

Personality metatraits and managerial AC dimensions in assessment center performance: the moderating effect of age in strong and weak VUCA simulations

Age,
competencies,
personality and
VUCA world

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Abstract

Purpose – We investigated the relationship between personality and managerial assessment center (AC) dimensions, emphasizing age's moderating role within volatility, uncertainty, complexity, ambiguity (VUCA) simulations.

Design/methodology/approach – We analyzed 327 managers and applied the AC method, examining areas like social skills, problem-solving, management and goal striving, openness to change, employee development using the VUCA framework.

Findings – We assessed personality metatraits through a questionnaire based on the circumplex model (CPM; Strus, Ciecuch, & Rowinski, 2014), identifying four bipolar metatraits. Results highlighted passiveness and disharmony as negatively correlated with all managerial AC dimensions, with passiveness adversely affecting social skills and problem-solving.

Originality/value – Age's moderating role emerged as pivotal in the relationship between personality and managerial AC dimensions, especially in specific VUCA contexts. This underscores age's influence on the interplay between personality and managerial efficacy, suggesting varying predictive capabilities across age groups. The research illuminates the complexities of these relationships, spotlighting age's nuanced impact.

Keywords Competencies, VUCA, Age, Personality

Paper type Research paper

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All subjects participated voluntarily. The participants provide their written informed content to participate in this study. The Declaration of Helsinki was adequately addressed.

The authors report there are no competing interests to declare.

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Introduction

Personality and assessment center (AC) dimensions are the subjects of many theories and empirical findings. Scholars perceive both constructs as a basis for predicting future behaviors (Thornton & Byham, 2013). Furthermore, the relationship between personality and AC dimensions is not unequivocal evidence in the literature findings (Jansen, Lievens, & Kleinmann, 2011; Meriac, Hoffman, Woehr, & Fleisher, 2008). Therefore, there remains a gap in knowledge about this connection. In this study, we underlined the important role of negative traits (and not positive ones) in managerial performance at different ages. Therefore, we used a new model of personality, i.e. the circumplex of personality metatraits (CPM) described by Strus, Ciecuch, and Rowiński (2014), which assumes that there are light and dark areas in the personality. It allowed us to distinguish between positive and negative traits. We aimed to determine whether there is a relationship between positive characteristics and a high level of AC dimensions presented by a manager and whether there is a relationship between negative characteristics and a low level of AC dimensions of a manager.

ACs often serve to select effective managers because the applied simulations closely correspond to the managerial roles they fulfill in real life (Spychalski, Quiñones, Gaugler, & Pohley, 1997). Researchers observe several behavior patterns during the AC process, which are precise predictors in terms of future performance (Thornton & Byham, 2013; Gaugler, Rosenthal, Thornton, & Bentson, 1987). The AC method relates to naturally observed behavior patterns in the managerial environment. The method aims to observe the behavior of an individual by asking one to complete various tasks designed in the form of simulations (Mischel, 1973). When designing AC simulations, researchers often apply the volatility, uncertainty, complexity, ambiguity (VUCA) patterns which assess managers based on set tasks with clearly defined industry standards of behaviors (Thornton & Lievens, 2018). The VUCA business environment is an acronym coined by the U.S. military (Stiehm & Townsend, 2002; Whiteman, 1998), which stands for volatility (rapid change due to multiple causes), uncertainty (lack of predictability), complexity (multiple and confusing forces), ambiguity (confusion in causes and effects in reality). Today, managers operate in both strong and weak VUCA situations, which require the activation of different behavior patterns.

Although some evidence suggests that the relationship between personality, AC dimensions and behavior can be effectively measured in AC, the findings are usually ambiguous, and therefore, the relationship remains unclear (Meriac *et al.*, 2008; Klehe *et al.*, 2012; Simonenko, Thornton, Gibbons, & Kravtcova, 2013). The ambiguous research results prove that researchers should place more effort into additional mechanisms that could better explain the relationship between personality and managerial AC dimensions while considering the specific situations in which managers operate. Moreover, managers at different life stages present a higher or lower level of AC dimensions, which depends on their natural predispositions, environment, experience and other factors (Streufert, Pogash, Piasecki, & Post, 1990). Finally, there is some evidence that age could be a potential moderator in this relationship (Krajewski, Goffin, Rothstein, & Johnston, 2007).

Therefore, we aimed to assess whether personality can explain managerial AC dimensions demonstrated in the AC performance and whether managers' age in strong and weak VUCA simulations moderates the relationship.

Defining personality and AC dimensions

There are numerous definitions of personality and AC dimensions in management and psychological research. For instance, the well-established Big Five approach defines personality as "dimensions of individual differences in the tendency to show consistent patterns of thoughts, feelings, and behavior" (McCrae & Costa, 1990, p. 23). According to Baczyńska (2015), AC dimensions are a set of complex skills acquired in the course of training

that determines the effective performance of work duties based on the individual's knowledge, experience and predispositions manifested in behavior patterns. Moreover, AC dimensions are more connected with procedural knowledge (*how?*) than declarative knowledge (*what?*), albeit they go beyond the scope of simple skills (Baczyńska, 2018). They also manifest in observed behaviors, hence it is possible to deduce the extent of managers' AC dimensions based on revealed behavior patterns. From a theoretical perspective, AC dimensions develop with experience, which is usually connected with the age of managers. Thus, from a logical perspective, older managers should present a higher level of managerial AC dimensions than younger ones. The relationship between these variables has not been scrutinized in the literature yet.

Thus, we analyzed the relationship between personality and the AC dimension from three perspectives: connection traits with overall assessment rating (OAR), dimensional performance, and overall exercise performance. To identify the relationship between personality (based on the Big Five model) and AC dimensions, we analyzed and summarized the subject literature (see Table 1).

From the theoretical perspective, personality traits and managerial AC dimensions are the main sources of human behaviors. From a logical perspective, these two variables should be closely related, but the reported research results have not fully supported it thus far (Jansen *et al.*, 2011; Meriac *et al.*, 2008).

Interactionist researchers (e.g. Thornton & Lievens, 2018; Mischel & Shoda, 1995) underline that human behavior is a function of both intrapersonal characteristics and the context in which a behavior pattern occurs. Individuals with specific traits enter a simulation and deal with it in a specific way, which means the context can trigger human behavior. The trait activation theory (Tett & Guterman, 2000; Tett & Burnett, 2003) claims that personality traits appear in the form of predicted sets of behaviors, although only when the situation requires the behavior associated with the given personality trait. In other circumstances, we can demonstrate neither the personality trait nor its impact on the observation results. Thus, for a person to be able to demonstrate a personality trait through their behavior, the situation must allow the expression of that trait. Therefore, we may conclude that both personality and context of operations play a crucial role in managers' performance.

Assessing managerial AC dimensions with strong and weak VUCA simulations

The AC method aims to observe an individual's behavior by asking them to complete various tasks designed in the form of simulations. The literature provides different taxonomies of simulations (Thornton & Lievens, 2018). However, all simulations are built to reflect key tasks of the job and elicit specific behaviors in exercises that correspond with specific behaviors required on the job (Thornton & Lievens, 2018).

As strong simulations relate to clear instructions and situational features refer to deeply embedded norms (social, managerial), individuals are expected to present clear behavior patterns. Strong simulations are thought to be "clear" situations that dampen individual differences. On the other hand, when both instructions and norms are ambiguous, an individual's behavior patterns may be more complex. Therefore, when simulations are very similar to each other, one lacks certainty whether they will provide unique information (Thornton & Lievens, 2018).

When designing AC simulations, researchers often apply the VUCA patterns which assess managers based on set tasks with clearly defined industry standards of behaviors (Thornton & Lievens, 2018). Experience shows that behavioral patterns vary depending on simulations: participants behave differently in group versus individual simulations, familiar versus new situations, such as employee appraisal in the case of a manager (weak VUCA) and unclear, rare, ambiguous situations, namely a merger or crisis (strong VUCA).

Table 1.
Selected literature
review

Managerial AC dimensions	Personality					Source
	Extraversion	Conscientiousness	Agreeableness	Openness	Neuroticism	
Social skills		+			-	Consiglio, Alessandri, Borgogni, and Piccolo (2013)
Problem-solving				+		Consiglio <i>et al.</i> (2013)
Management and goal-striving	+++	+++	+	+	-	Consiglio <i>et al.</i> (2013), Derue, Nahrgang, Wellman, and Humphrey (2011), Guillén and Saris (2013)
Openness to change				++		Consiglio <i>et al.</i> (2013), Guillén and Saris (2013)
Employee development	+		+		-	Dilchert and Ones (2009), Nahrgang, Morgeson, and Ilies (2009), Guillén and Saris (2013)

Note(s): + positive relationship between personality traits and AC dimensions. - negative relationship between traits and AC dimensions
Source(s): Own elaboration

Age as a moderator of the relationship between personality and managerial AC dimensions

The intricacies of personality in the managerial context have garnered substantial academic attention over the years. [Costa and McCrae's \(1992\)](#) five-factor model of personality extensively explores the broader five domains of personality. Though it primarily focuses on positive and neutral personality facets, it hints at negative dimensions, which find a deeper resonance in the dark triad of personality. This triad, identified by [Paulhus and Williams \(2002\)](#), comprises negative traits: narcissism, Machiavellianism and psychopathy, which profoundly influence individual behaviors.

Beyond mere chronological significance, age stands as a predictor of behavior and competence. In job performance studies, age emerges with a multifaceted influence. [Ng and Feldman \(2013\)](#) illustrate how age potentially moderates the connection between personality and job performance.

In today's rapidly evolving world, managers confront the challenges of a VUCA environment. [Bennett and Lemoine \(2014\)](#) emphasize the adaptive and versatile leadership requisite for this landscape, a sentiment echoed by [Kaplan and Kaiser \(2003\)](#), who link leadership versatility with personality.

Interestingly, empirical data offers no consistent correlation between age and either AC performance or managerial effectiveness. [Thornton and Byham's \(1982\)](#) review found no tangible link between age and AC performance. Conversely, studies like those by [Burroughs, Rollins, and Hopkins \(1973\)](#) and [Waldman and Avolio \(1986\)](#) revealed negative and positive correlations, respectively, between age and specific performance measures.

Delving further, [Krajewski et al. \(2007\)](#) demonstrated stronger links between personality traits and AC performance in older managers compared to younger ones, suggesting age's potential moderating role. They examined personality traits such as dominance, exhibition and achievement orientation against six AC dimensions, finding age to be a significant moderator for certain traits. Their analysis concluded that older managers' effectiveness often stems from the attributes they amass with age and prolonged managerial roles. [Martowska \(2014\)](#) further emphasizes the relationship between AC dimensions, experience and age, indicating that learned managerial behaviors often supersede innate personality traits in influencing performance.

Conclusively, the literature suggests that as personality morphs with age, managers of varying ages, influenced by diverse socialization and professional experiences, exhibit different strengths and weaknesses. While the nexus between personality and AC dimensions remains a complex tapestry of contradictions, it is prudent to view age as a potentially pivotal moderator in this dynamic.

Study aims and hypotheses

The article aims to assess the relationship between personality and managerial AC dimensions. Previous research failed to demonstrate a consistent link between personality and managerial AC dimensions demonstrated in AC performance, therefore, we tried to fill this research gap. Moreover, we wanted to test whether age would moderate the relationship between personality metatraits and managerial AC dimensions. We used a multimethod approach in collecting the data, i.e. we measured personality via self-reporting and assessed managerial AC dimensions in the form of AC performance.

Managerial effectiveness is a product of AC dimensions, traits, behaviors and context. However, it remains unclear how the manager's traits and behaviors are linked to each other. Based on these assumptions, we formulated the following hypothesis:

- H1.* Personality metatraits correlate with the AC performance; specifically, positive personality metatraits of stability (Alpha-plus), plasticity (Beta-plus), integration

(Gamma-plus) and self-restraint (Delta-plus) are positively related, and negative personality metatraits of disinhibition (Alpha-minus), passiveness (Beta-minus), disharmony (Gamma-minus) and sensation seeking (Delta-minus) are negatively related to the AC performance.

Scholars recognize personality as a stable predictor of managerial performance, namely success or failure (Cavazotte, Moreno, & Hickmann, 2012; Rothmann & Coetzer, 2003; Robertson, Baron, Gibbons, MacIver, & Nyfield, 2000). The performance of a person during AC is influenced by the level of individual traits, meaning individuals with specific traits enter a given VUCA simulation and deal with it in a specific way. Positive traits can facilitate AC dimensions, while negative trait/the dark sides of personality can be their blockers. Therefore, we hypothesized that:

H2. Personality metatraits predict managerial AC dimensions demonstrated in the AC performance, and this relationship depends on the particular VUCA scheme; specifically, personality metatraits are better predictors of managerial AC dimensions in strong VUCA than in weak VUCA.

Age plays an important role in the relationship between behaviors and personality. For instance, Streufert *et al.* (1990) showed that managers of different ages present various levels of particular AC dimensions that could depend on the environment, their experience and many other possible factors, so we developed the following hypotheses:

H3. Personality metatraits predict managerial AC dimensions demonstrated in the AC performance, and this relationship depends on managers' age; specifically, personality metatraits are better predictors of managerial AC dimensions demonstrated in AC performance among younger managers than older ones.

In the realm of personality psychology, there is a consistent acknowledgment of the so-called "dark side" of personality. This side is generally characterized by traits that can be seen as undesirable, maladaptive, or even counterproductive in various contexts, especially in professional settings. For instance, Paulhus and Williams (2002) coined the term "dark triad" to describe a trio of such negative traits: narcissism, Machiavellianism and psychopathy. Each of these traits is associated with manipulative behavior, lack of empathy and egocentricity.

Implications of negative traits on behavior

Research has continually shown that negative traits can profoundly affect individual behavior. For instance, individuals with high levels of Machiavellianism are more likely to engage in manipulative behavior, pursue personal gain at the expense of others and display a lack of concern for morality (Jones & Paulhus, 2011). Similarly, narcissism, characterized by grandiosity and a lack of empathy, can lead to aggressive reactions when such individuals feel threatened or perceive a slight (Bushman & Baumeister, 1998).

However, it is also important to note that negative traits do not operate in isolation. Various external factors, including environment, situations and individual experiences influence their manifestation. This makes it even more imperative to understand how these traits interplay with other factors, such as age, in determining individual behavior.

In the context of this study, considering the role of negative personality traits is essential, especially when examining their potential impact on managerial competencies. While competencies reflect one's skills and capabilities, personality traits, especially the negative ones, can act as inhibitors or facilitators in the expression of these competencies.

While evidence suggests the prominence of personality in managerial behavior and the nuanced role age plays in such settings, scholars have explored the “negative” side of personality and its interplay with age in a VUCA context only to a small extent. We aimed to bridge this gap, adding a new dimension to the ongoing discourse.

- H4. Age moderates the relationship between personality metatraits and managerial AC dimensions demonstrated in the AC performance in both strong and weak VUCA simulations; specifically, negative personality metatraits predict the demonstration of managerial AC dimensions in AC performance via managers’ age.

Method

Transparency and openness

We described our sampling plan, and all measures in the study, and we adhered to the *Journal of Applied Psychology* methodological checklist. All data, analysis code and research materials are available upon request. We analyzed data using SPSS Statistics version 27. The study’s design and its analysis were not preregistered.

Participants and procedure

A total number of 327 participants aged 25–51 ($M = 33.30$, $SD = 4.56$), 54% men, participated in this study. For the purpose of the analyses, we split them into three age groups: (1) younger managers (25–29 years old), (2) middle-aged managers (30–35 years old) and (3) older managers (36–51 years old). We used the assessment center (AC) method to collect data on managerial AC dimensions. We conducted 42 one-day AC sessions among managers who attended our University in Post Graduate Studies. In our AC, we followed the guidelines of AC methods (Lievens & Thornton, 2017).

We calculated the AC performance as an aggregate of assessors’ consensus ratings on each AC dimension. Such consensus – or “staff meeting” judgments – represent conventional AC performance criteria (Thornton & Byham, 1982). All assessors were psychologists. We prepared the same procedure, i.e. assessors’ consensus ratings, to differentiate between strong and weak VUCA simulations.

Measures

Managerial AC dimensions. We assessed five managerial AC dimensions (Baczyńska, 2015; Baczyńska & Thornton, 2017):

- (1) *Social skills:* supporting and cooperating/interacting and presenting manifest in effective communication (verbal and non-verbal), assertiveness, conscious and intentional influence on others without manipulation and teamwork support;
- (2) *Problem-solving:* analyzing, interpreting/creating and conceptualizing understood as the ability to analyze a situation, accurately diagnose the cause and effects of arising problems and actively seek the best solution to these problems;
- (3) *Management and goal-striving:* leading and deciding, organizing and executing, enterprising and performing are understood as striving to manage the course of work or people, organizing the actions of individuals and teams, striving for high results (planning, organizing, controlling), taking initiative and pursuing goals despite setbacks;
- (4) *Openness to change:* adapting and coping understood as taking responsibility for decision-making and implementing new solutions, representing the company strategy with workers and being flexible in situations of change;

- (5) *Employee development*: supporting, cooperating/enterprising and performing are understood as striving to develop employee AC dimensions and motivations to create conditions that help improve worker effectiveness.

As shown in Table 2, we assessed AC performance in four simulations, with each managerial competency observed in two or three simulations. We used the VUCA scheme to design simulations: strong VUCA included simulation 1 (discussion without a leader) and simulation 2 (meeting with an accountant), while weak VUCA included simulation 3 (discussion with assigned roles) and simulation 4 (meeting with an employee). Scores ranged from 1 to 6 and two trained assessors provided them.

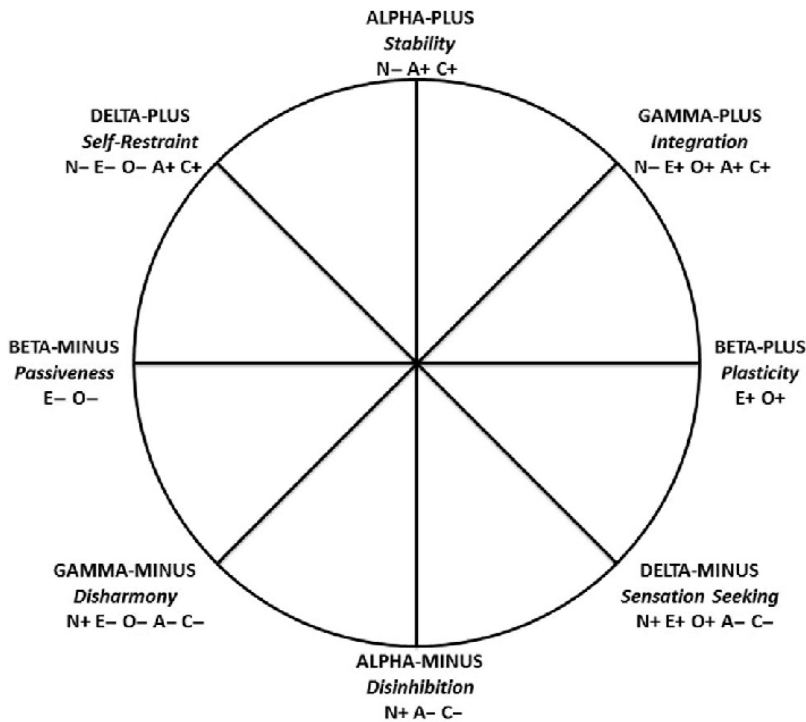
We used the CPM portrait questionnaire (Strus et al., 2014) to assess the personality metatraits related to differences among people in terms of thinking, behavior and emotions. The Questionnaire is built around eight poles (see Figure 1):

- (1) *Disinhibition (Alpha-minus)*: antisocial behavior, lack of impulse control and low tolerance of frustration; individuals who score high on this metatrait may sometimes show aggression and negative attitudes towards others;
- (2) *Passiveness (Beta-minus)*: an inclination to display passive behavior, apathy and stagnation; individuals who score high on this metatrait are rather dependent, submissive and display high change tolerance;
- (3) *Disharmony (Gamma-minus)*: an inclination to low mood (depression), pessimism, lack of energy with a low sense of mental and physical well-being; individuals who score high on this metatrait can be unapproachable, mistrustful, cold and distant, especially in interpersonal relations;
- (4) *Sensation seeking (Delta-minus)*: high impulsivity, inclination to take risks, excitement seeking and hedonistic, unconventional thinking; individuals who score high on this metatrait are sometimes self-centered, tend to dominate and compete.
- (5) *Stability (Alpha-plus)*: social adaptation, dutifulness, honesty and reliability; individuals who score high on this metatrait are patient, determined in pursuing their goals, highly self-motivated, able to defer gratification and highly tolerant of frustration;
- (6) *Plasticity (Beta-plus)*: openness to change and new experiences (both cognitive and behavioral); individuals who score high on this metatrait are keen to explore and discover, show openness and a positive attitude to change, display initiative,

	Strong VUCA		Weak VUCA	
	Simulation 1 Discussion without a leader	Simulation 2 Meeting with an accountant	Simulation 3 Discussion with assigned roles	Simulation 4 Meeting with an employee
Social skills	✓	✓	✓	
Problem-solving	✓	✓	✓	-
Management and goal-striving	✓	-	✓	✓
Openness to change	-	-	✓	✓
Employee development	✓	✓	-	✓

Table 2.
AC dimensions
measured in particular
AC simulations

Source(s): Own elaboration



Note(s): Copyright Strus, Ciecich, and Rowiński (2014)

Source(s): Own elaboration

Figure 1.
Circumplex model of
personality metatraits

invention and leadership tendencies, and are strongly oriented toward personal development;

- (7) *Integration (Gamma-plus)*: maturity and mental health; individuals who score high on this metatrait are characterized by well-being, optimism, internal and interpersonal harmony; they trust other people, are friendly, sincere, prosocial, stable, but also flexible and open to new experiences;
- (8) *Self-restraint (Delta-plus)*: the tendency to conform to social norms, high self-control, caution, conformism and conventionalism; individuals who score high on this metatrait are stable, orderly and compliant but less active, less sociable and relatively less open to new experiences.

The model identifies eight poles, as shown in Figure 1. The questionnaire consists of 54 items and the responses are inscribed on a seven-point Likert-type scale ranging from 1 meaning “not similar to me at all” to 7 – “very similar to me.” The Cronbach’s alpha for all scales was above 70.

Results

Descriptive statistics

We analyzed data in SPSS Statistics version 27 by running descriptive statistics to check the results’ distribution. As presented in Table 3, the results showed that social skills and

problem-solving achieved the highest mean scores ($M = 5.60$ and $M = 5.13$ respectively). Management and goal-striving was relatively stable across all three simulations in which we assessed this competency. Participants achieved high scores in openness to change, especially in simulation 4, in which they had to meet with an employee. Employee development had the highest mean score in simulation 2 when participants had to meet with an accountant.

We applied the general linear model (GLM) to test whether the differences in the mean levels of all five AC dimensions across the AC simulations were significant. The GLM results showed no significant differences in the level of three AC dimensions across all four simulations: (1) social skills, (2) problem-solving and (3) management and goal-striving. We observed a significant difference in the level of openness to change across simulations 3 and 4 ($p < 0.001$) and a significant difference in the level of employee development across simulations 1, 2 and 4 ($p < 0.01$).

Next, we tested the mean levels of personality metatraits. Participants achieved the highest scores in integration (Gamma-plus) $M = 5.45$, $SE = 0.69$, stability (Alpha-plus) $M = 5.39$, $SE = 0.67$, plasticity (Beta-plus) $M = 5.22$, $SE = 0.84$ and the lowest scores in disinhibition (Alpha-minus) $M = 1.96$, $SE = 0.76$ and disharmony (Gamma-minus) $M = 1.98$, $SE = 0.75$.

Correlations between the study variables

In the next step, we checked correlations between study variables with age as a control variable. As we may see in Table 4, plasticity (Beta-plus) had the strongest positive association with openness to change, problem-solving and employee development. Integration (Gamma-plus) correlated positively with problem-solving, openness to change and employee development. On the other hand, passiveness (Beta-minus) and disharmony (Gamma-minus) had negative associations with all managerial AC dimensions. Therefore, we confirmed H1.

Regression models

Strong and weak VUCA. We ran several linear regression models to check whether personality metatraits predicted managerial AC dimensions. We applied the VUCA scheme with simulations grouped into two categories. We tested nine different models where personality metatraits explained managerial AC dimensions observed in strong and weak VUCA simulations. As presented in Table 5, the results showed that passiveness (Beta-minus) was a negative predictor of social skills [$R^2 = 0.03$, $b = -0.20$, $p < 0.05$] in strong but

Table 3.
Means and standard deviations of AC dimensions measured in specific AC simulations

	Strong VUCA		Weak VUCA	
	Simulation 1 Discussion without a leader	Simulation 2 Meeting with an accountant	Simulation 3 Discussion with assigned roles	Simulation 4 Meeting with an employee
Social skills	5.61 (1.29)	5.63 (1.31)	5.56 (1.32)	–
Problem-solving	5.15 (1.41)	5.07 (1.48)	5.18 (1.38)	–
Management and goal-striving	4.89 (1.51)	–	4.90 (1.43)	4.83 (1.48)
Openness to change	–	–	4.82 (1.51)	5.12 (1.37)
Employee development	4.89 (1.52)	5.11 (1.36)	–	4.93 (1.51)

Source(s): Own elaboration

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Social skills	0.58**												
2. Problem-solving	0.75**	0.66**											
3. Management and goal-striving	0.58**	0.72**	0.69**										
4. Openness to change	0.61**	0.72**	0.66**	0.90**									
5. Employee development	-0.06	-0.02	-0.02	0.04	0.02								
6. Disinhibition (Alpha-minus)	-0.14*	-0.22**	-0.11*	-0.20**	-0.21**	0.12*							
7. Passiveness (Beta-minus)	-0.12*	-0.19**	-0.12*	-0.18**	-0.17**	0.45**	0.48**						
8. Disharmony (Gamma-minus)	-0.02	-0.00	-0.02	0.07	0.07	0.46**	-0.30**	0.12*					
9. Sensation seeking (Delta-minus)	0.05	0.10	0.03	0.04	0.04	-0.49**	0.08	-0.33**	-0.35**				
10. Stability (Alpha-plus)	0.07	0.18**	0.08	0.21**	0.21**	-0.04	-0.71**	-0.41**	0.39**	0.10			
11. Plasticity (Beta-plus)	0.05	0.12*	0.04	0.14*	0.13*	-0.34**	-0.42**	-0.59**	0.10	0.37**	0.58**		
12. Integration (Gamma-plus)	-0.03	-0.00	0.01	-0.01	-0.03	-0.15**	0.41**	-0.03	-0.40**	0.47**	-0.17**	0.10	
13. Self-restraint (Delta-plus)	5.60	5.13	4.87	4.97	4.98	1.96	2.31	1.98	3.49	5.39	5.22	5.45	4.45
<i>M</i>	1.23	1.35	1.41	1.24	1.28	0.76	0.83	0.75	0.99	0.67	0.84	0.69	0.87
<i>SD</i>													

Note(s): **correlation is significant at 0.01 level, * correlation is significant at 0.05 level

Source(s): Own elaboration

Table 4.
Means, standard
deviations and partial
correlations between
the study variables
controlling for
age group

Table 5.
Standardized beta
coefficients in linear
regression models
predicting managerial
AC dimensions in
strong and weak
VUCA simulations

Variable	Strong VUCA				Weak VUCA				Total		
	ss	ps	mgs	och	ed	ss	ps	mgs		och	ed
Disinhibition (Alpha-minus)	0.01	0.14	0.04	-	0.11	0.05	0.11	0.06	-0.12	0.13	0.11
Passiveness (Beta-minus)	-0.20*	-0.21*	-0.13	-	-0.14	-0.15	-0.21*	-0.11	-0.14	-0.13	-0.28*
Disharmony (Gamma-minus)	-0.07	-0.11	-0.08	-	-0.12	-0.06	-0.09	-0.12	-0.14	-0.09	-0.02
Sensation seeking (Delta-minus)	0.00	-0.08	-0.03	-	-0.00	-0.07	-0.05	-0.06	-0.02	-0.02	-0.12
Stability (Alpha-plus)	0.09	0.12	0.02	-	0.05	0.04	0.10	0.01	0.05	0.07	0.08
Plasticity (Beta-plus)	-0.08	0.06	0.04	-	0.07	-0.04	0.01	0.02	0.08	0.08	-0.02
Integration (Gamma-plus)	-0.06	-0.06	-0.07	-	-0.02	0.00	-0.04	-0.08	-0.01	-0.04	-0.02
Self-restraint (Delta-plus)	-0.00	0.04	0.04	-	0.03	0.00	0.02	0.05	0.06	0.03	0.06

Note(s): * $p < 0.05$; ss – social skills, ps – problem-solving, mgs – management and goal-striving, och – openness to change, ed – employee development
Source(s): Own elaboration

not in weak VUCA simulations. Passiveness (Beta-minus) also negatively predicted problem-solving in both strong [$R^2 = 0.08, b = -0.21, p < 0.05$] and weak VUCA simulations [$R^2 = 0.06, b = -0.21, p < 0.05$].

Besides the above results with specific managerial AC dimensions, we also wanted to check whether personality could be considered a predictor of all managerial AC dimensions observed in strong, weak and overall assessment rating (OAR), namely the mean score of all five managerial AC dimensions in both schemes. The results showed that only passiveness (Beta-minus) was a negative predictor of all managerial AC dimensions observed in strong VUCA [$R^2 = 0.07, b = -0.20, p < 0.05$] and OAR [$R^2 = 0.06, b = -0.19, p < 0.05$]. We found no positive associations between positive personality metatraits and managerial AC dimensions. Therefore, we partially confirmed H2.

Age groups. We ran linear regression models to check whether personality metatraits predicted managerial AC dimensions in particular age groups. As presented in Table 6, the results showed that in the case of group 1, disharmony (Gamma-minus) was a negative predictor of four managerial AC dimensions and self-restraint (Delta-plus) was a negative predictor of two managerial AC dimensions. In the case of group 2, passiveness (Beta-minus) was a negative predictor of two managerial AC dimensions. We found no significant coefficients in group 3.

Besides the above results with specific managerial AC dimensions, we also wanted to check whether personality could be considered a predictor of all managerial AC dimensions observed in OAR, namely the mean score of all five managerial AC dimensions in both schemes. The results showed that disharmony (Gamma-minus) was a negative predictor of AC performance in group 1 [$R^2 = 0.33, b = -0.55, p < 0.05$] and passiveness (Beta-minus) was a negative predictor of AC performance in group 2 [$R^2 = 0.06, b = -0.28, p < 0.05$]. We observed no significant regression coefficients in group 3. Thus, we partially confirmed H3.

Moreover, we run one-way ANOVA to check the overall assessment ratings (OAR) across the three age groups. As shown in Figure 2, the oldest group of managers achieved the highest OAR. However, the differences between groups were not significant $F(2, 326) = 0.87, p > 0.05$.

Age as moderator

Moderating variables affect either the strength or nature of the relationship between two other variables, and these are frequently used in management and psychology research (Dawson, 2014). For the purpose of our study, we tested several moderation models to check whether age moderates the relationship between personality metatraits (predictor variable) and AC performance (outcome variable). We analyzed data in SPSS Statistics version 27 with the macro PROCESS (Hayes, 2017) installed. Figure 3 shows a graphical representation of the model.

We specifically wanted to check whether negative personality metatraits predicted the demonstration of managerial AC dimensions in AC performance via managers' age. We assessed each competency in two AC simulations – strong and weak VUCA – except for openness to change, which we measured in weak VUCA only. We checked a total of 54 moderation models.

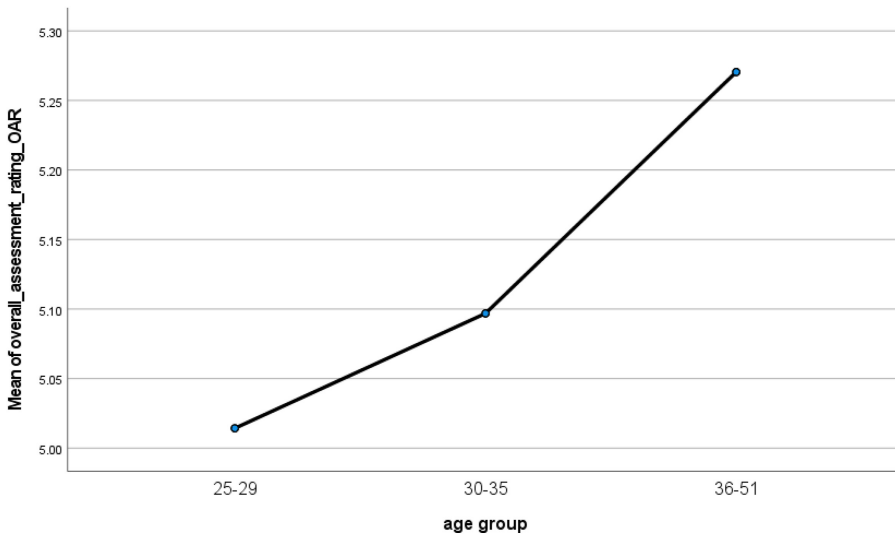
The results showed that disharmony (Gamma-minus) was a negative predictor of social skills in weak VUCA, while age moderated this relationship with significant effects $b = 0.40, p < 0.05, 95\% \text{ CI } [0.07, 0.73]$ in group 1. The relationship accounted for 3% of the total variance in social skills, so we could conclude that disharmony (Gamma-minus) was a blocker of social skills performance in the youngest group of managers.

Passiveness (Beta-minus) was a negative predictor of problem-solving in weak VUCA, and age moderated this relationship with significant effects $b = 0.35, p < 0.05, 95\% \text{ CI } [0.02,$

Table 6.
Standardized beta
coefficients in linear
regression models
predicting managerial
AC dimensions in three
age groups

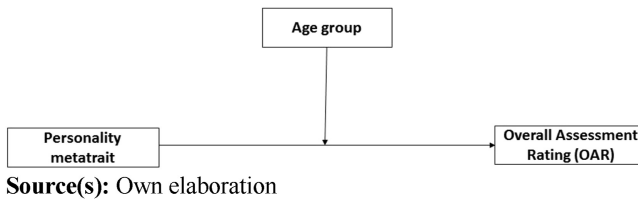
Variable	Group 1 (25-29) N = 50				Group 2 (30-35) N = 209				Group 3 (36-51) N = 68						
	ss	ps	mgs	och	ed	ss	ps	mgs	och	ed	ss	ps	mgs	och	ed
Disinhibition (Alpha-minus)	0.08	0.03	0.02	-0.08	-0.23	-0.02	0.09	0.04	0.02	0.18	0.15	0.33	0.17	0.09	0.18
Passiveness (Beta- minus)	0.06	0.00	0.37	0.20	0.14	-0.23	-0.27*	-0.23	-0.24*	-0.21	-0.17	0.02	-0.01	0.08	0.01
Disharmony (Gamma-minus)	-0.59**	-0.31	-0.54*	-0.54*	-0.51*	0.03	-0.06	0.04	-0.08	-0.06	-0.13	-0.21	-0.25	-0.13	-0.14
Sensation seeking (Delta-minus)	-0.06	-0.09	-0.09	-0.07	-0.10	-0.08	-0.11	-0.15	-0.09	-0.07	0.18	0.04	0.26	0.23	0.16
Stability (Alpha- plus)	0.05	0.17	0.11	-0.07	-0.00	0.05	0.10	0.04	0.07	0.10	0.04	-0.08	-0.12	-0.09	-0.15
Plasticity (Beta- plus)	0.23	0.05	0.03	0.28	0.25	-0.12	0.03	0.01	-0.03	0.02	-0.06	0.05	0.06	0.33	0.21
Integration (Gamma-plus)	-0.11	0.01	0.14	-0.40	-0.42	-0.04	-0.05	-0.07	0.08	-0.04	0.01	0.11	-0.14	-0.08	0.05
Self-restraint (Delta-plus)	-0.15	-0.48*	-0.46*	-0.27	-0.37	0.03	0.10	0.04	0.05	0.04	0.00	0.06	0.23	0.27	0.17

Note(s): * $p < 0.05$ ** $p < 0.01$; ss – social skills, ps – problem-solving, mgs – management and goal-striving, och – openness to change, ed – employee development
Source(s): Own elaboration



Source(s): Own elaboration

Figure 2.
Overall assessment
ratings (OAR) across
three age groups



Source(s): Own elaboration

Figure 3.
Graphical
representation of the
simplified
moderation model

0.68] in group 2. The relationship accounted for 6% of the total variance in problem-solving. Therefore, we could conclude that passiveness (Beta-minus) was a blocker of problem-solving in the middle-aged group of managers.

Disinhibition (Alpha-minus) was a negative predictor of management, and goal-striving and age moderated this relationship with significant effects in strong VUCA $b = 0.48$, $p < 0.01$, 95% CI [0.13, 0.83] and in weak VUCA $b = 0.41$, $p < 0.05$, 95% CI [0.08, 0.73] in group 3. The relationship accounted for 13% of the total variance in management and goal-striving. Therefore, we could conclude that disinhibition (Alpha-minus) was a blocker of management and goal-striving in the oldest group of managers.

We found no significant moderation effects for openness to change and employee development. Therefore, we partly confirmed H4.

Besides the above results with specific managerial AC dimensions, we also wanted to check whether personality could be a predictor of OAR with age as a moderating variable. We ran eight moderation models with each personality metatrait as a predictor variable (X), the mean score of all five managerial AC dimensions (OAR) as an outcome variable (Y) and age as a moderating variable (M). The results showed that out of all eight personality metatraits, only disinhibition (Alpha-minus) was a positive predictor of OAR, and age moderated this relationship with significant effects $b = 0.30$, $p < 0.05$, 95% CI [0.04, 0.56] in group 3. The relationship accounted for 2% of the total variance in managerial AC dimensions. Therefore,

we could conclude that disinhibition (Alpha-minus) was a blocker of managerial AC dimensions performance in the oldest group of managers.

Discussion

The article aimed to assess the relationship between personality metatraits and managerial AC dimensions demonstrated in AC simulations while considering managers' age, which we used as a moderator variable. According to our hypotheses, positive personality metatraits should be linked with a higher level of managerial AC dimensions, while negative personality metatraits should relate to a lower level of managerial AC dimensions. The results showed that plasticity (Beta-plus) positively related to openness to change, problem-solving and employee development. Integration (Gamma-plus) correlated positively with problem-solving, openness to change and employee development. On the other hand, passiveness (Beta-minus) and disharmony (Gamma-minus) had a negative relationship with all managerial AC dimensions. Thus, we could conclude that only three out of the eight measured personality metatraits played an important role in this relationship. We should highlight that although these correlations were significant, they were not very strong, hence the results should be interpreted with caution, albeit scholars reported similar findings in other studies that measured these constructs (e.g. Meriac *et al.*, 2008; Klehe *et al.*, 2012; Simonenko *et al.*, 2013).

As mentioned in the introduction, the level of individual characteristics and context may influence a person's performance in the AC. We assessed managerial AC dimensions by observing behavior in four AC simulations grouped into strong and weak VUCA, so in the second step, we wanted to check whether personality metatraits predicted AC performance in strong and weak VUCA simulations. We found that passiveness (Beta-minus) was a negative predictor of (1) social skills in strong but not in weak VUCA, (2) problem-solving in strong and weak VUCA. Summarizing, the dark characteristics of personality like apathy and submissiveness in interpersonal relations can be perceived as individual barriers to demonstrating social skills (e.g. effective communication, assertiveness and teamwork) and problem-solving (e.g. ability to analyze a situation and seek the best solution to these problems), which are crucial in managers' work environment. Interestingly, we found no relationships between positive personality metatraits and managerial AC dimensions. Therefore, we could conclude that the bright sides of our personality are neutral in this relationship and only the dark sides can disturb the demonstration of managerial AC dimensions.

The performance of a person during the AC may be influenced by the level of individual characteristics, the context and managers' age. Therefore, in the next step, we wanted to check whether personality metatraits predicted AC performance in various age groups. The results showed that disharmony (Gamma-minus) was a negative predictor of AC performance in the youngest group of managers, while passiveness (Beta-minus) was a negative predictor of AC performance in the middle-aged group of managers. We observed no significant regression coefficients in the oldest group of managers, so we could conclude that dark personality metatraits could be considered blockers in demonstrating managerial AC dimensions among the youngest and middle-aged managers. A possible explanation of our results could be that personality plays a more important role among younger managers than among older ones, whereas older managers' performance relies more on their AC dimensions.

Markedly, Krajewski *et al.* (2007) achieved slightly different results, claiming that AC dimensions such as dominance and exhibition were more strongly related to AC performance in older than younger managers. However, we should note that they defined exhibition as a desire to be at the center of attention and dominance as attempts to control the environment and influence or direct other people. After analyzing the content, we clearly see that

domination and exhibition are logically connected to managerial experience, so more experienced managers displayed these traits more strongly than younger ones. Therefore, not only traits but also the content require scrutiny when interpreting study results.

In the final step, we checked whether managers' age could be a moderator in the relationship between personality metatraits and AC performance in strong and weak VUCA simulations. Three moderation models were significant: (1) disharmony (Gamma-minus) was a negative predictor of social skills in weak VUCA and age moderated this relationship with significant effects in the youngest group of managers; (2) passiveness (Beta-minus) was a negative predictor of problem-solving in weak VUCA and age moderated this relationship with significant effects in the youngest group of managers; (3) disinhibition (Alpha-minus) was a negative predictor of management and goal-striving and age moderated this relationship with significant effects in the oldest group of managers. Thus, we may conclude that the dark characteristics of personality like inaccessibility in interpersonal relationships (distrust, coldness, distance) can disturb the demonstration of social skills. Second, we may perceive the dark characteristics of personality like apathy and submissiveness in interpersonal relations as individual barriers to problem-solving. Interestingly, the results concern the youngest group of managers only; they may not know how to deal with these characteristics in the workplace yet. In the case of the older group of managers, the dark characteristics of personality – which include antisocial tendencies underpinned by unrestraint and low frustration tolerance, aggression and antagonism toward people – were perceived as individual barriers to managing the course of work or people and pursuing goals. Based on the previous research findings (e.g. [Krajewski et al., 2007](#)), we may assume that older managers can express their personality in a more socially mature way in comparison to younger managers, and they can effectively connect it with their managerial AC dimensions. However, the moderation effects were minor, therefore, the interpretation of these findings requires caution, and further research is necessary to support these results.

To summarize, our study showed that the dark sides of personality may be related to a lower level of managerial AC dimensions in AC performance, although this relationship depends on managers' age: dark personality metatraits can block younger managers from demonstrating social skills and problem-solving, but in the case of older managers, dark personality metatraits block them from demonstrating management and goal-striving AC dimensions.

To conclude, this article has demonstrated the relationship between personality metatraits and managerial AC dimensions. The AC performance measures AC dimensions, which are a proven predictor of managerial performance (e.g. [Meriac et al., 2008](#); [Krause, Kersting, Heggstad, & Thornton, 2006](#); [Gaugler et al., 1987](#); [Jansen & Stoop, 2001](#)). Therefore, our results can be applied in development centers and treated as a reference point to some managerial development programs, which are currently becoming increasingly popular ([Tingle, Corrales, & Peters, 2019](#)). Such programs could facilitate managers' self-reflection by analyzing their behavior in different VUCA simulations in the form of workshops, training, or coaching sessions. As an example, we wish to mention the program currently in implementation at Kozminski University in Warsaw, titled "360 Leadership Program," which evaluates managerial and leadership AC dimensions, identifies boundaries and demonstrates how leaders can improve their effectiveness (for more details, see <https://leadership.kozminski.edu.pl/pl/>).

Limitations and future research

Although we conduct the study with great caution, we must mention its two main limitations. First, we collected the data from participants who graduated from the MBA program at Kozminski University, during which students improved their managerial AC dimensions. As a result, we observed high evaluations of individual managerial AC dimensions among our

participants. Second, our sample included participants from a single university who work in for-profit organizations based in Poland. To replicate the results and make the findings more representative, future research should test these assumptions by recruiting participants from various types of institutions and different countries. Moreover, longitudinal studies could show interesting trajectories of managerial AC dimensions development.

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