3.1: Summary of Prior Study Results on the Interactive Effects of Personality and GMA on Job Performance and Career Success	24
Table 3.2: Summary of Prior Study Results on the Interactive Effects of Personality and GMA on Academic Performance	28
Table 5.1: Comparison of GRM and GGUM Fit Statistics for Sample 2 Personality Scales.....	42
Table 5.2: Model-data Fit Statistics for Personality Scales in Study 1.....	43
Table 5.3: Confirmatory Factor Analysis Results Comparing 2-factor and 1-factor Personality Structures for Study 1 Personality Scales	44
Table 5.4: Correlations Between All Predictors and Criteria for Study 1	45
Table 5.5: Results of Regression Analyses for Task Performance Predicted by Personality and GMA in Study 1, Sample 1.....	46
Table 5.6: Results of Regression Analyses for Task Performance Predicted by Personality and GMA in Study 1, Sample 2.....	47
Table 6.1: Confirmatory Factor Analysis Results Comparing 2-factor and 1-factor Personality Structures for Study 2 Personality Scales	58
Table 6.2: Correlations Between All Predictors and Criteria for Study 2	59
Table 6.3: Results of Regression Analyses for OCB Predicted by Personality and GMA.....	60
Table 6.4: Results of Regression Analyses for CWB Predicted by Personality and GMA.....	61

LIST OF FIGURES

	Page
Figure 5.1: Interactive effect of conscientiousness and GMA on task performance in Sample 1 (left) and Sample 2 (right).....	48
Figure 6.1: Interactive effect of GMA and conscientiousness, agreeableness, openness, and extraversion on CWB.....	62
Figure 6.2: Interactive effect of agreeableness and GMA on CWB at low (-1 SD), average, and high (+1 SD) agreeableness.	63

Chapter 1

INTRODUCTION

Most research on the relationship between personality and job performance is relatively young. Well into the 1960s, the apparent lack of a strong personality-performance relationship led some researchers to advocate halting personality research entirely (Guion & Gottier, 1965). However, the 1990s brought the solidification of the five factor model (FFM), a personality taxonomy that finally demonstrated replicable correlations between personality and performance (Barrick & Mount, 1991; Digman, 1990). The last three decades have seen a surge a of interest in personality as a predictor of performance. Still, personality research is dominated by two competing findings: overwhelming evidence that personality matters for performance yet generally lower correlation magnitudes than expected (Sackett & Lievens, 2008).

Many reviews and meta-analyses have adamantly asserted the importance of personality for performance (e.g., Barrick & Mount, 2005; Judge, Rodell, Klinger, Simon & Crawford, 2013; Ones, Dilchert, Viswesvaran, & Judge, 2007; Sackett & Lievens, 2008). For the most part, the personality-performance correlations identified by Barrick and Mount (1991) have been consistently replicated, particularly regarding conscientiousness. Other evidence that supports personality's importance in performance includes incremental criterion-related validity beyond GMA, strengthened relationships for narrow performance dimensions, and the pervasive belief of many managers in personality's importance. In practice, another key advantage of including personality as a predictor is reduced adverse impact compared to using GMA alone (Hough, Oswald, & Ployhart, 2001).

Despite the enthusiasm for personality as a performance predictor, concerns regarding correlation magnitudes persist. In particular, these concerns stem from small personality-performance correlations relative to the robust relationship between performance and general mental ability (GMA; Sackett & Lievens, 2008). Of the FFM traits, conscientiousness is the strongest predictor of overall job performance and still shows only a modest correlation ($\rho = .27$, Barrick & Mount, 1991; $\rho = .26$, Judge et al., 2017). Further, although neuroticism is often cited as the second strongest predictor of job performance, updated meta-analyses have shown weaker correlations than those originally identified ($\rho = -.13$, Barrick & Mount, 1991; $\rho = -.08$, Judge et al., 2017). The other three FFM traits (extraversion, agreeableness, and openness) demonstrate reliable relationships with job performance either in specific occupational contexts (Barrick, Mount, & Judge, 2001) or for narrow performance dimensions but still do not exceed modest magnitudes (e.g., citizenship, Chiaburu, Oh, Berry, Li, & Gardner et al., 2011; Judge et al., 2017). In contrast, the *strongest* correlations between personality and job performance rival the *weakest* correlations between GMA and job performance. GMA predicts performance most strongly ($\rho = .51$) in high-complexity jobs and modestly ($\rho = .23$) in low-complexity jobs (Schmidt & Hunter, 2004). More recent reviews have found similar ranges (Schmitt, 2014).

Today, researchers have moved beyond studying simple correlations between FFM traits and performance. Instead, they have turned to qualifying the personality-performance relationship in the hopes of understanding factors that cause their empirical link to strengthen or weaken (Barrick & Mount, 2005). A variety of strategies have been invoked. Yet among the wide array of qualifiers entertained in recent research, one remains conspicuously absent: a personality-GMA interaction. Given the dominance of both GMA and personality in research on the antecedents of performance, this gap is surprising.

The research void on interactive effects of personality and GMA on performance stems from a brief series of studies – most notably Sackett, Gruys, and Ellingson (1998) and Mount, Barrick, and Strauss (1999) – that considered and ultimately dismissed the possibility of such interactive effects. However, reviewing the theoretical context for these studies reveals that they were focused on extending a *motivation-ability* interaction hypothesis to include personality rather than investigating a *personality-GMA* interaction specifically. Consequently, although these studies called for an end to personality-GMA interaction research, I argue that such an interaction has not yet been fully tested.

The current research revisits the possibility that GMA and personality have an interactive effect on performance. I hold that, beyond the intuitive appeal of an interaction between these two fundamental individual differences, current research on qualified personality-performance relationships easily extends to justify a personality-GMA interaction. In the following, I build on this recent personality-performance research to provide an updated personality-GMA interaction hypothesis. I also explore the theoretical framework, methodology, and empirical findings of prior studies to further justify revisiting the topic. Finally, I conduct two studies using the necessary methodological revisions to investigate how personality and GMA may interact to predict job performance.

Chapter 2

MODERN SUPPORT FOR A PERSONALITY-GMA INTERACTION

Among research on qualified personality-performance relationships, there are three bodies of literature that extend naturally to a personality-GMA interaction. The theory of *situational specificity* argues that situations moderate trait expression; GMA has been shown to affect evaluations of situational features, which in turn impact behavioral expression of personality traits. Research on *trait by trait interactions* suggests that personality traits influence the behavioral expression of one another; GMA may function similarly to personality by influencing the expression of other traits. Lastly, research on performance dimensions suggests that personality traits and GMA differentially predict *task and extra-role performance* but has so far shown inconsistent support for this theory; an interaction may explain inconsistencies.

Situational Specificity

One increasingly popular avenue for research on personality-performance moderators focuses on *situational specificity* (Barrick & Mount, 2005). Evidence for the moderating effect of situations (in the form of occupation types) emerged as early as Barrick and Mount's (1991) meta-analysis and has been consistently replicated (Barrick et al., 2001). More recently, Judge and Zapata (2015) utilized a taxonomy of situations and found that personality predicts performance differentially across situations. Today, the role of situations as moderators of the personality-performance relationship is perhaps best explained by Trait Activation Theory (TAT). TAT builds on empirical evidence of differential personality-performance relationships across job contexts and posits that people express traits in response to trait-relevant situational

cues (Tett & Burnett, 2003). Notably, if personality predicts performance to the extent that a situation activates a particular trait, then reasonably one's ability to assess that situation and modify behavior accordingly will also influence the strength of the personality-performance relationship. That is, the ability to assess situations will moderate the personality-performance relationship.

Both conceptual and empirical evidence support the role of GMA in one's ability to assess situations. First, although many definitions of intelligence exist, most researchers conceptualize it as the capacity to solve problems and learn. Gottfredson (1997) states that GMA reflects a "capability for comprehending our surroundings – 'catching on,' 'making sense' of things, or 'figuring out' what to do" (p. 13). Sternberg (1997) defines GMA as the "...abilities necessary for adaptation to, as well as shaping and selection of, any environmental context" (p. 1030). Based on definition alone, it is reasonable to expect that GMA influences one's ability to assess situations and the appropriateness of personality trait expressions in a given situation.

Empirical support for GMA's role in assessing situations and moderating the personality-performance relationship comes from the link between GMA and the Ability to Identify Criteria (ATIC). ATIC is a candidate's ability to correctly identify criteria used for selection decisions (Kleinmann et al., 2011). Research has shown that higher GMA predicts the ability to accurately assess desirable behaviors in a situation (Kleinmann et al., 2011). Candidates who exhibited higher ATIC received higher scores on assessment center exercises ($\rho = .61-.79$), suggesting that people with high ATIC modify their behavior (Jansen, Lievens, & Kleinmann, 2011).

Support for the relationship between ATIC and GMA also hints at the likely form of a personality-GMA interaction on job performance. Whereas low GMA individuals would perform well only if their personality was appropriate for the situation, high GMA individuals would be

able to better adapt to the situation regardless of their personality. The relationship between personality and performance should weaken among those with high GMA. Thus, the link between ATIC and GMA illustrates how GMA may play a role in adapting to situations and moderating personality expression accordingly.

Trait by Trait Interactions

Interactions among personality traits have also gained attention and support (Judge & Erez, 2007; Witt, Burke, Barrick, & Mount, 2002) in the quest to find moderators that clarify the personality-performance link. In fact, nearly all research on trait by trait interactions has shown support for their incremental validity over additive effects (Penney, David, & Witt, 2011). Trait by trait interactions “consider one trait as shaping the expression of the other” and posit that considering traits multiplicatively rather than additively provides a more nuanced, complete understanding of the personality profile (p. 396, Shoss & Witt, 2013). Similarly, Penney et al. (2011) proposed that traits interact because individuals have standings on multiple traits and therefore multiple trait-based goals which compete to drive behavior.

This logic also lends itself to a personality-GMA interaction. Many researchers advocate the same type of complex, non-independent relationship between personality and GMA (Furnham, 2008) that provides the basis for trait by trait interaction research. Notably, DeYoung (2011) has posited that intelligence may in fact occupy a part of the personality construct space. Further, Chamorro-Premuzic and Furnham (2004) have proposed that intelligence formatively impacts personality development. However, whereas trait by trait interactions are posited to stem from differences in trait-based goals, GMA may be more likely to affect one’s ability to achieve a goal than the focus of the goal. For example, consistent with the discussion of GMA’s role in

situation evaluation above, GMA may improve one's ability to understand the consequences of an action for a desired goal.

By extending trait by trait interactions to include GMA as influencing personality expression, we may resolve inconsistencies in the interrelation of GMA and personality traits. That is, GMA often does not correlate with FFM traits as we might expect given the correlations of each construct with job performance. For example, of the FFM traits, conscientiousness shows the strongest positive relationship with performance. Because GMA also shows a consistent positive relationship with performance, we might expect conscientiousness and GMA to correlate positively. However, GMA and conscientiousness typically show either a small negative or null correlation (DeYoung, 2011; Moutafi, Furnham, & Paltiel, 2005). Recently, Rammstedt, Danner, and Martin (2016) also found evidence of a quadratic relationship between conscientiousness and GMA such that high conscientiousness is particularly associated with low GMA. A popular explanation for this relationship is a compensatory mechanism by which people lower in GMA must work harder and operate in a more orderly fashion to achieve the same outcomes or goals as those higher in GMA (Furnham, 2008). Such a compensatory mechanism implies an interaction between GMA and conscientiousness in which personality has the most impact on performance among those with low GMA. In contrast, those with high GMA are less dependent on personality for high performance.

Other FFM traits similarly exhibit relationships with GMA that are inconsistent with their independent relationships with performance. Of the FFM, openness is typically considered to have the strongest correlation with GMA ($\rho = .30$), though the strength varies with type of intelligence measured and facet of openness considered (DeYoung, 2011). Nonetheless, the relative strength of the openness-GMA relationship stands in contrast to the overall weak or even

nonexistent openness-performance relationship (Barrick & Mount, 1991). Additionally, neither extraversion nor agreeableness demonstrate consistent relationships with GMA (Furnham, 2008), though both show positive relationships with performance in at least some contexts (Barrick & Mount, 2005). Neuroticism alone shows somewhat consistent relationships as it correlates negatively with both job performance and GMA ($\rho = -.15$), although the latter relation may be mediated by test anxiety (Ackerman & Heggestad, 1997; Barrick & Mount, 1991; DeYoung, 2011; Furnham, 2008). Thus, an interactive mechanism like that proposed for conscientiousness and GMA may similarly explain the relationships between the other FFM traits and GMA.

Task vs. Extra-Role Performance

One of the most widely-researched explanations for the weak personality-performance relationship focuses on the criterion as opposed to predictors, specifically the distinction between *task* and *extra-role* performance. Borman and Motowidlo (1993) defined task performance as the “technical core” of the job and extra-role—or as they originally referred to it *contextual*—performance as “the organizational, social, and psychological environment” of the job (1993, p. 73). They expected that personality would chiefly predict extra-role performance whereas task performance would have a stronger relationship with GMA. Further, they proposed that not distinguishing between performance dimensions may account for unclear or meager personality-performance relationships previously observed (Borman, Penner, Allen, & Motowidlo, 2001).

Research generally supports the different antecedents of not only task and extra-role performance but also subdimensions of extra-role performance (Cullen & Sackett, 2003; Dalal, 2005): Organizational Citizenship Behavior (OCB) and Counterproductive Work Behavior (CWB). Regarding the distinction between task performance and extra-role performance broadly, researchers agree GMA predicts task performance better than extra-role performance (Gonzalez-

Mulé, Mount, & Oh, 2014; LePine & Van Dyne, 2001; McHenry, Hough, Toquam, Hanson, & Ashworth, 1990). However, regarding the distinction between OCB and CWB, results are less clear. Personality traits are stronger predictors than GMA of CWB, but personality and GMA are equally important predictors of OCB (Gonzalez-Mulé et al., 2014). Within the FFM, agreeableness and conscientiousness typically show the relationships with OCB and CWB (Berry, Ones, & Sackett, 2007; Borman et al., 2001; Organ & Ryan, 1995), though more recent evidence has also supported openness as a strong predictor of OCB (Chiaburu et al., 2011).

As Borman and Motowidlo (1993) expected, distinguishing between performance dimensions qualifies the personality-performance relationship, yet research has not unanimously supported the types of relationships or strengths that Borman and Motowidlo anticipated. Specifically, not all FFM traits have demonstrated stronger relationships with extra-role than task performance. Further, research has yet to support a stronger relationship between OCB and *any* personality trait relative to the relationship between OCB and GMA. GMA-moderation may explain these inconsistencies. Much like the research discussed above that suggests GMA may help individuals better understand how to behave in a situation, some researchers have proposed that GMA may play an inhibitory role in CWB (Dilchert, Ones, Davis, & Rostow, 2007; Gonzalez-Mulé et al., 2014) and an enhancing role in OCB. Individuals with high GMA may recognize the need to suppress CWB and engage in OCB. This possibility again suggests that individuals with high GMA should show a weaker relationship between personality and extra-role performance than those with low GMA.

As outlined here, the role of GMA in moderating the personality-performance relationship is consistent with several other popular research veins. Research on situational specificity provides an explanation for a possible GMA-moderation mechanism given that GMA

plays a role in evaluating situations. Trait by trait interactions also extend to GMA-personality interactions, particularly for a compensatory role of personality in performance. Finally, inconsistencies between hypothesized relationships and findings regarding the antecedents of task and extra-role performance may be resolved by a personality-GMA interaction. Moreover, these literatures all lend themselves to the same hypothesis: the personality-performance relationship is weakest among those with high GMA and strongest among those with low GMA. Collectively, this body of research makes a strong case for empirically investigating personality-GMA interactions.

Chapter 3

PRIOR RESEARCH ON PERSONALITY-GMA INTERACTIONS

This paper is not the first to propose an interactive effect of personality and GMA on job performance. In fact, a number of studies have already considered the possibility. However, in stark contrast to the support presented above, past researchers have concluded that such an interaction does not exist. Indeed, given the support for a personality-GMA interaction outlined above, it seems that unsupportive prior findings are the primary and perhaps only argument against a renewed study on a personality-GMA interaction. Below, I make the case that prior findings should not be a barrier to continued research. I argue that the theoretical basis for the first stream of personality-GMA interaction research informed a methodological approach that did not sufficiently investigate the topic. Further, more recent empirical evidence provides support for an interaction and highlights the limitations of earlier studies.

Motivation-Ability Interaction Theory

Most past research on the interactive effect of personality and GMA on performance originates from the hypothesis that performance should be a function of both ability and *motivation* (Vroom, 1995). Though this hypothesis had enjoyed theoretical support since the 1950s (Maier, 1955), researchers found little empirical support for it due to inconsistent definitions of motivation. In the 1980s, Hollenbeck, Brief, Whitener, and Pauli (1988) extended the motivation-ability interaction theory to include personality. They posited that because of the link between motivation and some personality traits (in their study, these traits were self-esteem

and locus of control), we should expect the same type of interaction between personality and ability as between motivation and ability.

Shortly thereafter, the FFM solidified a taxonomy of personality and inspired renewed interest in personality research (Barrick & Mount, 1991; Digman, 1990). Armed with a reliable personality taxonomy but still no consistent taxonomy of motivation, researchers turned their attention wholly from a motivation-ability interaction to the personality interaction laid out by Hollenbeck et al. (1988). Conscientiousness – the closest FFM trait to motivation – began being substituted for motivation altogether (O'Reilly III & Chatman, 1994; Wright, Kacmar, McMahan, & Deleeuw, 1995). Indeed, in their recent meta-analysis of the motivation-ability interaction theory of performance, Van Iddekinge, Aguinis, Mackey, and DeOrtentiis (2017) note that the vast majority of related research used trait-based measures of motivation, including conscientiousness. Yet Van Iddekinge et al. (2017) also note that conscientiousness is a “broad, multifaceted construct” and chose not to include studies that operationalized motivation as conscientiousness in their meta-analysis. Thus, what had for nearly a half-century been the *motivation-ability interaction* became the *personality-ability interaction*, seemingly due more to a shift in convenient operationalization than theory.

In the late 1990s, two capstone studies appear to have put an end to research on the interactive effects of personality and GMA on job performance. A study by Sackett et al. (1998) in *Journal of Applied Psychology* and a subsequent study Mount et al. (1999) in *Journal of Management* found unsupportive results for an interactive effect of personality and GMA on performance. However, these studies were still rooted in motivation-ability interaction and therefore considered only motivation-related personality traits. Mount et al. (1999) state:

Most studies testing the interaction model have used a measure of personality as a proxy for trait motivation. Therefore, a critical assumption in testing this interaction is that the measure of personality used must be related to motivation. Of the Big Five personality measures, conscientiousness is most closely related . . . (p. 709)

Sackett et al. (1998) also exclusively included personality traits related to motivation:

We are working from a theoretical framework that posits interactions for personality characteristics closely linked to the conceptualization of motivation as direction, level, and persistence of effort. Specifically, we focus on dependability and need-for-achievement rather than conduct a scattershot examination of ability-personality interactions. (p. 547)

Although restricting personality to motivation-related traits was appropriate for testing a motivation-ability interaction, it unfortunately led to a moratorium on research related to a GMA interaction with *all* personality traits.

Notably, the theoretical approach employed by these two hallmark studies was relatively consistent with the time. Whereas pre-21st century research focused primarily on theory-testing, today researchers tend to place equal emphasis on theory-building and theory-testing (Colquitt & Zapata-Phelan, 2007). For example, Judge, Higgins, Thoresen, and Barrick (1999) did consider GMA interactions with the other FFM traits, but they did so only as footnote replication of Sackett et al. (1998). No theoretical justification was provided for including the other traits. Thus, the tradition of motivation-ability theory, enthusiasm for a solidified personality taxonomy, and the research climate of the time perfectly coincided to halt research on a personality-GMA interaction before it was ever truly considered.

Empirical Support

Despite the scarcity of recent research on a personality-GMA interaction within industrial-organizational psychology, as well as the unsupportive findings of prior studies, empirical evidence persists in support of an interactive effect. The few studies that have recently revisited the topic have found support for it. Table 3.1 summarizes all studies known to the author that have investigated interactive effects of personality and GMA on job performance or career success. Further, within other fields, interest in a personality-GMA interaction has grown. Research on academic achievement in particular has begun to consider the implications of this moderated relationship and has shown some promise for the presence of an interaction. Table 3.2 summarizes seven studies that have explored a personality-GMA interaction in relation to academic performance.

At first, the support of recent studies for a personality-GMA interaction may seem to conflict with the results of earlier studies. However, a thorough review of the predictors and criteria in Tables 3.1 and 3.2 reveal that recent findings in fact supplement and clarify prior findings. Recent studies on possible interactive effects of personality and GMA on performance differ from prior studies in three key ways: (1) they expand the personality predictor beyond motivation-based traits; (2) they utilize FFM-based measures of personality; and (3) they discriminate between performance dimensions. These three distinctions help to reconcile recent and prior findings and provide empirical support for revisiting a personality-GMA interaction.

Job Performance & Career Success. Since the capstone studies of Sackett et al. (1998) and Mount et al. (1999), very few studies have considered the interactive effects of personality and GMA on job performance or career success. Two studies known to the author have considered such an interaction. Perkins and Corr (2006) found support for a buffering effect of

GMA on the relationship between neuroticism and performance in the military among those with low GMA. Perry, Hunter, Witt, and Harris (2010) found support for a multiplicative interaction between the achievement facet of conscientiousness and GMA such that those high in achievement motivation demonstrated a stronger positive relationship between GMA and performance relative to those lower in achievement motivation. Finally, de Haro et al. (2013) investigated the interactive effects of GMA and conscientiousness, neuroticism and openness on salary and career satisfaction. They found support for interactive effects involving all three traits on salary as well as an interactive effect of GMA and conscientiousness on career satisfaction. Notably, the form of the conscientiousness-GMA interaction was different from that found by Perry et al. (2010). de Haro, Castejón, and Gilar (2013) found a positive conscientiousness-salary and conscientiousness-satisfaction relationship among those with low-GMA and negative relationships among those with high-GMA. The results of these recent studies relative to earlier studies can be understood according to the three themes identified above.

The Full FFM. Recent studies on the interactive effects of personality and GMA on job performance have begun to shift away from a foundation in motivation-ability interaction theory. Of regressions in Table 3.1, just 6 of 54 (11%) involved a predictor that was not a proxy for motivation, and all 6 were included in two of the most recent studies (de Haro et al., 2013; Perkins & Corr, 2006). Table 3.1 shows that of regressions involving a neuroticism-GMA interaction, 3 of 4 (75%) showed evidence of an interaction. Of regressions involving an openness-GMA interaction, 1 of 2 (50%) showed evidence of an interaction. These results suggest that personality-GMA interactions may exist when the operationalization of personality is expanded to include all FFM traits, not just motivation-based traits such as conscientiousness. Still, the majority of research on the personality-GMA interaction is rooted in the motivation-

ability interaction theory. Additional research on an interaction between GMA and non-motivation traits is clearly needed.

FFM-Based Assessments. The second notable distinction between recent and earlier studies on personality-GMA interactions is a shift toward using FFM construct-valid assessments. Most personality researchers today utilize FFM-based personality assessments, but very few did so prior to the late 1990s. In the lead-up to dismissing a personality-GMA interaction, Mount et al. (1999) noted that their study was the first on the topic to use a construct-valid measure of conscientiousness. Because Mount et al. (1999) was the second of the two capstone studies on the personality-GMA interaction, their study was also the *only* one to use a construct-valid measure prior to the effective moratorium. Although O'Reilly & Chatman (1994), Wright et al. (1994), and Sackett et al. (1998) each referenced conscientiousness as a proxy for motivation, they utilized measures of achievement motivation and dependability rather than conscientiousness itself. Even Perry et al. (2010) did not use an FFM-based measure in their recent study of a conscientiousness-GMA interaction, although they reported high convergence of their measure with the FFM. de Haro et al. (2013) did use an FFM-based measure of conscientiousness in their investigation of salary and career satisfaction. Thus, there are only two studies (de Haro et al., 2013; Mount et al., 1999) known to the author that have used FFM-based measures of conscientiousness in investigating interactive effect of conscientiousness and GMA on job performance or career success.

In contrast to the measures used to assess conscientiousness, studies that recently investigated other traits have used FFM-based measures and found support for an interaction (de Haro et al., 2013; Perkins & Corr, 2006). These results suggest prior studies of an interaction may have been affected by the use of non-FFM assessments. Notably, several of the studies that

did not use a construct-valid measure of conscientiousness instead used measures of achievement motivation, citing high correlations between the two constructs. O'Reilly & Chatman (1994) report a strong correlation between their composite measure of achievement need and an FFM measure of conscientiousness ($\rho = .79$). Likewise, Wright et al. (1995) use a modified achievement need measure and cite a strong correlation between need for achievement and conscientiousness generally ($\rho = .67$). If we acknowledge, as earlier researchers have done, the strong correlation between construct-valid conscientiousness and achievement motivation and limit Table 3.1 regressions to only those that include achievement motivation as a predictor, 8 of 11 (73%) show support for an interaction. Of regressions including only FFM assessments of conscientiousness, 2 of 5 (40%) show support for an interaction. Of all regressions in Table 3.1 that utilized FFM assessments regardless of the trait, 5 of 11 (45%) show support for an interaction. The use of measures not based in the FFM may, in part, account for the unsupportive findings of earlier studies for a personality-GMA interaction.

Performance Criteria. Of studies that have thus far considered the interactive effects of personality and GMA on job performance, performance criteria have varied widely. As described above, the distinction between task performance and extra-role performance is now considered essential to uncovering personality-performance relationships. However, among the studies that led to the suspension of research on a personality-GMA interaction, only Sackett et al. (1998) differentiated between performance dimensions by considering different dimensions of military performance. Instead, most studies included composites of performance that likely blurred dimensions. For instance, the performance composites used in Mount et al. (1999) included both traditional task performance items (e.g., “know-how” and “job knowledge”) and extra-role performance (e.g., “organizational commitment” and “motivates others”). The earliest studies

(Hollenbeck et al., 1988 & O'Reilly & Chatman, 1994) did not include traditional measures of job performance at all, instead including measures of salary and application success. However, more recently, Perry et al. (2010) did utilize task performance specifically and found support for an interaction between two facets of conscientiousness and GMA. Insufficient distinction between performance dimensions in past studies may have muddled the relationship between predictors and criteria and impeded the identification of an interaction.

Academic Performance. While research exploring a GMA-moderated relationship between personality and performance has largely stood still within industrial-organizational psychology, interest in the topic has surged within other fields. Especially noteworthy is emerging evidence for the interactive effects of personality and GMA on academic performance. Of the regressions in Table 3.2, 10 of 18 (56%) show support for an interaction. This support is particularly relevant given that academic and job performance exhibit similar relationships with FFM traits and GMA (Kuncel, Hezlett, & Ones, 2004; Trapmann, Hell, Hirn, & Schuler, 2007). The contrast between the support for interactive effects on academic performance relative to job performance in earlier studies can again be understood in terms of the three critical shifts in recent personality research.

The Full FFM. Although many studies regarding the interactive effects of personality and GMA on academic performance are rooted in motivation-ability interaction theory, a much larger percentage has considered traits other than conscientiousness relative to studies of job performance. Of the regressions in Table 3.2, 8 of 18 (44%) were not related to motivation (i.e., conscientiousness or a proxy), and of these 4 of 8 (50%) showed support for an interaction. Beaujean et al. (2011) found evidence for an interactive effect of openness and GMA on math achievement. Heaven and Ciarrochi (2012) found that intellect (a facet of openness) predicts

academic achievement in those with high GMA but not those with low GMA. Lozano, Gordillo, and Pérez (2014) demonstrated that GMA moderates the relationship between impulsivity (a facet of neuroticism) and academic performance. Finally, Zhang and Ziegler (2015) found support for an interactive effect of openness and GMA on midterm exam performance, though no interactive effect of neuroticism and GMA. These results again support the need to revisit GMA interactions with all FFM traits.

FFM-Based Measurement. Like research on the relationship between personality and job performance, research on the relationship between personality and academic performance has also moved toward utilizing FFM-based measures of assessment. Of the regressions in Table 3.2, 12 of 18 (67%) used an FFM-based measure of assessment. Notably, two of the regressions that did not include an FFM-based assessment were conducted by Hollenbeck et al. (1988) and pre-date widespread acceptance of the FFM. Among regressions that utilized FFM-based assessments, 6 of 12 (50%) showed support for an interaction between personality and GMA: 3 of 5 for conscientiousness, 3 of 4 for openness, 0 of 1 for neuroticism, and 0 of 2 for agreeableness. As with studies that utilized job performance as the criterion, the results point to the importance of using FFM-based assessments when considering an interaction between personality and GMA and the need for more research before drawing definitive conclusions.

Performance Criteria. The use of academic performance as a criterion may itself explain inconsistent findings relative to the interactive effects of personality and GMA. Academic performance is a somewhat narrower, more objective performance measure than many of the criteria used to operationalize job performance in Table 3.1. In particular, academic performance is perhaps most conceptually related to task performance. Support for interactive effects of

personality and GMA on academic performance relative to job performance broadly lends additional credence to the importance of distinguishing between performance dimensions.

Other Criteria. In addition to research on the interactive effects of personality and GMA on academic performance, evidence for interactive effects on other criteria has also been found. Hirsh, Morisano, and Peterson (2008) found support for the interaction of GMA and extraversion in decision making, though they did not find support for an interaction with neuroticism. Postlethwaite, Robbins, Rickerson, and McKinniss (2009) found that GMA moderated the relationship between conscientiousness and workplace safety behavior, with conscientiousness more strongly predicting workplace safety among those with lower GMA. Finally, Shi, Dai, and Lu (2016) identified support for an openness-GMA interaction in divergent thinking.

Despite claims that a personality-GMA interaction does not impact job performance, empirical evidence does not yet lead to that conclusion. Recent evidence from within industrial-organizational psychology supports the interactive effects of personality and GMA on job and career performance. Moreover, evidence from other fields also suggests that personality and GMA impact performance interactively. Finally, overall shifts in personality research, both in theory and measurement, explain the discrepancy between these more recent results and earlier research findings. Although prior studies on the interactive effects of personality and GMA on job performance invoked methodology appropriate given the theoretical and methodological context of the time, the same methodological approach would not be appropriate today. Next, I summarize the key methodological limitations of past research and outline a path forward for renewed, comprehensive research on a personality-GMA interaction.

Methodological Limitations

Five methodological limitations warrant revisiting a personality-GMA interaction. The first three limitations have already been illustrated above by identifying key themes in empirical findings. Limitations 1 and 2 relate to the now popular acceptance of the FFM. Limitation 3 stems from changes in how performance is conceptualized. The final two limitations address more recent advances in personality research. Limitation 4 relates to advances in the scoring of personality measures that may also have affected the findings of prior studies. Finally, Limitation 5 acknowledges recent evidence of curvilinear personality-performance relationships.

Limitation 1: The Full FFM. Because prior studies on a personality-GMA interaction stemmed from motivation-ability interaction theory, most did not consider FFM traits other than conscientiousness. That is, none of the early studies operationalized personality using the complete FFM taxonomy. As discussed above, recent research has shown tentative support for an interaction between GMA and the other FFM traits. These results call for a robust study that considers an interaction between each of the FFM traits and GMA.

Limitation 2: FFM-Based Measurement. Among early studies that operationalized personality as conscientiousness, only one utilized an FFM-based assessment (Mount et al., 1999). More recent studies have utilized FFM-based assessments of personality traits and have found support for an interaction, which suggests that findings of earlier studies may have differed had they used FFM construct-valid assessments.

Limitations 3: Performance Criteria. Very few personality-GMA interaction studies from the 1990s or before distinguished between task and extra-role performance. Several operationalized performance as career success. Most others utilized general performance which combined task and extra-role performance. As stated above, distinguishing between performance

types is now considered critical to identifying personality-performance relationships. Using general performance as the criteria may have prevented clear relationships from emerging. More recent studies that have utilized narrower performance criteria, such as task or academic performance, have shown support for a personality-GMA interaction. A thorough investigation of a personality-GMA interaction on job performance should include measures that distinguish between the different dimensions of job performance (i.e., task, OCB, and CWB).

Limitation 4: Scoring of Personality Measures. Of prior studies, all used composite or average scores as their predictor and criteria variables. Morse, Johanson, and Griffeth (2012) showed that use of raw scores can lead to inflated Type 1 error rates as well as reduced power for significance tests in moderated multiple regression analyses. In particular, Type 1 error increases in the case of assessments poorly suited to the latent trait distribution of those assessed (i.e., items that are more extreme than the majority of persons being measured). Recent research suggests that most personality measures fit Morse et al.'s definition of assessment inappropriateness (Carter, Dalal, Guan, LoPilato, & Withrow, 2017). Because all prior investigations of personality-GMA interactions utilized raw scores, past findings may reflect Type 1 error or reduced power. Thus, as suggested by Embretson (1996), Morse et al. (2012), and Carter et al. (2017), item response theory (IRT) methods should be used to increase accuracy in the detection interactive effects.

Limitation 5: Curvilinear Personality-Performance Relationships. Researchers have called for considering non-linear personality-performance relationships for decades (Barrick & Mount, 1991; Ones, Dilchert, Viswesvaran, & Judge, 2007). More broadly, researchers have increasingly embraced the notion that adaptive traits may be maladaptive at extreme ends (Grant & Schwartz, 2011; Pierce & Aguinis, 2013). Although so far limited, early findings point to

curvilinear personality-performance relationships such that high levels of an adaptive trait are either detrimental or no longer beneficial, particularly for conscientiousness (Carter et al., 2014; Le et al., 2011). To the author's knowledge, no research to date has considered interactions between GMA and quadratic personality terms. The emerging evidence for curvilinear personality-performance relationships suggests that, if personality and GMA interact, differential curvilinear personality-performance relationships may exist at varying levels of GMA. Thus, when using regression to identify the interactive effects of personality and GMA, interactions between the GMA term and a quadratic personality term may be required. Notably, results that support *either* an interaction between a quadratic personality term and GMA or an interaction between a linear personality term and GMA would both point to a meaningful personality-GMA interaction. However, a significant interaction between GMA and the quadratic but not linear personality term could help to explain unsupportive earlier findings.

Table 3.1

Summary of Prior Study Results on the Interactive Effects of Personality and GMA on Job Performance and Career Success

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
1. Hollenbeck et al. (1988)	Yes	2 of 2	Insurance salespersons ($N = 48$)	Janis-Field Feelings of Inadequacy Rotter locus of control	Aptitude Index Battery for insurance sales	Commission-based salary	Yes (.06) No
2. O'Reilly & Chatman (1994)	Yes	1 of 1	MBA students ($N = 94$)	Adjective Checklist: achievement, endurance, and order*	GMAT scores	Offer/interview ratio Number of offers Current salary Salary increment Promotions	No Yes (.25) Yes (.09) Yes (.04) Yes (.16)
3. Wright et al. (1995)	Yes	1 of 1	Warehousers ($N = 203$)	Jackson Personality Research Form, modified for achievement need*	Adults Basic Learning Exam	Composite of supervisor ratings of performance	Yes (.09)
4. Sackett et al. (1998)	Yes	1 of 4	Enlisted Army personnel ($N = 8,274$)	ABLE: achievement inventory*	ASVAB	Core technical proficiency Effort and leadership General soldiering proficiency Personal discipline Physical fitness and military bearing	No No No No No
		2 of 4	Management-track recent college graduates ($N = 247$)	ABLE: dependability inventory EPPS: achievement*	School and College Ability Test series	Core technical proficiency Effort and leadership General soldiering proficiency Personal discipline Physical fitness and military bearing Managerial Level	No No No No No No

Table 3.1 (continued)

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
5. Mount et al. (1999)	Yes	3 of 4	Entry-level bakery employees ($N = 97$)	EPPS: need for order, need for deference, and need for endurance			No
				CPI: achievement via status and capacity for status*			Yes (.02)
				CPI: achievement via conformance, socialization, responsibility, and self-control			No
				GZTS: restraint			No
				EI: performance	FACT: inspection	Composite of performance ratings	No
					EAS: visual speed and accuracy		Yes (.06)
					EAS: numerical ability		No
				GZTS: restraint	FACT: inspection		No
					EAS: visual speed and accuracy		No
					EAS: numerical ability		No
		4 of 4	Employees at financial institution ($N = 197$)	EI: performance	Basic Skills Test for Business, Industry, and Government series		No
							No
5. Mount et al. (1999)	Yes	1 of 3	Mid-level, civilian U.S. Army Management Training Activity Department managers ($N = 146$)	PCI: conscientiousness	Wonderlic Personnel Test	Composite of supervisor ratings of performance	No
		2 of 3	Sales representatives in appliance manufacturing ($N = 103$)				No

Table 3.1 (continued)

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
		3 of 3	District managers in newspaper company (<i>N</i> = 121)				No
6. Perkins & Corr (2006)	No	1 of 2	Candidates attending Admiralty Interview Board (<i>N</i> = 607)	TSDI: neuroticism	Written cognitive test battery	Assessment center exercise score: command task and group decisions exercise	Yes (.07)
		2 of 2	Candidates at Regular Commission Board (<i>N</i> = 62)				Yes (.07)
7. Perry et al. (2010)	Yes	1 of 2	Call service representatives (<i>N</i> = 210)	OPQ32: global conscientiousness	Watson-Glasser Critical Thinking Appraisal	Career satisfaction	No
				OPQ32: achievement		Composite of supervisor ratings of task performance	No
				OPQ32: order			Yes (n/a)
				OPQ32: competitiveness			No
				OPQ32: dependability			No
		2 of 2	Call service representatives (<i>N</i> = 218)	OPQ32: traditionalism	Data reasoning test	Yes (n/a)	
				OPQ32: forward planning		No	
				OPQ32: global conscientiousness		No	
				OPQ32: achievement		Yes (n/a)	
				OPQ32: order		No	
				OPQ32: competitiveness		No	
				OPQ32: dependability		No	
				OPQ32: traditionalism		No	
				OPQ32: forward planning		No	

Table 3.1 (continued)

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
8. de Haro et al. (2013)	Yes	1 of 1	University Graduates (N = 130)	BFI: conscientiousness	Test of "g", Scale 3	Salary	Yes (n/a)
						Career satisfaction	Yes (.09)
	No			BFI: neuroticism		Salary	Yes (n/a)
						Career satisfaction	No
	No			BFI: openness		Salary	Yes (n/a)
						Career satisfaction	No

Note. Studies incorporating career success, in addition to job performance, were included given their prevalence among early literature investigating a personality-GMA interaction on performance. Column “MxA Theory” indicates whether a study was based in theory for a motivation-ability interaction. ABLE = Assessment of Life and Background Experiences. EPPS = Edwards Personal Preference Schedule. CPI = California Psychological Inventory. GZTS = Guilford-Zimmerman Temperament Survey. EI = Employment Inventory. PCI = Personal Characteristics Inventory. OPQ32 = Occupational Personality Questionnaire. BFI = Big Five Inventory. TSDI = Trait Self-Description Inventory. ASVAB = Armed Services Vocational Aptitude Battery. FACT = Flanagan Aptitude Classification Tests. EAS = Employee Aptitude Survey. Personality measures in boldface are FFM-based measures. n/a indicates a statistic was not provided.

*Indicates a measure was meant to assess achievement need specifically.

Table 3.2

Summary of Prior Study Results on the Interactive Effects of Personality and GMA on Academic Performance

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
1. Hollenbeck et al. (1988)	Yes	1 of 2	U.S. introductory management students ($N = 130$)	Janis-Field Feelings of Inadequacy	SAT Verbal	GPA	No
				Rotter locus of control	SAT Verbal SAT Math	GPA	Yes (.03) Yes (.02)
2. Ziegler et al. (2009)	Yes	1 of 1	German university psychology students ($N = 271$)	NEO-PI-R: global conscientiousness	Intelligence-Structure-Test-2000-R	GPA	Yes (.02)
				NEO-PI-R: achievement striving			Yes (<.01)
3. Beaujean et al. (2011)	No	1 of 1	U.S. university students ($N = 197$)	IPIP NEO-PI-R: Openness	Composite of 6 cognitive ability measures	Reading achievement composite	No
				IPIP NEO-PI-R: Conscientiousness			No
				IPIP NEO-PI-R: Agreeableness			No
				IPIP NEO-PI-R: Openness		Math achievement composite	Yes (n/a) ^a
				IPIP NEO-PI-R: Conscientiousness			Yes (n/a) ^a
				IPIP NEO-PI-R: Agreeableness			No
4. Heaven & Ciarrochi (2012)	No	1 of 1	Australian high school students ($N = 786$)	50-item IPIP: Openness/Intellect	Grade 7 standardized verbal and numerical ability tests	Grade 10 academic performance	Yes (.02)
5. Lozano et al. (2014)	No	1 of 1	Spanish psychology undergraduates ($N = 100$)	Barratt's Impulsivity Scale	Spanish adaptation of Primary Mental Abilities test	Performance in 4 psychology classes	Yes (.04)
6. Zhang & Ziegler (2015)	Yes	1 of 1	Chinese secondary school students ($N = 836$)	NEO-FFI: Openness	Raven's Standard Progressive Matrices	Midterm exams	Yes (n/a)

Table 3.2 (continued)

Source	MxA	Sample no.	Sample Type	Predictors		Criterion	Interaction (ΔR^2)
				Personality	GMA		
				NEO-FFI:			No
				Conscientiousness			
				NEO-FFI:			No
				Neuroticism			
7. Di Domenieco & Fournier (2015)	Yes	1 of 1	Canadian undergraduate students ($N = 271$)	Behavioral Indicators of Conscientiousness	Wonderlic Personnel Test	GPA	Yes (.03)
				Academic Self-Regulation Scale			No

Note. Column “MxA Theory” indicates whether a study was based in theory for a motivation-ability interaction. ABLE = Assessment of Life and Background Experiences. IPIP NEO-PI-R = International Personality Item Pool NEO Personality Inventory-Revised. NEO-FFI = NEO Five Factor Inventory. Personality measures in boldface are FFM-based measures.

n/a indicates a statistic was not provided.

*Indicates a measure was meant to assess achievement need specifically.

^a Interaction was not statistically significant at the .05 level but was discussed as meaningful (interaction coefficient was as large as that of main effect).

Chapter 4

THE CURRENT STUDIES

Given the overlap between recent personality research and a personality-GMA interaction, the empirical evidence for such interactive effects on both performance and other criteria, and the methodological limitations of past studies, the role of a personality-GMA interaction in predicting job performance clearly requires further investigation. Former studies that have considered personality-GMA interactions have traditionally limited personality to conscientiousness due to a theoretical foundation in motivation-ability interaction theory. By drawing on previous research on situational specificity, trait by trait interactions, and distinguishing performance types, I have made a case for why a personality-GMA hypothesis should be considered in and of itself, rather than due to an overlap between personality and motivation.

Due to limited prior research on this topic, the current research is primarily exploratory and considers two research questions that investigate the interactive effects of personality and GMA on both task and extra-role performance. However, because each of the three literatures discussed above points to a similar form for personality-GMA interactions, I also hypothesize that when an interaction exists, personality will show the strongest relationship with performance among individuals low in GMA.

Research Question 1 (RQ1): Is the relationship between each of the FFM traits and task performance moderated by GMA?

Hypothesis 1 (H1): GMA moderates the personality-task performance relationship such that it is strongest for low-GMA and weakest for high-GMA individuals.

Research Question 2 (RQ2): Is the relationship between each of the FFM traits and extra-role performance, including (a) OCB and (b) CWB, moderated by GMA?

Hypothesis 2 (H2): GMA moderates the personality-extra-role performance relationship such that it is strongest for low-GMA and weakest for high-GMA individuals.

The current research expands on prior research by updating the methodology used to empirically investigate the interactive effects of personality and GMA. Specifically, the current research addresses the methodological limitations identified in earlier studies by: (1) considering all five FFM traits; (2) utilizing FFM-based measures; (3) distinguishing between task (Study 1) and extra-role (Study 2) performance as well as between OCB and CWB within extra-role performance; (4) scoring assessments using appropriate IRT analyses; and (5) considering curvilinear personality-performance relationships.

Each research question and corresponding hypothesis is addressed in a separate study. Study 1 investigates task performance by utilizing supervisor ratings in datasets from two organizations. Study 2 investigates extra-role performance by utilizing self-report measures of OCB and CWB in a sample of adult workers. In both studies, I first explore the corresponding research question to investigate which personality traits interact with GMA to predict performance. For significant interactions, I then evaluate the corresponding hypotheses to determine the relationship between personality and performance at low, average, and high levels of GMA.

Chapter 5

STUDY 1: TASK PERFORMANCE

Method

Samples. Sample 1 data were collected from 3,963 employees at a large, multinational consumer goods organization (47.3% female; 41.5% United States). Data included responses to an in-house personality assessment, a cognitive ability assessment, and supervisor performance ratings. Personality and performance scales were derived using the full data. Because GMA data was not available for all participants, those with GMA data were subset for regression analyses ($N = 300$; 49.0% female; 38.0% United States).

Sample 2 data were collected from 3,104 employees at a large, multinational technology organization. Data included responses to a personality assessment, a cognitive ability assessment and supervisor ratings of performance. Predictor and criterion scales were constructed using all data available for each construct. However, personality, GMA, and performance ratings were not all available for all participants. Participants with all required predictor and criterion variables were subset for regression analyses ($N = 1,410$).

Personality Measures and Scoring. In Sample 1, participants completed a subset of 242 personality items in a computer adaptive test (CAT). Participants indicated the extent to which they agreed or disagreed with a statement (1 = “strongly disagree”; 6 = “strongly agree”). In CATs, participants complete a subset of items that target their trait levels. Consequently, substantial missingness is inherent to CAT data. Due to this missingness, responses were dichotomized into 1 = agree and 0 = disagree. Items were categorized into FFM traits separately

by the author and major advisor, and any disagreements were discussed. The ideal point model for dichotomous data (Maydeu-Olivares, Hernández, & McDonald, 2006) was used to select items for inclusion in final FFM measures. Final scales include 17 items for conscientiousness, 8 items for agreeableness, 8 items for neuroticism, 13 items for openness, and 8 items for extraversion. Prior research has shown that ideal point responding more accurately describes responses to personality constructs using Likert-scaled statements (LaPalme, Tay, & Wang, 2017). Thus, comparison of ideal point and dominance-based scoring was not necessary for Sample 1.

In Sample 2, participants completed a 225-item personality assessment. Items included variable response categories and option types (e.g., strongly disagree to strongly agree; yes, in between, and no; frequency; and situational judgement statements). Because item content included frequencies, rankings, etc., rather than introspective comparison of the self to the item stimulus, a dominance response process was expected to fit the data as well or better than an ideal point response process. Like Sample 1, the author and major advisor separately categorized all items and then discussed disagreements. The graded response model (GRM), which is appropriate for polytomous data conforming to a dominance response process (Samejima, 1997), was used to select items for inclusion in final FFM scales. Final scales included 13 items for conscientiousness, 11 items for agreeableness, 14 items for neuroticism, 8 items for openness, and 21 items for extraversion. Table 5.1 compares the fit of the GRM and the generalized graded unfolding model (GGUM; Roberts, Donoghue, & Laughlin, 2000) for the final personality scales in Sample 2. For all scales, the GRM scoring showed lower AIC and BIC relative to the GGUM scoring, confirming expectations of better fit with the GRM scoring.

Participants were scored using the described scales and corresponding IRT model. Table 5.2 shows model-data fit statistics for all personality scales in Samples 1 and 2. Absolute fit indices suggest adequate or good model-data fit for all personality scales ($RMSEA < .08$; Hu & Bentler, 1999). Relative fit indices suggest adequate fit for most scales (TLI and $CFI > .90$; Hu & Bnetler, 1999), excluding conscientiousness, agreeableness, and extraversion in Sample 2. However, null RMSEA values for each of these models was less than .158, suggesting that relative fit indices are not appropriate for determining model-data fit for these three scales (Kenny, 2014; Kenny, Kaniskan, & McCoach, 2015). A confirmatory factor analysis of all personality traits as measured in both samples suggested that a higher-order two-factor structure (i.e., stability comprised of conscientiousness, agreeableness and neuroticism; plasticity comprised of openness and extraversion; DeYoung, 2006) fit the data better than a one-factor structure (Table 5.3). These results suggest that the data is consistent with the two-factor structure found in other personality research (DeYoung, 2006; Digman, 1997). Overall, results suggest that the developed personality scales adequately reflect the FFM.

General Mental Ability Measures and Scoring. In Sample 1, GMA was measured using composite scores from an internally, IRT-validated in-person cognitive ability assessment. In Sample 2, participants completed a 90-item cognitive ability assessment. From this a 68-item measure of GMA was constructed for the current study to be consistent with the Weschler Adult Intelligence Verbal IQ subtest (Enns & Reddon, 1998; Wechsler, 1955). Items included both verbal comprehension (vocabulary, similarities, etc.) and working memory (e.g. arithmetic, letter-number sequences, etc.) content. GMA was scored using the IRT two-parameter logistic (2PL) model. The three-parameter logistic (3PL) model is often appropriate for dichotomously scored (i.e., correct or incorrect) multiple choice assessments (Waller, 1989) because it includes

a g-parameter that accounts for guessing (Embretson & Reise, 2000). However, the data did not show evidence of meaningfully large g-parameters, and model-data fit statistics suggested better fit of the 2PL relative to the 3PL (AIC = 173250, BIC = 174060 for the 2PL; AIC = 173364, BIC = 174579 for the 3PL). Both absolute and relative fit statistics suggest excellent model-data fit for the GMA measure in Sample 2 (RMSEA = .03, TLI = .97, CFI = .99).

Task Performance Measure and Scoring. In Sample 1, a 5-item task performance measure was selected from supervisor ratings using the graded response model (GRM; Samejima, 1997). Supervisors rated employees on a scale of 1 = “weak” to 5 = “exceptional” for each behavior item. Global fits statistics were not available for task performance in Sample 1 due to the low number of items in the measure. However, coefficient alpha suggests a high internal consistency estimate ($\alpha = .82$). In Sample 2, an 11-item measure of task performance was derived from supervisor ratings using the GRM (Samejima, 1997). Absolute and relative fit statistics suggest excellent model-data fit for the task performance measure (RMSEA = .04; TLI = .96; CFI = .96). Correlations between all predictors and criteria are presented in Table 5.4 for Samples 1 and 2.

Data Analysis

Moderated multiple regression models were constructed for each of the FFM traits in Sample 1 and Sample 2. Hierarchical regression was used to enter terms in subsequent steps. In step 1, linear GMA, linear personality, and quadratic personality terms were entered. Due to recent evidence that personality may be curvilinearly related to GMA, as well as Type 1 and Type 2 error that can result from correlated variables in interaction terms (Cortina, 1993), quadratic GMA terms were entered as covariates in step 2. In step 3, the interaction of the linear personality term and linear GMA term was entered. In step 4, the interaction of the quadratic

personality term and the linear GMA term was entered. Personality and GMA were standardized prior to calculating quadratic and interaction terms. Change in R^2 was calculated for each step.

Results

Table 5.5 shows the results of all task performance regressions analyses at each step for each of the FFM traits in Sample 1. Results showed a significant interaction between the quadratic conscientiousness term and linear GMA term. Inclusion of this interaction term yielded a marginally significant increase in variance explained, $\Delta R^2 = .010$, $p = .08$. Results also showed a marginally significant interaction between the linear conscientiousness term and linear GMA term, but the corresponding increase in variance explained was not significant. Variance explained by the inclusion of both interaction terms was marginally significant, $\Delta R^2 = .016$, $p = .08$. Figure 5.1 graphs the interactive effect of conscientiousness and GMA on task performance. For employees with high GMA, conscientiousness was positively related to task performance but only until an inflection point, after which high conscientiousness became detrimental to task performance. For employees with average GMA, increased conscientiousness was generally beneficial for task performance, even at high levels. For employees with low GMA, conscientiousness had little to no effect on task performance. Thus, results were somewhat consistent with H1 such that personality showed a stronger relationship with performance among average-GMA employees relative to high-GMA employees. However, low-GMA employees showed a weaker relationship between personality and performance than average-GMA employees. Results for Sample 1 showed no support for interactive effects of GMA and any of the other FFM traits on task performance.

Table 5.6 shows the results of all task performance regression analyses at each step for each the FFM personality traits in Sample 2. Results showed a significant interaction between

the quadratic conscientiousness term and linear GMA term. Inclusion of this interaction term yielded a significant increase in variance explained $\Delta R^2 = .003, p = .03$. Results also showed a marginally significant interaction between the linear conscientiousness term and linear GMA term, but the corresponding increase in variance explained was not significant. Variance explained by the inclusion of both interaction terms was significant, $\Delta R^2 = .005, p = .03$. Figure 5.1 shows that the form of the conscientiousness-GMA interaction in Sample 2 was similar to the form of the interaction in Sample 1. For employees with high GMA, conscientiousness was beneficial to performance only until an inflection point, after which conscientiousness was unimportant for performance. For those with average GMA, conscientiousness was beneficial to performance even at high levels. For those with low GMA, conscientiousness was relatively unimportant for performance, although those with very high levels of conscientiousness benefited slightly. Thus, like Sample 1 results, the form of the conscientiousness-GMA interaction in Sample 2 was somewhat consistent with H1 such that average-GMA employees showed a stronger conscientiousness-performance relationship relative to high-GMA employees. However, low-GMA employees showed little to no relationship between conscientiousness and performance unless very high in conscientiousness.

Openness and extraversion also showed evidence of a marginally significant interaction between their linear terms and the linear GMA terms in Sample 2. However, the inclusion of interaction terms did not yield a meaningful increase in variance explained for either trait. For openness, low-GMA employees showed the strongest negative relationship between openness and task performance whereas high-GMA employees showed little to no relationship between openness and task performance. The form of this interaction was consistent with H1. For extraversion, high-GMA employees showed the strongest positive relationship between

extraversion and task performance whereas low-GMA employees showed little to no relationship between extraversion and task performance. The form of this interaction was opposite that predicted by H1.

Discussion

RQ1 inquired about the interactive effects of personality and GMA on task performance. Study 1 results support a conscientiousness-GMA interaction in both Samples 1 and 2. H1 proposed that for identified interactions, personality would be more strongly related to task performance at lower levels of GMA. Such a compensatory mechanism is consistent with the current results for conscientiousness, although more nuanced than first proposed. Conscientiousness appears to compensate for lower GMA, but only when comparing those with average GMA to those with high GMA. Individuals with low GMA did not benefit from increased conscientiousness, although Sample 2 results suggest that very high conscientiousness may help even low-GMA employees in some cases. Additionally, in Sample 2, the interactive effects of GMA with openness and extraversion were marginally significant. However, because these interactive effects did not account for significant increases in explained variance and did not replicate between samples, results do not provide strong support for interactive effects of GMA and FFM traits other than conscientiousness on task performance.

These results may be explained by more closely examining the nature of conscientiousness. Conscientiousness relates to one's ability to focus, pursue long-term goals, and follow rules. Put another way, conscientiousness is centered around inhibiting immediate impulses in favor of more long-term objectives. Indeed, conscientiousness has been linked to the prefrontal cortex which is responsible for planning and restricting impulses (DeYoung et al., 2010). Planning for long-term objectives is only useful in so far as one has a good understanding

of those objectives and what types of actions will help achieve them. Thus, a base level of GMA that allows one to understand goals and how to achieve them may be necessary before conscientiousness is useful. On the other hand, results suggest that if an individual is high in GMA, excessive planning may be unnecessarily inhibitive. High-GMA individuals likely have more accurate instincts and do not require as much impulse inhibition to be high performers. Individuals who are average in GMA benefit most from conscientiousness because careful planning and impulse inhibition allows them to determine the most appropriate course of action. Thus, results support a compensatory mechanism such that individuals with lower GMA must work harder to achieve the same performance as individuals with higher GMA, but individuals must also be at least average in GMA.

The lack of significant findings for interactions between GMA and agreeableness, neuroticism, openness, or extraversion may stem from these traits' relative unimportance for task performance generally. Of the FFM, conscientiousness is by far the most strongly related to task performance. Although earlier research suggested neuroticism is the second most important FFM trait for task performance, more recent research calls this into question (Judge et al., 2013). Of the FFM traits, the present results also support conscientiousness as the strongest predictor of task performance in both samples. In contrast, interactions between GMA and other FFM traits may emerge for criteria that are more strongly related to the other FFM traits (e.g., openness in a job requiring high creativity). Notably, after conscientiousness, openness has been shown to have the strongest relationship with academic performance (Poropat, 2009), and some research suggest that openness and conscientiousness show enhancing or compensatory effects for those with low GMA (Beaujean et al., 2011; Ziegler, Knogler, & Bühner, 2009). These findings further

suggest that lack of significant findings in the current study may be attributable to the primary importance of conscientiousness for the task performance domain.

Some prior studies on personality-GMA interactions (see Table 3.1) found support for interactions between GMA and FFM traits beyond conscientiousness. However, a closer look at the criteria used explains the discrepancy in findings. Perkins and Corr (2006) found support for a neuroticism-GMA interaction on performance in an assessment center. de Haro et al. (2013) found evidence for neuroticism-GMA and openness-GMA interactions in predicting salary. Neither assessment center performance nor salary perfectly reflects the task performance domain. Further, assessment center performance may be impacted by test anxiety, which is associated with neuroticism (Furnham, 2008). Likewise, salary may be influenced by selection bias such that high-openness and high-neuroticism individuals select careers with different income potentials. Consequently, the present results do not conflict with prior findings.

The current results also point to a limitation of earlier studies that may have obscured a conscientiousness-GMA interaction. Earlier studies that have explored an interactive effect of conscientiousness and GMA on performance have only considered linear relationships. In the current study, results for both Sample 1 and Sample 2 only showed marginal significance for an interactive effect of the linear conscientiousness term with GMA. In both samples, the inclusion of an interactive effect between the quadratic conscientiousness term and GMA was necessary to reveal a meaningful increase in variance explained. Thus, earlier studies may have missed identifying a conscientiousness-GMA interaction because they did not include the quadratic interaction term.

Overall, Study 1 results suggest that, of the FFM, only conscientiousness interacts with GMA to predict task performance. Because results may reflect the salience of conscientiousness

specifically for task performance, it is important to consider interactive effects of personality and GMA in other performance domains. Extra-role performance represents one such domain in which FFM traits beyond conscientiousness show stronger correlations with performance. Study 2 investigates the interactive effects of personality and GMA on extra-role performance.

Table 5.1

Comparison of GRM and GGUM Fit Statistics for Sample 2 Personality Scales

	AIC		BIC	
	GRM	GGUM	GRM	GGUM
Conscientiousness	40419.39	40822.15	40727.44	41719.88
Agreeableness	37761.82	37818.10	37980.26	38478.19
Neuroticism	50732.63	51057.48	50991.71	51942.24
Openness	30985.92	31142.75	31075.24	3155.51
Extraversion	78296.90	78616.15	78750.57	79962.73

Note. Boldface indicates smaller value in GRM-GGUM comparison.

Table 5.2
Model-data Fit Statistics for Personality Scales in Study 1

	M2	df	RMSEA	RMSEA 95% CI		TLI	CFI
				Low	High		
Sample 1¹ (N = 3,963)							
Conscientiousness	137.91	119	.006	.002	.019	.9980	.9984
Agreeableness	23.21	20	.006	.000	.017	.9957	.9969
Neuroticism	28.89	20	.008	.004	.018	.9942	.9956
Openness	107.82	65	.013	.008	.017	.9808	.9924
Extraversion	4.80	35	.007	.000	.014	.9979	.9984
Sample 2 (N = 2,757)							
Conscientiousness	231.85	36	.052	.046	.059	N/A	N/A
Agreeableness	288.72	27	.069	.063	.077	N/A	N/A
Neuroticism	532.00	47	.072	.066	.077	.9045	.9265
Openness	22.69	8	.030	.016	.045	.9416	.9708
Extraversion	1211.94	150	.060	.056	.063	N/A	N/A

Note. Relative fit statistics are not appropriate indicators of model-data fit for Sample 2 conscientiousness, agreeableness, and extraversion scales because null RMSEA is less than .158 (Kenny, 2014).

¹ Fit statistics may indicate overfitting due to the missingness of computer adaptive testing data. However, the majority of items were developed to be consistent with an ideal point response process and underwent a large-scale test validation and equating effort (Carter, Williamson, & Shaikh, 2013; Williamson, Conley, Guan, Siedor, & Carter, 2015).

Table 5.3
Confirmatory Factor Analysis Results Comparing 2-factor and 1-factor Personality Structures for Study 1 Personality Scales

					RMSEA 90% CI		SRMSR	TLI	CFI
	<i>df</i>	AIC	BIC	RMSEA	Low	High			
Sample 1									
2-factor	4	43539.89	43606.41	.016	.000	.035	.010	.992	.997
1-factor	5	43552.61	43613.08	.033	.020	.048	.017	.967	.984
Sample 2									
2-factor	4	35831.83	35896.97	.103	.088	.119	.032	.914	.966
1-factor	5	35846.71	35905.93	.098	.085	.113	.035	.922	.961

Table 5.4
Correlations Between All Predictors and Criteria for Study 1

	1	2	3	4	5	6
Sample 1						
1. Conscientiousness						
2. Agreeableness	.099**					
3. Neuroticism	-.279**	-.092**				
4. Openness	.312**	.108**	-.261**			
5. Extraversion	.205**	.083**	-.136**	.258**		
6. GMA	-.076	.006	-.089	.125*	-.027	
7. Task Performance	.112**	.067**	-.055**	.135**	.082**	.131*
Sample 2						
1. Conscientiousness						
2. Agreeableness	.291**					
3. Neuroticism	-.530**	-.439**				
4. Openness	.270**	.153**	-.234**			
5. Extraversion	.599**	.338**	-.539**	.324**		
6. GMA	.119**	.109**	-.220**	.124**	.134**	
7. Task Performance	.085**	.094**	-.099**	-.021	.058*	.095**

Note. Boldface indicates significance at the $\alpha = .05$ level. P-values are one-tailed.

* $p < .05$. ** $p < .01$.

Table 5.5

Results of Regression Analyses for Task Performance Predicted by Personality and GMA in Study 1, Sample 1

	Conscientiousness			Agreeableness			Neuroticism			Openness			Extraversion		
	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$
Step 1: GMA, Linear and Quadratic Personality Terms															
GMA	.144**	.057	.047**(.047**)	.133*	.062	.018(.018)	.139**	.059	.022(.022)	.127*	.058	.029*(.029*)	.115*	.062	.018(.018)
P	.088†	.057		-.054	.094		-.042	.090		.060	.059		.077	.063	
P ²	-.118**	.050		-.036	.059		.002	.040		-.078*	.042		-.004	.038	
Step 2: Controlling for Quadratic GMA Terms															
GMA	.100*	.060	.063**(.016†)	.106†	.064	.028(.010)	.109*	.062	.033†(.011)	.099*	.060	.039*(.009)	.101†	.064	.023(.004)
P	.154*	.074		-.053	.109		-.033	.102		.048	.077		.045	.082	
P ²	-.112**	.050		-.037	.059		.003	.040		-.078*	.042		-.004	.038	
GMA ²	-.083*	.048		-.088*	.053		-.085*	.049		-.078†	.049		-.046	.051	
P*GMA ²	-.061	.051		-.010	.051		-.002	.043		.007	.054		.032	.055	
Step 3: Linear Interaction Term															
GMA	.095†	.060	.069**(.006)	.104†	.064	.028(.001)	.108*	.062	.033(.000)	.094†	.060	.042*(.003)	.100†	.064	.023(.001)
P	.136*	.075		-.050	.110		-.037	.107		.057	.077		.054	.084	
P ²	-.110*	.050		-.041	.059		.004	.042		-.074	.043		-.002	.038	
GMA ²	-.071†	.048		-.088*	.053		-.085*	.049		-.074†	.049		-.047	.052	
P*GMA ²	-.049	.052		-.015	.052		.001	.048		.002	.054		.027	.055	
P*GMA	.086†	.061		-.027	.064		.008	.063		-.062	.061		-.033	.064	
Step 4: Quadratic Interaction Term															
GMA	.193**	.082	.079**(.010†)	.047	.098	.031(.002)	.160*	.076	.038(.005)	.084	.074	.042†(.000)	.081	.076	.024(.001)
P	.145*	.075		-.062	.111		-.007	.110		.056	.077		.051	.085	
P ²	-.090*	.051		-.063	.066		-.024	.048		-.076*	.043		-.007	.040	
GMA ²	-.063†	.048		-.092*	.053		-.087*	.049		-.075	.049		-.049	.052	
P*GMA ²	-.063	.052		-.017	.052		-.007	.048		.002	.054		.025	.056	
P*GMA	.089†	.061		.038	.104		.088	.092		-.065	.062		-.023	.068	
P ² *GMA	-.108*	.062		.062	.079		-.054	.046		.011	.044		.019	.041	

Note. P = Personality term. Boldface indicates term or ΔR^2 is significant at the $\alpha = .05$ level. $N = 300$. P-values are one-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$.

Table 5.6

Results of Regression Analyses for Task Performance Predicted by Personality and GMA in Study 1, Sample 2

	Conscientiousness			Agreeableness			Neuroticism			Openness			Extraversion		
	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$
Step 1: GMA, Linear and Quadratic Personality Terms															
GMA	.092**	.027	.016**(.016**)	.094**	.027	.018**(.018**)	.083**	.027	.017**(.017**)	.107**	.027	.012**(.012**)	.095**	.027	.013**(.013**)
P	.074**	.027		.084**	.027		-.080**	.027		-.032	.027		.039†	.027	
P ²	.008	.019		.013	.019		.007	.019		.007	.021		.016	.019	
Step 2: Controlling for Quadratic GMA Terms															
GMA	.089**	.027	.016**(.001)	.092**	.027	.019**(.001)	.087**	.029	.017**(.000)	.102**	.028	.013**(.001)	.097**	.028	.013**(.000)
P	.062*	.032		.070*	.032		-.085**	.032		-.047†	.032		.040	.032	
P ²	.009	.019		.013	.019		.007	.019		.009	.022		.016	.019	
GMA ²	-.010	.018		-.011	.018		-.011	.018		-.011	.018		-.012	.018	
P*GMA ²	.011	.017		.014	.018		.006	.019		.015	.016		-.002	.017	
Step 3: Linear Interaction Term															
GMA	.089**	.027	.018**(.002)	.092**	.027	.019**(.000)	.086**	.029	.018**(.001)	.102**	.028	.014**(.002)	.102**	.028	.014**(.001)
P	.061*	.032		.070	.032		-.084**	.032		-.049†	.032		.043†	.032	
P ²	.004	.020		.014	.020		.014	.020		.002	.022		.008	.020	
GMA ²	-.016	.018		-.010	.018		-.003	.019		-.018	.019		-.019	.019	
P*GMA ²	.014	.017		.014	.018		.006	.018		.014	.016		-.005	.017	
P*GMA	.041†	.027		-.008	.027		.035	.030		.042†	.027		.041†	.028	
Step 4: Quadratic Interaction Term															
GMA	.130**	.033	.021**(.003*)	.100**	.033	.019**(.000)	.104**	.034	.019**(.001)	.107**	.034	.014**(.000)	.104**	.034	.014**(.000)
P	.056*	.032		.071*	.032		-.087**	.032		-.050†	.032		.043†	.032	
P ²	.004	.020		.014	.020		.014	.020		.002	.022		.009	.020	
GMA ²	-.020	.019		-.010	.018		-.004	.019		-.018	.019		-.019	.019	
P*GMA ²	.028†	.018		.015	.019		-.003	.020		.016	.018		-.005	.018	
P*GMA	.037†	.027		-.007	.027		.035	.030		.041†	.028		.040†	.028	
P ² *GMA	-.044*	.020		-.009	.020		-.025	.023		-.005	.020		-.002	.021	

Note. P = Personality term. Boldface indicates term or ΔR^2 is significant at the $\alpha = .05$ level. $N = 1,410$. P-values are one-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$.

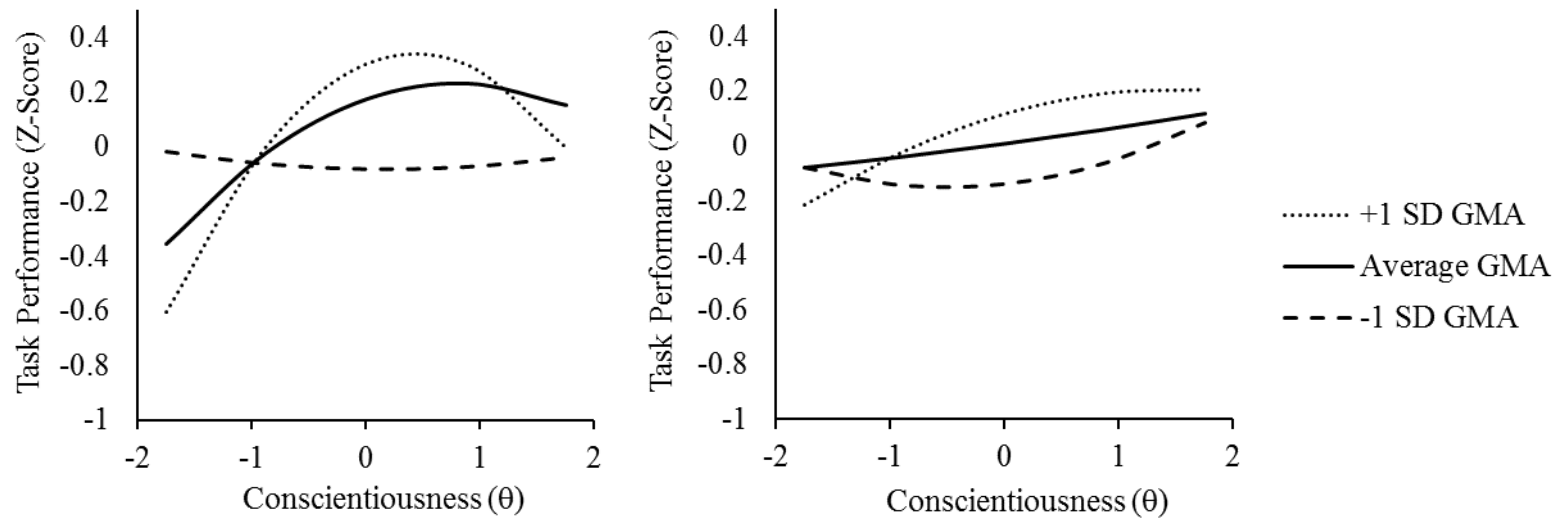


Figure 5.1. Interactive effect of conscientiousness and GMA on task performance in Sample 1 (left) and Sample 2 (right).

Chapter 6

STUDY 2: EXTRA-ROLE PERFORMANCE

Study 2 replicates Study 1 but considers extra-role rather than task performance. RQ2 is first considered to identify possible interactive effects of personality and GMA on OCB and CWB. H2 is then evaluated by considering the form of significant interactions. Whereas Study 1 used supervisor ratings of performance, the current study utilizes self-report measures. Although self-reports of performance present limitations, prior research suggests that they may more accurately capture CWB (Gonzalez-Mulé et al., 2014). Thus, the current study uses self-report measures to investigate the role of personality-GMA interactions in extra-role performance.

Method

Sample. Participants ($N = 1,276$; $M_{\text{age}} = 34.56$, 66.9% female, 81.9% white) were recruited through Amazon Mechanical Turk (MTurk). To qualify, participants were required to be at least 18 years old, able to read English, and living in the United States. Although the full dataset was used to score the FFM traits and GMA, only participants who indicated that they earned wages outside of MTurk were included in scoring performance and in regression analyses ($N = 1,141$; $M_{\text{age}} = 34.77$; 67.8% female; 83.6% white). Qualifications were determined using self-report. All participants completed all measures in the form of an online questionnaire. Participants were compensated \$.75 for completing the survey.

Personality. Personality was measured using 10-item scales from the International Personality Item Pool (IPIP; Goldberg, 1999) similar to those in the NEO PI-R (Costa & McCrae, 1992). Respondents indicated the extent to which they agreed that an item described

them accurately on a scale of 1 = “strongly disagree” to 6 = “strongly agree.” Participants completed 10-item scales for each trait. Personality scales were scored using the GGUM². Because the GGUM does not provide global fit statistics, model-data fit was assessed using χ^2/df ratios (Drasgow et al., 1995). χ^2/df ratios indicate misfit between model-predicted scores and observed scores. χ^2/df ratios less than 3 indicate acceptable fit. All items in all scales showed χ^2/df ratios less than 3. Notably, FFM scales were not more consistent with a higher-order 2-factor than a 1-factor structure (Table 6.1). Although RMSEA, TLI, and CFI show relatively poor fit for both the 2-factor and 1-factor model, these indicators commonly falsely suggest poor model-data fit in low df models (Kenny et al., 2015). SRMSR does suggest good model-data fit for both the 2-factor and 1-factor models (SRMSR = .050, .051 respectively). Additionally, FFM traits were measured using existing IPIP 10-item scales intended to be consistent with the NEO-PI-R. These scales are commonly used measures of the FFM and further bolster confidence in the appropriateness of measured constructs.

General Mental Ability. GMA was assessed using a 17-item subsample of Sandia Matrices (Matzen et al., 2010). The Sandia Matrices are nonverbal puzzles designed to reflect the same types of object relations and logic problems that are used in the popular, commercially available Raven’s Progressive Matrices (Raven, 2000; Raven & Court, 1993). From the Sandia Matrices norming study, items were selected representing each of three levels of object relations problems (one relation, two relations, and three relations) as well as logic problems to represent a range of difficulty levels. Answers were dichotomously scored as either correct or incorrect.

² Because personality measures in Study 2 used Likert response options, it was not necessary to compare model-data fit of ideal point scoring and dominance-scoring approaches as explained in Study 1 (LaPalme et al., 2017).

GMA was scored using the 3PL. In addition to being conceptually consistent with dichotomously scored multiple-choice data (Waller, 1989), several items showed g-parameters above .100, which suggests that guessing may have influenced responses for some items. Both absolute and relative fit indices suggest excellent model-data fit for the 3PL-scored GMA measure (RMSEA = .02; TLI = .98; CFI = .98).

Extra-Role Performance. Extra-role performance was assessed using the Organizational Citizenship Behavior Checklist (OCB-C) as a measure of OCB (Fox, Spector, Goh, Bruursema, & Kessler, 2012) and the Workplace Deviance Measure (Bennet & Robinson, 2000) as a measure of CWB. The OCB-C includes 20 statements of prosocial behaviors and asks respondents to indicate the frequency with which they engage in those behaviors on a scale of 1 = “never” to 5 = “daily.” The Workplace Deviance Measure includes 19 statements of interpersonal and organizational deviance and asks respondents to indicate the frequency with which they engage in those behaviors on a scale of 1 = “never” to 7 = “daily.”

Performance measures were scored with the GRM (Samejima, 1997). Absolute fit indices suggest good model-data fit for OCB (RMSEA = .06) and CWB (RMSEA = .05) while relative fit indices suggest good fit for CWB (TLI = .92; CFI = .94). RMSEA for the OCB null model was less than .158. Therefore, relative fit indices cannot provide meaningful information about improved fit over the null model (Kenny, 2014; Kenny et al., 2015). Table 6.2 shows correlations between all predictor and performance criteria (Berry et al., 2007; Chiaburu et al., 2011).

Data Analysis

To investigate RQ2, moderated multiple regression models were constructed for each of the FFM traits predicting OCB and CWB. Hierarchical regression was used to enter terms in subsequent steps using the same approach as Study 1. In step 1, linear GMA, linear personality, and quadratic personality terms were entered. In step 2, quadratic GMA terms were entered as

covariates (Cortina, 1993). In step 3, the interaction of the linear personality term and linear GMA term was entered. In step 4, the interaction of the linear quadratic term and the quadratic GMA term was entered. Personality and GMA were standardized prior to calculating quadratic and interaction terms. Change in R^2 was calculated for each step.

Results

RQ2 inquired about the interactive effects of personality and GMA on extra-role performance, operationalized as both OCB and CWB. Table 6.3 shows the results of all OCB regressions analyses at each step for each of the FFM personality traits. Results showed evidence of a marginally significant interactive effect of the linear openness term and quadratic GMA term, as well as a marginally significant interactive effect of the linear extraversion term and linear GMA term. However, including interaction terms did not yield a meaningful increase in explained variance for either openness or extraversion. The form of the openness-GMA interaction was such that high-GMA individuals showed a slightly stronger positive openness-OCB relationship than did those lower in GMA. Thus, the form of the openness-GMA interaction was opposite that predicted by H2. The form of the extraversion-GMA interaction was such that high-GMA individuals showed a stronger positive extraversion-OCB relationship, particularly for those above average in extraversion, than did those lower in GMA. Thus, the form of the extraversion-GMA interaction was also opposite that predicted by H2. Overall, results do not provide strong support for interactive effects of GMA and any of the FFM on OCB, particularly of the form proposed by H2.

Table 6.4 shows the results of all CWB regression analyses at each step for each of the FFM personality traits. For conscientiousness, openness, and extraversion, results support interactive effects consistent with H2. For conscientiousness and openness, the interactions

between the linear personality term and linear GMA term were significant and yielded a significant or marginally significant increase in variance explained. Results for openness also showed a significant interactive effect of the linear openness term and quadratic GMA term. Figure 6.1 graphs these interactive effects. For both conscientiousness and openness, individuals with low GMA showed steeper decreases in CWB as personality increased than did those with moderate or high GMA. For extraversion, the interaction between the quadratic extraversion term and the linear GMA term was significant and yielded a marginally significant increase in variance explained. Results also showed support for marginally significant interactive effects of the linear extraversion term and linear GMA term as well as the linear extraversion term and quadratic GMA term. As shown in Figure 6.1, individuals who were low or moderate in GMA showed an “inverted-U” relationship with CWB such that individuals with average levels of extraversion reported the highest levels of CWB. Among individuals high in GMA, extraversion showed little to no relationship with CWB. Thus, results show support for interactive effects of GMA with conscientiousness, openness, and extraversion on CWB consistent with H2.

Results also showed evidence of an interactive effect between the linear agreeableness term and quadratic GMA term. That is, there was a curvilinear relationship between GMA and CWB that differed as a function of one’s standing on agreeableness. Although these results support a significant interaction between agreeableness and GMA, they are not consistent with the form of the interaction in H2. To more clearly illustrate this relationship, Figure 6.2 graphs CWB regressed on GMA at 1 standard deviation below, at, and 1 standard deviation above the mean of agreeableness. For low-agreeableness individuals, GMA showed a positive relationship with CWB but only for those who were average or above average in GMA. For high-agreeableness individuals, GMA also showed a slight positive relationship with CWB but only

for those who were average or below average in GMA. At average agreeableness, GMA showed a consistent positive relationship with CWB. However, the agreeableness-CWB relationship was relatively consistent across GMA levels. Thus, although agreeableness did show an interaction with GMA, it was not of the form predicted by H2.

Discussion

RQ2 inquired about the interactive effects of personality and GMA on extra-role performance, including both OCB and CWB. Although some interactive effects of personality and GMA on OCB were marginally significant, overall results did not support interactive effects of personality and GMA on OCB. In contrast, all FFM traits except neuroticism showed evidence of interacting with GMA to affect CWB. Further, the forms of three of the four interactions were consistent with H2 such that high-GMA individuals showed weaker relationships between personality and CWB relative to low-GMA individuals.

Results for conscientiousness, openness, and extraversion support H2 and are consistent with prior research that suggests high GMA allows individuals to understand the consequences of their actions and inhibit the desire to engage in CWB (Dilchert et al., 2007). Notably, this explanation is also consistent with the role of GMA in interpreting situations. High GMA individuals better understand appropriate behaviors for a given situation. Consequently, personality traits that might otherwise influence individuals to engage in CWB are curtailed among those high in GMA. Further, results point to a more dramatic influence of GMA on the relationships of extraversion and openness with CWB than that of conscientiousness with CWB. These results may be explained by reviewing the differential relationships of the higher-order traits stability and plasticity with deviant behavior. Although plasticity subtraits are negatively related to CWB, their relationships are much weaker than are those of stability subtraits with

CWB (Berry et al., 2007). Prior research has shown that stability represents restraint while plasticity represents engagement such that those who are high in plasticity will be more likely to engage in a wide variety of behaviors, including negative behaviors (Hirsh, DeYoung, & Peterson, 2009). Moreover, research has shown that, when controlling for GMA, plasticity is *positively* associated with externalizing behaviors (DeYoung, Peterson, Séguin, & Tremblay, 2008) and that some facets of openness (e.g., actions) are positively associated with CWB specifically (Harris, Carter, & Williamson, 2017). The current results also show that, when controlling for GMA, the relationships between stability subtraits and CWB are much stronger than are the relationships between plasticity subtraits and CWB. To the extent that GMA reflects an inhibiting influence, it is likely to have a less dramatic impact on stability subtraits, which likewise restrain behavior, than on plasticity subtraits, which encourage greater frequency of behaviors generally.

The explanation of GMA as an inhibiting influence may also explain the lack of significant findings for a neuroticism-GMA interaction and the inconsistency of the agreeableness-GMA interaction with H2. Because one component of neuroticism is impulsivity, it may be that high-neuroticism individuals are unable to inhibit the desire to engage in CWB regardless of GMA level. Of the FFM, agreeableness showed the strongest relationship with CWB. Highly agreeable people may be less prone to CWB impulses; thus, there are fewer impulses for GMA to inhibit. Results suggest that people of average agreeableness show a relatively constant relationship between GMA and CWB. However, the relationship between GMA and CWB becomes more pronounced for individuals who are high in GMA and low in agreeableness or, alternatively, low in GMA and high in agreeableness.

Notably, the positive relationship between GMA and CWB is not consistent with prior literature. Results may have been influenced by sample characteristics. Prior research has suggested that MTurk workers tend to be more highly educated than the average citizen in their countries yet are likely to be underemployed (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010). Underemployment can lead to job dissatisfaction, and dissatisfaction is in turn linked to CWB (Judge, Scott, & Ilies, 2006). Participants in the current sample may be intelligent but insufficiently challenged in their day-to-day jobs, leading to higher reports of CWB than found in other sample pools. Indeed, it is possible that some of the participants completed the survey while on the job which would itself constitute a CWB.

In contrast to the potential inhibiting influence of GMA on the relationship between personality and CWB, GMA did not play an enhancing role in OCB such that high-GMA individuals engaged in OCB regardless of their personality (i.e., show a weaker personality-OCB relationship). In contrast, openness and extraversion showed marginally significant interactions with GMA such that high-GMA individuals showed slightly stronger relationships between personality and OCB relative to lower GMA individuals. Although these interactive effects did not increase variance explained and may not warrant serious consideration, the current results suggest that overall personality is the primary driver of OCB. GMA showed no correlation with OCB and further, if personality-GMA interactions exist, high GMA appears to only exaggerate individuals' natural inclinations to engage in OCB. Intriguingly, prior research suggests that personality and GMA are similarly important predictors of OCB (Gonzalez-Mulé et al., 2014). One possible explanation for this discrepancy is the use of self-reports in the current study. Prior meta-analyses have emphasized non-self-report measures of OCB. It is possible that in the current study, OCB self-reports are inflated due to social desirability bias or common method

variance (Organ & Ryan, 1995). Alternatively, non-self-reports may be subject to the halo effect such that supervisors expect high-GMA individuals, who are likely also high task performers, to engage in more OCB. Additionally, Gonzalez-Mulé et al. (2014) suggest that GMA correlates with OCB because some OCBs are highly related to core task functions. However, the OCB measure used in this study does not assess behaviors that are intrinsically related to task performance, particularly given that the current sample included a wide range of occupations. Overall, although the current results do not support interactive effects of personality and GMA on OCB, they may also point to methodological issues in OCB measurement.

Table 6.1

Confirmatory Factor Analysis Results Comparing 2-factor and 1-factor Personality Structures for Study 2 Personality Scales

	<i>df</i>	AIC	BIC	RMSEA	RMSEA 90% CI		SRMSR	TLI	CFI
					Low	High			
2-factor	4	17291.3	17373.67	.146	.124	.170	.050	.695	.878
1-factor	5	17294.43	17371.66	.133	.113	.155	.051	.747	.873

Table 6.2
Correlations Between All Predictors and Criteria for Study 2

	1	2	3	4	5	6	7
1. Conscientiousness							
2. Agreeableness	.358**						
3. Neuroticism	-.467**	-.340**					
4. Openness	.120**	.259**	-.040				
5. Extraversion	.299**	.139**	-.393**	.139**			
6. GMA	-.084**	.049*	.033	.094**	-.109**		
7. OCB	.157**	.102**	.021	.177**	.221**	.033	
8. CWB	-.359**	-.425**	.233**	-.129**	-.041	.042	.131**

Note. Boldface indicates significance at the $\alpha = .05$ level. P-values are one-tailed.

* $p < .05$. ** $p < .01$.

Table 6.3

Results of Regression Analyses for OCB Predicted by Personality and GMA

	Conscientiousness			Agreeableness			Neuroticism			Openness			Extraversion		
	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$
Step 1: GMA, Linear and Quadratic Personality Terms															
GMA	.049*	.029	.027**(.027**)	.033	.030	.012**(.012**)	.032	.030	.002(.002)	.011	.029	.035**(.035**)	.058*	.029	.053**(.053**)
P	.161**	.030		.078*	.030		.022	.030		.186**	.030		.228**	.029	
P ²	.003	.021		.036†	.022		.019	.022		-.049*	.025		-.014	.018	
Step 2: Controlling for Quadratic GMA Terms															
GMA	.048†	.031	.027**(.000)	.026	.031	.013*(.001)	.025	.031	.004(.002)	.003	.031	.037**(.002)	.057*	.031	.053**(.001)
P	.159**	.035		.063*	.034		.000	.035		.162**	.034		.214**	.035	
P ²	.003	.021		.036†	.022		.018	.022		-.047*	.025		-.013	.018	
GMA ²	-.003	.019		-.009	.019		-.016	.019		.001	.019		-.010	.018	
P*GMA ²	.002	.015		.012	.015		.022	.019		.024†	.017		.016	.022	
Step 3: Linear Interaction Term															
GMA	.051	.032	.027**(.000)	.026	.031	.013*(.001)	.025	.031	.005(.001)	.002	.031	.037**(.000)	.059*	.031	.055**(.001)
P	.154	.035		.059*	.035		.009	.036		.161**	.035		.21**	.035	
P ²	.007	.022		.037*	.022		.024	.022		-.047*	.025		-.010	.018	
GMA ²	-.001	.019		-.009	.019		-.016	.019		.001	.019		-.006	.018	
P*GMA ²	.007	.017		.018	.017		.015	.020		.025†	.018		.020	.022	
P*GMA	.023	.031		.024	.031		-.039	.032		.007	.032		.041	.032	
Step 4: Quadratic Interaction Term															
GMA	.070	.039	.028**(.000)	.049	.040	.014*(.001)	.015	.039	.005(.000)	.003	.040	.037**(.000)	.041	.036	.055**(.001)
P	.154	.035		.059*	.035		.007	.036		.161**	.035		.208**	.035	
P ²	.007	.022		.037*	.022		.022	.023		-.047*	.025		-.011	.018	
GMA ²	-.004	.019		-.013	.019		-.016	.019		.001	.019		-.009	.018	
P*GMA ²	.001	.018		.016	.017		.014	.020		.025†	.018		.027	.024	
P*GMA	.025	.031		.032	.032		-.039	.032		.007	.032		.043†	.032	
P ² *GMA	-.018	.022		-.020	.022		.011	.023		-.001	.025		.021	.022	

Note. P = Personality term. Boldface indicates term or ΔR^2 is significant at the $\alpha = .05$ level. $N = 1,141$. P-values are one-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$.

Table 6.4
Results of Regression Analyses for CWB Predicted by Personality and GMA

	Conscientiousness			Agreeableness			Neuroticism			Openness			Extraversion		
	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$	β	SE	$R^2(\Delta R^2)$
Step 1: GMA, Linear and Quadratic Personality Terms															
GMA	.006	.028	.129**(.129**)	.064**	.027	.186**(.186**)	.043†	.029	.061**(.061**)	.049*	.030	.020**(.020**)	.037	.030	.008*(.008*)
P	-.361**	.028		-.434**	.027		.226**	.029		-.129**	.030		-.037	.030	
P ²	.007	.020		.044*	.020		-.050*	.021		-.021	.025		-.043**	.018	
Step 2: Controlling for Quadratic GMA Terms															
GMA	.007	.030	.133**(.004†)	.077**	.028	.192**(.007**)	.056*	.030	.064**(.003)	.077**	.031	.035**(.015**)	.040	.032	.015**(.008*)
P	-.325**	.033		-.389**	.031		.201**	.034		-.060*	.034		.011	.035	
P ²	.007	.020		.046*	.020		-.051*	.021		-.028	.025		-.045**	.018	
GMA ²	.003	.018		.008	.017		.020	.018		.005	.019		.031*	.018	
P*GMA ²	-.031*	.014		-.039**	.013		.024†	.018		-.066**	.017		-.055**	.023	
Step 3: Linear Interaction Term															
GMA	.015	.030	.136**(.003†)	.078**	.028	.194**(.001)	.056*	.030	.064**(.001)	.076**	.031	.038**(.003*)	.041†	.032	.016**(.001)
P	-.336**	.033		-.396**	.031		.206**	.034		-.068*	.034		.007	.035	
P ²	.017	.020		.047**	.020		-.048*	.021		-.032†	.025		-.041*	.019	
GMA ²	.008	.018		.007	.017		.020	.018		.002	.019		.034*	.019	
P*GMA ²	-.019	.016		-.03*	.015		.020	.019		-.054**	.018		-.051*	.023	
P*GMA	.056**	.029		.034	.028		-.025	.031		.063*	.031		.039	.033	
Step 4: Quadratic Interaction Term															
GMA	.013	.037	.136**(.000)	.103**	.036	.194**(.001)	.059†	.038	.064**(.000)	.095**	.039	.039**(.000)	.008	.037	.019**(.003†)
P	-.336**	.033		-.395**	.031		.207**	.035		-.067*	.034		.004	.035	
P ²	.017	.020		.047*	.020		-.048**	.022		-.035†	.025		-.043*	.019	
GMA ²	.008	.018		.003	.018		.020	.018		.001	.019		.029†	.019	
P*GMA ²	-.018	.017		-.032*	.015		.020	.019		-.052**	.018		-.037†	.024	
P*GMA	.055*	.029		.043†	.029		-.026	.031		.066*	.032		.042†	.033	
P ² *GMA	.002	.021		-.022	.020		-.003	.022		-.019	.025		.040*	.023	

Note. P = Personality term. Boldface indicates term or ΔR^2 is significant at the $\alpha = .05$ level. $N = 1,141$. P-values are one-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$.

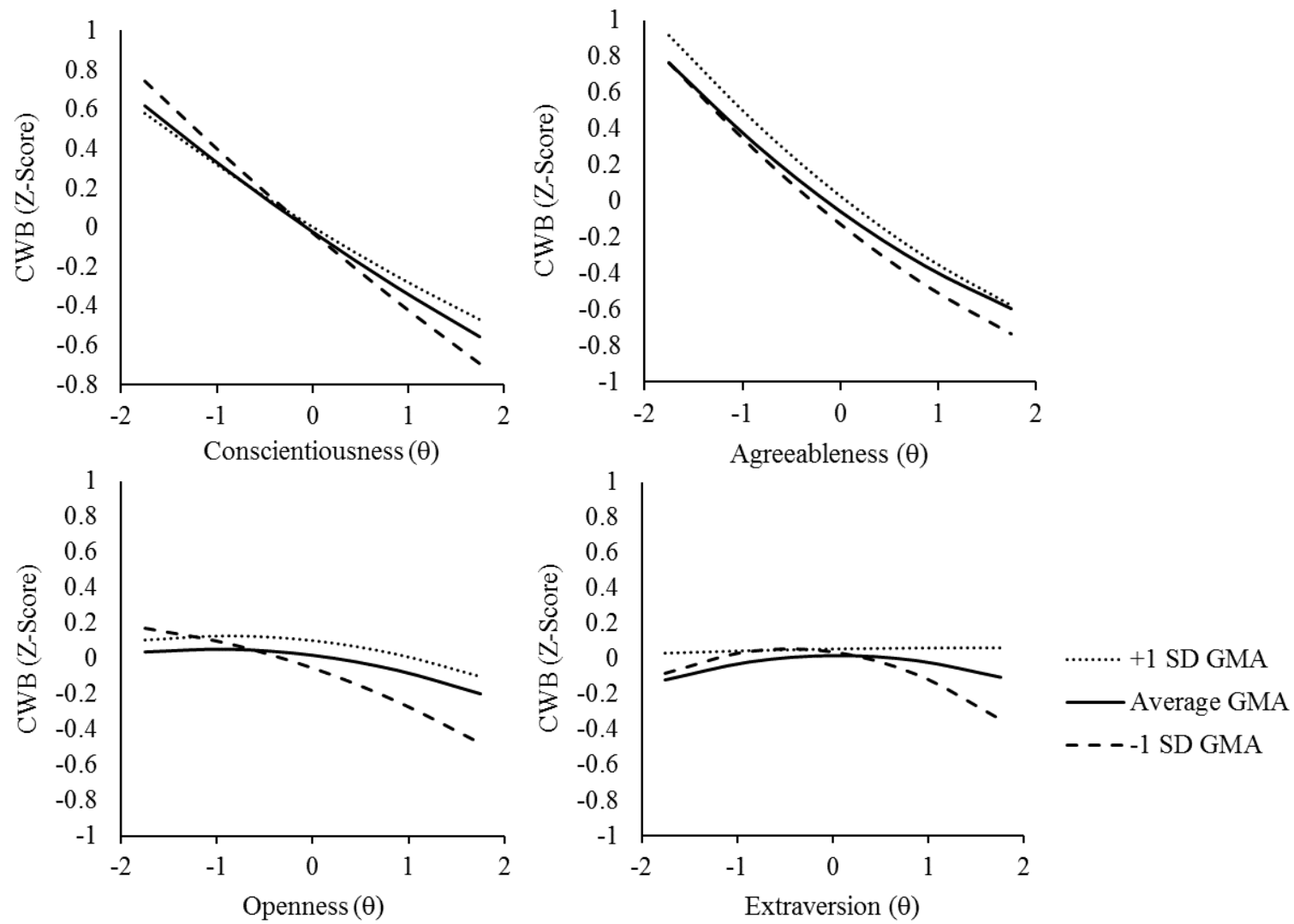


Figure 6.1. Interactive effects of GMA and conscientiousness, agreeableness, openness, and extraversion on CWB.

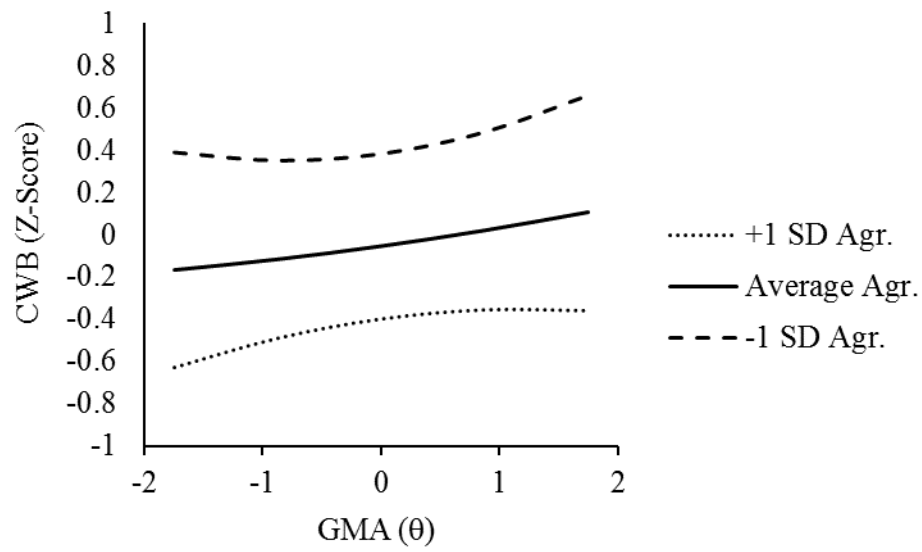


Figure 6.2. Interactive effect of agreeableness and GMA on CWB at low (-1 SD), average, and high (+1 SD) agreeableness.

Chapter 7

GENERAL DISCUSSION

Personality and GMA represent two of the most fundamental individual differences and researched predictors of performance. Understanding how they interact is critical to basic psychological research as well as a nuanced explanation of job performance. By revisiting early research on this topic and building off current trends in personality research, I have shown that a personality-GMA interaction remains a ripe topic for study. Results of the current studies provide empirical support for the continued investigation of how personality and GMA might interact to impact performance. In response to RQ1 regarding task performance, both Sample 1 and Sample 2 showed support for a conscientiousness-GMA interaction. In response to RQ2, results showed support for interactive effects of GMA and four of the FFM traits on CWB, though very little support for interactive effects of GMA and personality on OCB.

Importantly, the form of identified interactions was consistent with hypotheses for all but one significant interaction. Current trends in personality research suggest that personality should show a stronger relationship with performance among individuals with low GMA. Although conscientiousness did not improve task performance for low-GMA individuals, it did help those with average GMA compensate relative to those with high GMA. Further, among individuals with high GMA, high conscientiousness was unimportant or even detrimental to performance. These results suggest that while the inhibitive, goal-focused nature of conscientiousness can be beneficial, it can also be overly restrictive at the extremes for individuals who are otherwise highly intelligent. Results also point to an inhibiting function of GMA for CWB. The

relationship between personality and CWB was weakest among those with high GMA for three of the four identified interactions. Overall, results of both studies suggest that high-GMA individuals are better able to anticipate the consequences of their behavior and modify it accordingly.

Results also have broader implications for research on the relationship between personality, GMA, and performance. Study 1 results suggest that the conventional understanding of the relationship between conscientiousness and task performance does not hold at all GMA levels, particularly among individuals high in both GMA and conscientiousness. Assuming a linear relationship that is constant for all levels of GMA is likely to yield misleading predictions of task performance and, consequently, selection decisions. Study 2 results also contribute to our understanding of personality-performance relationships by pointing to a more nuanced personality-CWB relationship than researchers typically propose. Including GMA as a moderator term may be particularly important for understanding how CWB is predicted by plasticity subtraits openness and extraversion. In addition to varying by level of GMA, results suggest that relationships between personality, GMA, and CWB are likely to be curvilinear, which could explain the relatively weak correlations magnitudes found when only linear relationships are considered. Thus, the current findings have important theoretical implications for how we think about the relationships between personality and performance.

The current results also point to the importance of several methodological updates relative to earlier studies. First, the current study emphasizes the importance of differentiating between task and extra-role performance, and further between types of extra-role performance. Results showed differential support for interactions by performance type. Additionally, very few prior studies considered personality traits beyond conscientiousness. Our results suggest that

GMA interacts only with conscientiousness to affect task performance but interacts with other traits as well to affect CWB. Moreover, results suggest that including quadratic terms was critical to identifying significant conscientiousness-GMA interactions for task performance. Results for CWB predicted by extraversion also showed support for a significant interactive effect of the quadratic extraversion term and GMA. Earlier studies may have missed evidence of interactions because they considered only linear terms. Finally, the current study utilized IRT scoring and FFM-based measures of all personality traits which may have aided detection of interactions by improving construct measurement.

Limitations and Future Directions

The current studies involved several limitations. First, very little information was available about the jobs of participants in Study 1. The two samples may have reflected a relatively homogenous population and may not be reflective of jobs more generally. However, the two samples did come from organizations in different industries, providing some confidence in generalizability. The replication of findings between Sample 1 and Sample 2 bolsters confidence in the findings of Study 1. Conversely, Study 2 involved an MTurk sample with a wide range of occupations which may have obscured findings that differ between occupations. Future studies should more explicitly consider how personality-GMA interactions may differ by occupational context.

Additionally, the scope of the current study and datasets did not afford analysis at the facet-level of personality. Research suggests narrower aspects of performance are best predicted by personality facets rather than traits (Barrick & Mount, 2005). Further, differential facet-level relationships may explain weak or curvilinear relationships at the trait level. Facets may likewise show differential interactions with GMA, which could explain the absence of trait-level

interactions. Notably, in their recent meta-analysis of the interactive effects of motivation and ability on performance, Van Iddekinge et al. (2017) did not find evidence of interactive effects. Although they did not consider conscientiousness, the motivational traits considered overlap with some facets of conscientiousness, which suggests that different facets of conscientiousness may show differential interactions with GMA. Future research should refine the scope of the research question included here to investigate differential facet-level interactions with GMA.

Conclusion

By revising critical methodological limitations of earlier studies on the role of personality-GMA interactions in performance, the current study has revived the topic and offered initial insight. Overall, results of the current study suggest that there are interactive effects of personality and GMA on performance, including both task and extra-role performance. Results for task performance suggest a nuanced compensation mechanism in which conscientiousness can improve performance among those with at least moderate GMA. However, among high-GMA individuals, high conscientiousness may be detrimental to performance. Results for CWB were consistent with the hypothesis such that personality is most strongly related to performance for low-GMA individuals, suggesting GMA inhibits CWB. Clearly, the historic dismissal of personality-GMA interactions was premature. Although largely exploratory, the current findings have important implications for our understanding of the relationship between personality, GMA, and performance. Future research should continue to investigate the interactive effects of personality and GMA on performance by replicating results and refining research questions.

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