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The influence of the auditor's personality in audit quality

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ABSTRACT

This study analyzes the auditor personality impact on audit quality, using partial least squares structural equation model and fuzzy-set qualitative comparative analysis methods. This research draws on the insights of Big 5 personality theory and empirical studies in audit quality. The PLS-SEM result reveals that the traits of agreeableness, conscientiousness and openness are positively associated with professional skepticism of auditors, while conscientiousness and neuroticism negatively affect reduced audit quality practices. The fsQCA results show the existence of multiple configurations of personality traits leading to high (low) audit quality. Moreover, the causal asymmetry found reveals that personality is a combination of individual traits that interact in a differentiated and complex way with audit quality. This study complements previous research on auditor's drivers for supplying audit quality and provides support to audit firm decisions informing about the most relevant combinations of personality traits that auditors must have to make outstanding audit quality.

1. Introduction

The provision of credible accounting information is very relevant to improve resource allocation and efficient contracts and it can be achieved through auditing (DeFond and Zhang, 2014). The confidential nature of auditing, which is in force in many countries, prevents users of financial statements from accessing the quality of the work carried out by auditors (Gundry and Liyanarachchi, 2007). However, it is not possible to anticipate the situations in which auditors could compromise audit quality (Gundry and Liyanarachchi, 2007).

Christina and Brahmana (2019) state that, even though some studies link the individual differences in auditors to audit quality, the results are still not consistent. Some studies focused on the effect of several individual auditors' personal characteristics, but did not focus on auditor personality (Gul, Wu and Yang, 2013). The studies that focused on the effect of auditor personality on audit quality found a significant relationship between them (Gundry and Liyanarachchi, 2007; Christina and Brahmana, 2019; Balasingam, Arumugam and Sanatova, 2019).

To describe trait structure for the study of personality, the Big Five model (e.g., Farag and Elias, 2016) has been the most widely accepted (McCrae and Costa, 2008). Nevertheless, most studies about auditor personality use the Locus of Control model (Christina and Brahmana, 2019) or on personality type A and B (Kelley and Margheim, 1990; Malone and Roberts, 1996; Gundry and Liyanarachchi, 2007; Balasingam et al., 2019). Besides this, DeFond and Zhang (2014) state that some dimensions of auditor competencies are under-researched within the scope of audit quality, namely the individual auditor characteristics in driving audit quality, such as professional skepticism and personality traits, among others. Gundry and Liyanarachchi (2007, p. 140) state that "further research on personality type and its effects will better enable auditing firms to identify staff training and development needs and cater for these effectively".

Gundry and Liyanarachchi (2007, p. 140) have studied personality, which is characterized by several attributes, namely, being a multidimensional concept, and state that the "auditing profession may attract and also require different types of personalities". This implies that there must be different bundles of personality traits that can lead to high audit quality, suggesting the possibility of multiple configurations that lead to the same outcome (Woodside, 2013), for the study of which fsQCA is a good tool. From the research carried out it was possible to verify that, to our knowledge, fsQCA has not been used to study the impact of auditor personality in audit quality; instead, multiple regression is the statistical methodology used most for data analysis by studies in this area (Gundry and Liyanarachchi, 2007; Balasingam et al., 2019; Christina and Brahmana, 2019).

This research draws on the insights of the Big 5 personality model (Costa and McCrae, 1987; Goldberg, 1990) and empirical studies in auditing (e.g., Emerson and Yang, 2012). This study aims to analyze the influence of auditor personality on audit quality and has as its main objectives: 1) identify the auditors' personality characteristics combinations that lead to a high quality audit, and 2) analyze the effect of auditor personality in professional skepticism, reduced audit quality

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practices (RAQP) and material judgment. This work proposes to use a joint approach of Partial Least Squares – Structural Equation Modeling (PLS-SEM) and fsQCA to data collected from a sample of 91 Revisores Oficiais de Contas (Portuguese designation for Statutory Auditors). The results reveal that there is a relationship between personality and audit quality. Besides that, they show the existence of multiple configurations of personality traits leading to high (low) audit quality. Furthermore, the causal asymmetry found reveals that personality is a combination of individual traits that interact in a differentiated and complex way with audit quality.

The present work contributes to the literature by showing how the personality traits of an auditor impact the quality of an audit. Besides that, it contributes to the practice by informing auditing firms about the most relevant combinations of characteristics an auditor must have to achieve high audit quality.

The paper is structured as follows: the next section proceeds with the literature review, covering audit quality and auditor personality, the following section presents the methods, the results, and their discussion and, lastly, the conclusions, contributions, limitations, and future research are presented.

2. Literature review

2.1. Audit quality

The purpose of audits is "to enhance the degree of confidence of intended users in the financial statements" (International Auditing and Assurance Standards Board (IAASB), 2009, in International Standard of Auditing (ISA) No. 200, p. 72, paragraph 3). Auditing is confidential (Gundry and Liyanarachchi, 2007), so when analyzing an audit, it is important to bear in mind that audit quality is a perceived trait and so it cannot be directly observed (Knechel, Krishnan, Pevzner, Shefchik and Velury, 2013).

Therefore, according to IAASB (2009), when leading an audit, auditors have two main objectives: 1) get a high level of confidence that the financial statements as a whole are free from material misstatement, regardless of being an error or fraud, and express their opinion on the state of preparation of the financial statements in accordance with the applicable financial reporting framework; and 2) elaborate a report about the financial statements with their conclusions.

Audit quality has been widely defined as "the market-assessed joint probability that a given auditor will both discover a breach in the client's accounting system, and report the breach" (DeAngelo, 1981, p. 186). In this way, the probability that an auditor discovers a misstatement depends on a lot of factors, namely the usage of the appropriate resources in an effective way during the audit process (i.e., inputs and process), while the probability of the auditor report that misstatement is related to the auditor take the adequate action getting into account the context, namely the independence from the client (i.e., output and context) (DeAngelo, 1981; Knechel et al., 2013).

The Government Accountability Office (GAO, 2003, p. 13) definition considers that audit quality is achieved when it is conducted "in accordance with Generally Accepted Auditing Standards (GAAS) to provide reasonable assurance that the audited financial statements and related disclosures are (1) presented in accordance with Generally Accepted Accounting Principles (GAAP) and (2) are not materially misstated whether due to errors or fraud".

The financial report process is complex due to several factors. First, it has multiple stakeholders, namely users, auditors, regulators, and society, each of them with a different view of audit quality, leading to the need to use different types of indicators to assess audit quality (Knechel et al., 2013). Second, this complexity is also related to the general attributes of the concept – incentives, uncertainty, uniqueness, process, and judgment – and its multidimensions, namely, inputs, process, outcomes, and context (Knechel et al., 2013).

According to Francis (2011), one of the audit inputs is the people who do audits, and audits have higher quality when are carried out by competent people. Knechel et al. (2013) reinforce that an audit is a professional service, and the audit quality depends on the skills and knowledge of the team engaged in the audit, but also the technology and methodology that is used. Therefore, the "quality of the audit depends on the quality of auditor judgements during all stages of the audit" (Knechel et al., 2013, p. 393). Social psychology literature denotes the relevance of demographic, physiological and cognitive characteristics for an individual performance (Francis, 2011).

The measurement of audit quality is complex because the level of assurance provided by auditors in their work is unobservable (DeFond and Zhang, 2014). Therefore, multiple audit quality measures have been used in the literature. DeFond and Zhang (2014) summarize metrics from two perspectives of the auditing process: inputs-based proxies and output-based proxies. In contrast, Knechel et al. (2013) propose a set of audit quality indicators based on four categories: inputs, process, outcomes, and context. Gaynor, Kelton, Mercer and Yohn (2016) point out that there is no one-size-fits-all audit quality measure. Therefore, we followed DeFond and Zhang's (2014) recommendation of a multiple approach to audit quality measurement, considering professional skepticism as an input proxy and materiality judgment and RAQP as process proxies.

2.1.1. Professional skepticism

Professional skepticism of an individual "is at the foundation of the auditing profession" (Hurtt, 2010, p. 149). In accordance with the American Institute of Certified Public Accountants (AICPA) (1997, p. 1724), SAS No. 82 states that professional skepticism "is an attitude that includes a questioning mind and a critical assessment of audit evidence". This SAS states that an auditor should have a skeptical mindset, which means, auditors must have in mind the possibility of a material misstatement due to fraud, or error, independently of last experiences or auditors' belief about management honesty and integrity (IAASB, 2009, in ISA No. 200).

Hurtt (2010, p. 151) states that professional skepticism is a multidimensional concept which can be defined as "the propensity of an individual to defer concluding until the evidence provides sufficient support for one alternative/explanation over others". Furthermore, this author states that this multi-dimensional individual characteristic can be considered both as a trait or as a state: a trait because it is intrinsic to the individual, so it is relatively stable during life; and a state because it can be triggered by specific situations, influencing auditors' mindsets and consequently their behavior.

Christina and Brahmana (2019, p. 157) refer to professional skepticism as "an attitude that includes thoughts that constantly question and critically evaluate audit evidence". Nelson (2009, p. 4) defines professional skepticism as "indicated by auditor judgements and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor". In this sense, an auditor with high professional skepticism needs more convincing evidence to be persuaded and to judge the accuracy of the statement (Nelson, 2009). MacMillan and White (1993, p. 445) consider auditors as skeptical if they are more "sensitive to evidence that reduces the risk of failing to detect material errors in the client's financial statements". In the same way, Fogelin (1994, p. 3) defines a skeptic as an individual who "doubt[s] things" or "calls things into question" and Bunge (1991, p. 131) defines as a critical individual as someone who "want to see evidence before believing".

Nelson (2009) raises some aspects that can influence auditors' professional skepticism, namely, auditor knowledge, auditor traits and incentives. Knowledge has an impact in the sense that previous experience can affect the ability to identify errors and complex patterns; traits like problem-solving ability or ethical predisposition influence the auditor's judgment and action; finally, incentives can impact professional skepticism in conscious or unconscious ways. Knechel et al. (2013) reinforce that professional skepticism increases the quality of the auditor's

judgements, when associated with knowledge and skills, leading to higher audit quality.

Hurtt (2010) identified six characteristics of professional skepticism: a questioning mind, a suspension of judgment, a search for knowledge, interpersonal understanding, self-esteem, and autonomy. The first three characteristics are related to the auditor's approach to the evidence and how deep they analyze it before making a decision. Interpersonal understanding is related to the human aspect that an auditor should also consider in an audit, namely the auditor motivation and integrity. Finally, the last two characteristics are related to the auditor's capacity to take action as a result of the information collected.

2.1.2. Reduced audit quality practices

A reduced audit quality practice (RAQP) is the possibility of failure of some of the audit steps by the auditor, which can lead to an inappropriate reduction of the effectiveness of evidence gathering (Malone and Roberts, 1996). The reduction of RAQP by an accounting firm can be encouraged by control policies and review procedures, as well as by the consequences applied when an RAQP is discovered, a fact Malone and Roberts (1996) supported with the findings of their study.

Studies in this area (Kelley and Margheim, 1990; Malone and Roberts, 1996; Coram, Ng and Woodliff, 2003; Gundry and Liyanarachchi, 2007) focused mainly on behaviors that reduce the quality of an audit: 1) prematurely signing-off on a required audit step; 2) reducing the amount of work performed on an audit step below what the auditor would consider reasonable; 3) failing to research an accounting principle or auditing issue; 4) failing to pursue a questionable item in the audit; 5) carrying out superficial reviews of client documents; and 6) accepting weak client explanation. For example, Kelley and Margheim (1990) found that the acts reducing the amount of work and failing to research an accounting principle are more common than prematurely signing-off on audit program steps. Moreover, Kelley and Margheim (1990) revealed that 54% of auditors incurred in at least one of five types of RAQP, while in Coram et al. (2003), about 63% admit it, and point to auditing engagement with low risk and high time-budget pressure as the main reasons for RAQP.

According to Gundry and Liyanarachchi (2007), RAQP represent ethical issues to which individuals respond in different ways, and in consequence of that it is very relevant to analyze personality characteristics of auditors. Therefore, some studies (Gundry and Liyanarachchi, 2007; Balasingam et al., 2019) found a significant relationship between personality type and the incidence of RAQP. Gundry and Liyanarachchi (2007) show that individuals with different personality traits have distinctive predisposition to engage in RAQP. Malone and Roberts (1996) found a negative and significant relationship between some personality characteristics (need for approval and need for achievement) and RAQP. None of these studies used Big Five personality traits.

2.1.3. Material judgement

One of the auditors' objectives when conducting an audit is to get a high level of confidence regarding the financial statements as a whole, which should be free from material misstatement, regardless of being an error or fraud (IAASB, 2009, 2009a, in ISA No. 200 and 320). Therefore, performance materiality is defined as "the amount or amounts set by the auditor at less than materiality for the financial statements as a whole to reduce to an appropriately low level the probability that the aggregate of uncorrected and undetected misstatements exceeds materiality for the financial statements as a whole" (IAASB, 2009a, in ISA No. 320, p. 316, paragraph 9). Chong (2015, p. 27) states that this definition does not clearly define the criteria that constitute material, and described materiality as "matters which would influence the decision making of a prudent stockholder, after considering the qualitative and quantitative variables, and fairness on presenting in the financial statements".

According to IAASB (2009, 2009a), determining the materiality of the financial statements is not a simple mechanical calculation; it involves the exercise of professional judgment in planning and performing the audit and the auditors' perception of the needs of the users of the financial statements. A misstatement, including omissions, is considered material if it influences the economic decisions of users, and the judgement about its materiality must take into account the circumstances around and the size and nature of the misstatement (IAASB, 2009, 2009a). In this context, Christina and Brahmana (2019, p. 157) defined professional judgment as "the application of knowledge and experience relevant to auditing, accounting and ethical standards". IAASB (2009, in ISA No. 200, p. 77, paragraph 13) defines professional judgment as "the application of relevant training, knowledge and experience, within the context provided by auditing, accounting and ethical standards, in making informed decisions about the courses of action that are appropriate in the circumstances of the audit engagement".

In accordance with IAASB (2009), some features of auditors have influence in their professional judgement, such as training, knowledge, and experience, which should be developed in a way that can give them the necessary competencies to achieve a high-level of quality judgement.

Estes and Reames (1988) concluded that irregularities in materiality judgements can result in lower levels of audit quality. These authors state that research about materiality focuses on two subjects: financial statement relationships and personal characteristics of the auditor; the latter were the focus of their study (namely, gender, age, place of employment, education and experience). However, from the literature reviewed for this study it was not possible to find a study that analyses the impact of auditor personality in materiality.

2.2. Auditor personality

Fraud detection and prevention is essential and can be improved through auditor attention to fraudulent indicators, which should be reported (Rose, 2007). In this sense, auditor traits and experience are very relevant to avoid fraud, as well as to understand it (Rose, 2007). Personality traits cannot be directly measured, so researchers have to deduce them from complex patterns of clear and unclear behavior (McCrae and Costa, 1997), so it is very important to understand those traits (Emerson and Yang, 2012).

As referred to above, personality type is a multi-dimensional concept (Gundry and Liyanarachchi, 2007) and previous studies about auditor personality usually use Locus of Control and personality Type A and B. However, Five-Factor Model, or as it has also been called, Big Five personality dimensions (John and Srivastava, 1999) or 'Big Five' (McCrae and Costa, 2008), has been described as "the most widely accepted solution to the problem of describing trait structure – that is, finding a simple and effective way to understand relations among traits." (McCrae and Costa, 2008, p. 273).

'Big Five' "is a model of the structure of traits" (McCrae and Costa, 2008, p. 277), that organizes trait language and scientific concepts into a single framework (John and Srivastava, 1999). In this sense, it organizes personality traits hierarchically in terms of five basic dimensions: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience (McCrae and John, 1992; McCrae and Costa, 1997). This model is great for research because it captures broadly the common points of the existing systems of personality traits (John and Srivastava, 1999), being essential to organize research findings (McCrae and Costa, 2008).

According to McCrae and John (1992), the most appealing characteristics of this model are that it: 1) facilitates researchers' work by integrating a vast personality constructs; 2) is comprehensive; and 3) provides a global description of personality in an efficient way, through five dimensions.

Some authors criticize the characterization of personality in terms of five dimensions, because it cannot be so simple (McCrae and Costa, 2008), however, as John and Srivastava (1999, p. 105) state, this model describes personality "at the broadest level of abstraction, and each

dimension summarizes a large number of distinct, more specific personality characteristics".

Big Five personality dimensions have been used in auditors' research about ethical intention (Saadullah and Bailey, 2014), risk tolerance (Hrazdil, Novak, Rogo, Wiedman and Zhang, 2020), but it has not been used to study audit quality. Studies that used other personality theories found a relation between auditor personality and audit quality (Emerson and Yang, 2012; Christina and Brahmana, 2019). For example, Farag and Elias (2016) found a positive relationship between five personality dimensions of the 'Big Five' and professional skepticism.

2.2.1. Extraversion

This personality trait is characterized by a desire to be with other people, to be very sociable, fun-loving, friendly, affectionate, talkative (McCrae and Costa, 1987; Toegel and Barsoux, 2012) and emotionally positive (John and Srivastava, 1999), but such people pull energy from others (Toegel and Barsoux, 2012).

These individuals are outgoing, assertive, and energetic (John and Srivastava, 1999; Toegel and Barsoux, 2012). They tend to be too talkative and have high activity levels and can be perceived as domineering. Such people are an inspiration to others, but for themselves this can be exhausting (Toegel and Barsoux, 2012). This personality trait contrasts with reserved, solitary, and somber people (McCrae and Costa, 2008). Therefore, we defined the following hypotheses:

H_{1a}: The extraversion trait has influence on professional skepticism.

H_{1b}: The extraversion trait has influence on RAQPs.

H_{1c}: The extraversion trait has influence on material judgement.

2.2.2. Agreeableness

Agreeableness is a "classic dimension of character, describing 'good' versus 'evil' individuals" (McCrae and John, 1992, p. 197). Usually, this personality trait is judged by its disagreeable pole, antagonism, which characterizes people that remain always against others, are skeptical, uncooperative, stubborn, rude (McCrae and Costa, 1987), selfish and arrogant (McCrae and Costa, 2008).

This is the dimension, among the five, that varies the most between people and the differences are related to national culture, industry, company culture and even the function a person performs (Toegel and Barsoux, 2012). According to McCrae and Costa (1987) and Toegel and Barsoux (2012), agreeable people are modest and want to get along with others. These individuals are considerate, trusting, and trustworthy, they promote collaboration and always consider other's opinions (Toegel and Barsoux, 2012). These individuals are characterized as good-natured, cooperative and trustful and their most relevant traits are altruism, tender-mindedness, trust and modesty (John and Srivastava, 1999).

This personality trait is also described as dependent and flattering (McCrae and Costa, 1987), and in leading positions agreeable people have difficulty to provide negative feedback and make decisions that can disappoint others (Toegel and Barsoux, 2012). Regarding this personality trait, the following hypotheses have been formulated:

H_{2a}: The agreeableness trait has influence on professional skepticism.

H_{2b}: The agreeableness trait has influence on RAQPs.

H_{2c}: The agreeableness trait has influence on material judgement.

2.2.3. Conscientiousness

Conscientiousness is a "classic dimension of character, (…) describing 'strong-willed' versus 'weak-willed' individuals" (McCrae and John, 1992, p. 197).

Conscientious people are described as hardworking, ambitious, energetic, and persevering, with a high sense of duty, scrupulous, perhaps moralistic (McCrae and Costa, 1987) and disciplined (McCrae and Costa, 2008). They tend to be perfectionist, concerned with small details, which can lead them to lose sight of the big picture (Toegel and Barsoux, 2012). The same authors characterize them as workaholics, obsessive with goal achievement and with low levels of flexibility to deal with some situations.

John and Srivastava (1999) describe these individuals as ordered, responsible and dependable. "Conscientiousness describes socially prescribed impulse control that facilitates task- and goal-directed behavior, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing tasks" (John and Srivastava, 1999, p. 121).

Emerson and Yang (2012) studied the relevance of conscientiousness on the perception of an auditor's ability to detect fraud and found that this ability is greater for auditors with higher levels of conscientiousness. These authors describe them as diligent, persevering, organized, and systematic in approaching and presenting their assessment. The hypotheses under study are:

H_{3a}: The auditor personality characteristic conscientiousness has influence on professional skepticism.

H_{3b}: The auditor personality characteristic conscientiousness has influence on RAQPs.

H_{3c}: The auditor personality characteristic conscientiousness has influence on material judgement.

2.2.4. Neuroticism

McCrae and Costa (1987) state that neuroticism has its origin in negative affect, and characterize individuals as insecure, self-conscious, and temperamental, who use inappropriate coping mechanisms, such as hostile reactions, or self-blame to deal with negative emotions. These individuals tend to experience negative emotions easily, being characterized as impatient, overreacting, less resilient to stress, struggle to stay calm, and show anger (Toegel and Barsoux, 2012).

Neuroticism characterizes people that are sad and scared, and on the opposite pole are individuals characterized as being calm and stable (McCrae and Costa, 2008). "Neuroticism contrasts emotional stability and even-temperedness with negative emotionality, such as feeling anxious, nervous, sad, and tense." (John and Srivastava, 1999, p. 121). The hypotheses under analysis are:

H_{4a}: The neuroticism trait has influence on professional skepticism.

H_{4b}: The neuroticism trait has influence on RAQPs.

H_{4c}: The neuroticism trait has influence on material judgement.

2.2.5. Openness to experience

Individuals predisposed to be open to experience are characterized as "original, imaginative, broad interests, and daring", and intelligent (McCrae and Costa, 1987, p. 87). These authors believe that intelligent individuals are more predisposed to experience. Toegel and Barsoux (2012) state that this trait of personality characterizes people with intellectual curiosity, independence of judgement and individuals highly orientated to the big picture.

John and Srivastava (1999) describe these individuals as intellectual, imaginative, and independent-minded and with an original and complex mental and experiential life. On the opposite side are rigid, practical, and traditional individuals (McCrae and Costa, 2008).

These individuals are described as too complex and too innovative, which can lead them to be frustrating to their colleagues who can get more confused than enlightened with their abstract communication (Toegel and Barsoux, 2012). The hypotheses established for this personality trait are the following:

H_{5a}: The openness to experience trait has influence on professional skepticism.

H_{5b}: The openness to experience trait has influence on RAQPs.

H_{5c}: The openness to experience trait has influence on material judgement.

The Big Five dimensions described above have been measured in terms of six specific facets that define each dimension (John and Srivastava, 1999), summarized in Table A1 and presented in Appendix A. The facets allow a discrete trait to be measured, contributing to go

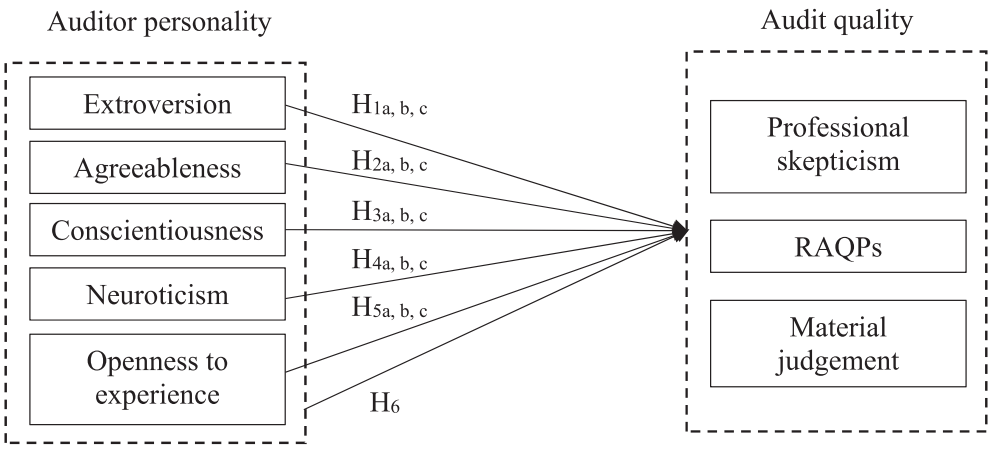

Fig. 1. Research model.

Table 1
Research sample characteristics.

Characteristic	Metric	Frequency	%
Career	Partner	66	72.5%
	Manager	19	20.9%
	Other	6	6.6%
Audit firm	Big4	17	18.7%
	Non-Big4 member of international network	19	20.9%
	Firm not affiliated to an international network	55	60.4%
Age	Less than or equal to 44 years	36	39.6%
	Between 45 and 55 years	28	30.8%
	More than or equal to 56 years	27	29.7%
Experience in auditing	Less than or equal to 15 years	26	28.6%
	Between 16 and 25 years	38	41.8%
	More than or equal to 26 years	27	29.7%
Gender	Female	24	26.4%
	Male	67	73.6%

beyond the five dimensions (Costa and McCrae, 2008).

Finally, the five personality traits presented above can present in a person in different proportions, and there is no one perfect trait pattern that describes a great auditor performing a higher quality audit. Therefore, to understand the best trait combination for an auditor, we propose the following hypothesis:

H_6: Different combinations of auditor personality characteristics (extroversion, agreeableness, conscientiousness, neuroticism, openness to experience) lead to audit high quality.

3. Method

3.1. Research model

Drawing on the literature review and taking each audit quality indicator separately, this study considers six hypotheses, depicted in Fig. 1.

3.1.1. Sample and data collection

This study focuses on the perceptions, attitudes and behaviors of auditors, and the survey is an appropriate method for measuring them (Speklé and Widener, 2018). The empirical data come from a self-administered online survey sent by email to Portuguese certified auditors during June and July 2019, the answers to which were recorded in the QUALTRICS platform. We used the List of Statutory Auditors from June 2019 as our sampling frame, which provided information on auditor names and contact details. To increase the response rate, a two-step procedure was followed (an initial email plus one follow-up). The questionnaire was divided into two parts: one to collect respondent characteristics, and one with questions related to measuring variables.

The Mann-Whitney test was used to compare the early and late response for all items used to measure the constructs. Except for two items, no significant differences were found in the comparisons, indicating overall a likely absence of nonresponse bias (Armstrong and Overton, 1977). In order to minimize response bias and common method bias, we followed some suggestions from Podsakoff, MacKenzie, Lee and Podsakoff (2003) and Podsakoff, MacKenzie and Podsakoff (2012). Firstly, a letter explaining the study's objectives and the investigation process accompanied the questionnaire, as well as informing that participation was voluntary and confidential, there were no right or wrong answers and requesting honest answers to the questions. Secondly, the acquiescence bias led us to label the points of the scales used. Thirdly, the variables in this study are based on the validated instruments in the literature and measurement items were mixed so that respondents did not produce the correlation as expected. Before launching the questionnaire, we did a pre-test with three professionals who are all auditors and academics. In terms of statistical analysis of common method bias, we used Harman's single-factor test (Podsakoff et al., 2003). All indicators used in the model entered an exploratory factor analysis with unrotated factor solution. The exploratory factor analysis yielded 26 factors with eigenvalues greater than 1, explaining about 84.6% of the variance, with the first factor accounting for only 16.9% of the variance.

The target population of this study was the 1,334 certified auditors registered in the Portuguese Institute of Statutory Auditors in June 2019. Although the study received a total of 198 questionnaires (a response rate of 14.8%), 107 were excluded due to excessive missing data. Therefore, the study comprises 91 usable responses, corresponding to a final response rate of 6.8%. Table 1 describes some of the respondent characteristics. The results show that 72.5% of the respondents are partners of an audit firm and 60.4% perform the audit profession in a non-member firm of an international network of auditing firms. Furthermore, most auditors (60.4%) are more than 45 years of age, 71.4% have more than 16 years of professional experience in auditing and 73.6% are men.

3.1.2. Variables and measures

The Big 5 model defines personality as a hierarchy of personality traits classified into five dimensions: extraversion (EXTR), agreeableness (AGRE), conscientiousness (CONS), neuroticism (NEUR) and openness to experience (OPEN) (Gosling, Rentfrow and Swan, 2003). All five dimensions of personality were measured with forty-four items presented in the personality 'Big Five' inventory developed by John, Donahue and Kentle (1991) and John, Naumann and Soto (2008) on a scale ranging from 1 (strongly disagree) to 5 (strongly agree) (see Table B3 in

Table 2
Descriptive statistics.

	Theoretical range	Actual range	Mean	SD	Percentile 10%	Percentile 50%	Percentile 90%
AGREE	1 – 5	3.00 – 5.00	4.22	0.43	3.67	4.33	4.67
CONS	1 – 5	3.00 – 5.00	4.00	0.42	3.30	4.00	4.50
EXTR	1 – 5	2.50 – 5.00	3.64	0.46	3.00	3.5	4.00
NEUR	1 – 5	1.25 – 3.75	2.41	0.55	1.75	2.25	3.25
OPEN	1 – 5	2.80 – 5.00	3.79	0.50	3.04	3.80	4.40
RAQP	10 – 50	10 –30	17.46	4.92	10	17	24
PS	25 – 125	82 –125	99.72	7.88	90	98	110
MAT	0 – 100	3 – 100	42.35	17.39	19	50	58.60

Appendix B).

Professional skepticism (PS) encompasses six different behavioral characteristics: search for knowledge, suspension of judgement, self-determining, interpersonal understanding, self-confidence, and questioning mind (Hurtt, 2010). In this study we considered *PS* as a second-order latent variable. Each dimension was measured with five items adapted from Hurtt's (2010) professional skepticism scale (see Table B1 in Appendix B), on a scale ranging from strongly disagree (1) to strongly agree (5). Hurtt (2010) used a six-point scale. Like Peytcheva (2014), we used a scale that offers a neutral point to avoid forcing the auditors to make choices related to their perceptions and behaviors. Auditors scoring higher on the scale are more skeptical.

RAQP was measured with eleven items adapted from Pierce and Sweeney (2004) and Coram et al. (2003) on a scale ranging from 1 (never) to 5 (nearly always) (see Table B2 in Appendix B).

The judgment of materiality resulted from one case adapted from Estes and Reames (1988). Auditors had to assess the probability of a certain event occurring for the recognition of impairment losses on a single client (MAT), to be considered a material misstatement. This account receivable was equal to 33% of current assets, 10% of total assets and 33% of net income.

The literature reveals that the researcher has flexibility in deciding the construct measurement approach (Hair, Sarstedt, Ringle and Gudergan, 2018; Myszkowski, Storme and Tavani, 2019). The reflective measurement model was adopted based on the five personality traits and audit quality proxies. In this approach, the observable items are highly correlated and are manifestations of the construct that underlies them (Hair, Hult, Ringle and Sarstedt, 2017); where it is assumed that auditors responded differently to the items due to having different construct scores (Borsboom, 2008).

All the ordinal variables were measured based on instruments sourced from the literature. However, the original scales are purified through an interactive process due to the analysis of uni-dimensionality and convergent validity explained below in Section 4.2.1. The personality traits scale scores were calculated as the participant's mean item response. The scores of the skepticism and *RAQP* constructs were computed by summing the scores of the items. We followed the same approach to the authors of the original scales (John et al., 1991; Hurtt, 2010; Pierce and Sweeney, 2004).

3.1.3. Statistical modeling technique

This study uses two alternative and complementary analysis procedures – partial least squares structural equation modelling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA) – to test our hypotheses, an approach recently followed by several authors (e.g., Cruz-Ros, Guerrero-Sánchez and Miquel-Romero, 2018). PLS-SEM is a variance-based structural equation modelling that allows the causal relationships between one or more independent variables and one or more dependent variables to be simultaneously estimated (Hair, Ringle and Sarstedt, 2011) without imposing distributional assumptions on the data and to address of collinearity issues (Hair, Risher, Sarstedt and Ringle, 2019). The estimation is done through an iterative process of Ordinary Least Squares (OLS) regressions, which aims to maximize the explained variance of dependent variables (Hair et al., 2017). PLS-SEM is based on linear models, unifinality and additive effects (Woodside, 2013).

PLS-SEM is a suitable method when the goal is to perform a causal-predictive analysis (Cachón-Rodríguez, Blanco-González, Prado-Román, and Diez-Martin, 2021). Moreover, it is a valid alternative to covariance-based structural equation modeling techniques for estimating complex models (multiple constructs, items, and structural paths) of cause-effect relationships, especially in a context where the sample size is small (Hair, Sarstedt, Ringle and Mena, 2012). The sample of this study meets the minimum requirement for the application of the PLS-SEM model: ten times the largest number of structural paths directed at a particular endogenous latent construct in the structural model (Hair et al., 2017). In the vein of Cachón-Rodríguez, Prado-Román and Zúñiga-Vicente (2019) and Cachón-Rodríguez, Prado-Román and Blanco-González (2021), we additionally used the power test Cohen (1988) to determine the minimum sample size. Following Hair et al. (2017) recommendation, we used the G*Power 3.1.9.7 software (Faul, Erdfelder, Buchner and Lang, 2009), which showed that 75 observations are needed to detect a medium effect size f^2 of 0.15 at a significance level of 10% and a power level of 80%. Therefore, a sample size of 91 observations is sufficient for the results obtained from the PLS-SEM method to be valid and robust. The software used for data analysis was SMARTPLS 3.0 (Ringle, Wende, and Will, 2014).

Subsequently, the data were analyzed using fsQCA, an analysis technique that combines case-oriented quantitative analysis and variable-oriented quantitative analysis. FsQCA offers a real alternative to conventional statistical analysis methods (Ragin, 2008). Traditional techniques consider permanent causality, uniformity of causal effects, additivity, and causal symmetry (Rihoux and Ragin, 2009). FsQCA does not consider these assumptions, since it is a technique capable of unraveling complex causal structures such as equifinality, multifinality, multiple conjunctural causality and asymmetric causality (Basedau and Richter, 2014). FsQCA seeks patterns of associations through various cases, which provide evidence that certain conditions lead to a specific outcome (Schneider and Wagemann, 2010), rather than simply identifying correlations between endogenous and exogenous constructs. Additionally, fsQCA analyzes how conditions combine into configurations to produce an outcome, instead of considering the independent variables as competitors in explaining the dependent variable behavior (Woodside, 2013). The study uses the fsQCA3.1b software (Ragin and Sean, 2016) and conducts three analyses to test our hypothesis. Hence, the models are:

PS = *f* (AGRE, CONS, EXTR, NEUR, OPEN)
RAQP = *f* (AGRE, CONS, EXTR, NEUR, OPEN)
MAT = *f* (AGRE, CONS, EXTR, NEUR, OPEN)

4. Empirical results

4.1. Descriptive analysis

Table 2 summarizes the relevant statistics for the dependent and independent variables. The average *PS* score was 99.72, revealing an appreciable level of this behavior in auditors. *RAQP* had an average score of 17.46, suggesting that certain restless behaviors in auditing are

Table 3
Evaluation of the measurement model.

Construct	Item	Loading	AVE	CR	Construct	Item	Loading	AVE	CR
AGRE	AG5	0.758	0.520	0.762	Interpersonal understanding	PS5	0.824	0.593	0.852
	AG7	0.588				PS14	0.890		
	AG9	0.800				PS26	0.675		
CONS	CO1	0.739	0.543	0.826		PS30	0.667		
	CO6	0.746			Questioning mind	PS13	0.606	0.502	0.799
	CO7	0.780				PS18	0.638		
	CO8	0.679				PS24	0.783		
EXTR	EX4	0.829	0.676	0.807		PS28	0.789		
	EX6	0.816			Self-confidence	PS2	0.664	0.549	0.857
NEUR	NE5	0.706	0.500	0.795		PS6	0.815		
	NE6	0.496				PS12	0.756		
	NE7	0.810				PS17	0.590		
	NE8	0.772				PS21	0.848		
OPEN	OP1	0.695	0.567	0.867	Self-determining	PS1	0.785	0.606	0.821
	OP3	0.717				PS10	0.852		
	OP4	0.781				PS16	0.689		
	OP5	0.822			Search for knowledge	PS4	0.882	0.633	0.895
	OP8	0.743				PS8	0.610		
RAQP	RAQP1	0.695	0.521	0.915		PS15	0.870		
	RAQP2	0.786				PS23	0.788		
	RAQP4	0.567				PS29	0.798		
	RAQP5	0.739			Suspension of judgement	PS3	0.793	0.560	0.835
	RAQP6	0.699				PS9	0.674		
	RAQP7	0.822				PS22	0.730		
	RAQP8	0.749				PS27	0.789		
	RAQP9	0.755							
	RAQP10	0.667							
	RAQP11	0.705							

Table 4
Discriminant validity.

	AGRE	CONS	EXTR	MAT	NEUR	OPEN	PS	RAQP
AGRE	**0.721**	0.747	0.779	0.158	0.618	0.417	0.672	0.292
CONS	0.504	**0.737**	0.848	0.248	0.602	0.702	0.783	0.427
EXTR	0.416	0.521	**0.822**	0.163	0.565	0.889	0.688	0.295
MAT	−0.139	−0.217	−0.120	**1.000**	0.285	0.167	0.137	0.065
NEUR	−0.388	−0.443	−0.349	0.252	**0.707**	0.336	0.360	0.208
OPEN	0.340	0.547	0.568	−0.151	−0.255	**0.753**	0.598	0.211
PS	0.515	0.618	0.460	−0.100	−0.272	0.525	**0.752**	0.521
RAQP	−0.188	−0.360	−0.197	0.028	−0.064	−0.160	−0.446	**0.722**

Note: the boldface scores on the diagonal are the square root of AVE, HTMT ratio above the diagonal and correlations between the constructs below the diagonal (Fornell-Larcker criterion).

very infrequent. The data reveal that, on average, auditors considered a probability of 42.35% of uncollectability of a large account receivable for this situation to be material. The confidence score for this decision was 7.7 on a scale of 1 to 10. The coefficient of variation was 41% and 28% in *MAT* and *RAQP*, respectively, suggesting that there is some heterogeneity among auditors. Finally, the results showed that the auditors presented higher average scores in the personality traits of *AGREE* and *CONS* and lower scores in *NEUR*.

4.2. PLS-SEM analysis

PLS-SEM requires a two-step approach in analyzing and interpreting a research model (Hair et al., 2017). Firstly, we analyzed the measurement model and then assessed the structural model.

4.2.1. Assessment of measurement model

The assessment of the measurement model requires the inspection of convergent validity, reliability, and discriminant validity (Hair et al., 2017; Hair, Risher, Sarstedt and Ringle, 2019). Convergent validity was analyzed using the standardized loadings of the indicators and the average variance extracted (AVE). Following an interactive process, the original scales were purified excluding items with outer loadings below the threshold of 0.4, as well as items with outer loadings between 0.4 and 0.708 that allowed increasing composite reliability and AVE (Hair et al., 2017). For all constructs, AVE value was equal to or greater than 0.50, showing that the latent variables explain more than half of the variance of its indicators (Fornell and Larcker, 1981). Results show that the model has convergent validity (Table 3).

Reliability gauges the degree of consistency between multiple indicators of a construct. Composite reliability (CR) was above the threshold of 0.70 (Hair et al., 2017), suggesting that all constructs have good reliability (Table 3).

The discriminant validity was checked by the cross-loadings method, the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio (Hair et al., 2017). First of all, each indicator loads highest on its assigned construct than its cross-loadings with other constructs. Secondly, the square root of the AVE of each construct was above the correlations among the remaining variables in the model. Third, values of the HTMT ratio of latent variables are lower than the threshold of 0.9 (alternatively, 0.85 is used as the more conservative threshold). The results present in Table 4 confirm that all three criteria were observed, highlighting that the constructs are distinct from each other.

4.2.2. Structural model

The structural model assessment involved the analysis of five criteria: i) collinearity issues; ii) signal, magnitude, and significance of

Table 5
Structural equation modelling: path coefficients analysis.

Structural relations	Beta	Standard Error	t value	P-value	Test
H1a: EXTR -> PS	0.062	0.119	0.517	0.605	Rejected
H1b: EXTR -> RAQP	−0.081	0.167	0.484	0.628	Rejected
H1c: EXTR -> MAT	0.048	0.155	0.309	0.757	Rejected
H2a: AGRE -> PS	0.256	0.093	2.754	0.006	Accepted
H2b: AGRE -> RAQP	−0.067	0.128	0.521	0.603	Rejected
H2c: AGRE -> MAT	−0.001	0.117	0.005	0.996	Rejected
H3a: CONS -> PS	0.365	0.107	3.416	0.001	Accepted
H3b: CONS -> RAQP	−0.465	0.133	3.506	0.000	Accepted
H3c: CONS -> MAT	−0.118	0.141	0.839	0.401	Rejected
H4a: NEUR -> PS	0.067	0.091	0.739	0.460	Rejected
H4b: NEUR -> RAQP	−0.302	0.131	2.312	0.021	Accepted
H4c: NEUR -> MAT	0.201	0.147	1.364	0.173	Rejected
H5a: OPEN -> PS	0.220	0.095	2.320	0.020	Accepted
H5b: OPEN -> RAQP	0.087	0.126	0.685	0.493	Rejected
H5c: OPEN -> MAT	−0.063	0.136	0.459	0.646	Rejected

the structural model relationships; iii) model predictive accuracy; iv) effect size; and v) model predictive relevance (Hair et al., 2017). Variance inflation factor for all independent constructs (five personality traits) were between 1.325 and 1.910, which was below the threshold of 5 (Hair et al., 2017). Therefore, we concluded that there was no issue of collinearity in our model.

Our hypothesis was tested based on the path coefficients, where its significance resulted from a bootstrapping procedure (with 5000 bootstrapped subsamples using the no sign changes option). Results show that some traits of the auditors' personality have an influence on audit quality (Table 5). Specifically, the professional skepticism is positively and significantly influenced by agreeableness, conscientiousness, and openness traits; and *RAQP* is negatively and significantly influenced by the conscientiousness and neuroticism. In addition, we performed a robustness analysis in which we considered an alternative proxy for judgement materiality. For this purpose, we used a second case adapted by Estes and Reames (1988) involving the determination of the amount of a misstatement in impairment losses in the inventory account that would make it material. The results obtained do not differ from the base model.

The coefficient of determination (R^2) is a measure of the model's predictive accuracy since it provides the proportion of variance in the dependent constructs explained by the independent constructs linked to it. The R^2 values for *RAQP*, *PS* and *MAT* were 0.201, 0.484 and 0.080, respectively. Except *MAT*, the values were above the threshold of 0.20 (Hair et al., 2017), with a particularity for the explanatory capacity of the *PS* that is considered high.

Afterwards, we run the effect size (f^2) to measure the effect of each exogenous construct on each endogenous construct. Using the Cohen (1988) threshold, we found that *AGRE* ($f^2 = 0.088$), *CONS* ($f^2 = 0.135$) and *OPEN* ($f^2 = 0.055$) had a small effect on professional skepticism. The results reveal that *CONS* ($f^2 = 0.142$) and *NEUR* ($f^2 = 0.086$) also had a small effect on *RAQP*. In materiality judgement only the *NEUR* ($f^2 = 0.033$) trait had an equally small effect.

Finally, we calculated the Stone-Geisser's Q^2 test to measure the predictive relevance of the model. A blindfolding procedure with an omission distance of 6 was used. For professional skepticism (0.250) and *RAQP* (0.083) the Q^2 values are greater than zero (Hair et al., 2017), confirming that the model is predictive for these two constructs of audit quality and indicating that the estimates were stable.

Table 6
Overview of the necessary conditions.

	Professional skepticism				RAQP				Materiality			
	Presence		Absence		Presence		Absence		Presence		Absence	
	con.	cov.	con.	cov.	con.	cov.	con.	cov.	con.	cov.	con.	cov.
AGREE	0.65	0.76	0.50	0.54	0.57	0.66	0.60	0.65	0.56	0.53	0.57	0.74
~AGREE	0.60	0.56	0.78	0.67	0.70	0.65	0.68	0.60	0.72	0.55	0.64	0.67
CONS	0.81	0.78	0.58	0.53	0.63	0.60	0.74	0.67	0.68	0.54	0.70	0.75
~CONS	0.51	0.57	0.76	0.79	0.66	0.73	0.56	0.59	0.68	0.62	0.57	0.71
EXTR	0.83	0.72	0.64	0.51	0.65	0.56	0.80	0.64	0.73	0.51	0.73	0.71
~EXTR	0.43	0.56	0.65	0.78	0.58	0.75	0.45	0.55	0.58	0.61	0.49	0.71
NEUR	0.63	0.63	0.69	0.64	0.61	0.61	0.69	0.65	0.74	0.60	0.59	0.66
~NEUR	0.64	0.69	0.60	0.60	0.65	0.69	0.58	0.59	0.58	0.51	0.64	0.78
OPEN	0.76	0.75	0.60	0.55	0.62	0.61	0.69	0.64	0.65	0.53	0.66	0.74
~OPEN	0.55	0.60	0.73	0.74	0.64	0.68	0.58	0.59	0.67	0.59	0.58	0.69

Note: ~ indicates the absence of a condition; con. = consistency; cov. = coverage.

Table 7
Overview of the sufficient conditions – presence of the outcomes.

	Materiality		RAQP						Professional skepticism						
	C1	C2	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C7
AGREE	●	Ä	Ä	●	Ä	●		●	Ä	Ä			●	●	
CONS	Ä	●	Ä		●	Ä	Ä	●	●		●		●	Ä	●
EXTR	Ä	Ä		Ä	Ä	●		Ä	●	●	●	●	Ä	●	●
NEUR		●	Ä				Ä	Ä			●	●	Ä	Ä	
OPEN	Ä	●		Ä	●	●	Ä			●		●		Ä	●
Consistency	0.83	0.86	0.86	0.89	0.86	0.86	0.86	0.85	0.86	0.85	0.88	0.87	0.92	0.89	0.87
Raw coverage	0.29	0.22	0.36	0.29	0.23	0.25	0.37	0.22	0.46	0.44	0.47	0.47	0.23	0.25	0.61
Unique coverage	0.15	0.08	0.02	0.04	0.04	0.02	0.01	0.01	0.02	0.00	0.00	0.01	0.02	0.01	0.07
Solution consistency	0.84		0.81						0.79						
Solution coverage	0.37		0.58						0.78						

Note: black circles indicate the presence of a condition; circles with "x" indicate the absence; blank spaces indicate "not important".

Table 8
Overview of the sufficient conditions – absence of the outcomes.

	Materiality								RAQP			Professional skepticism				
	C1	C2	C3	C4	C5	C6	C7	C8	C1	C2	C3	C1	C2	C3	C4	C5
AGREE		Ä		Ä	Ä		●	●	Ä	Ä			Ä	Ä	●	●
CONS		Ä	Ä	Ä	●	●	●	●	●		●	Ä		Ä		Ä
EXTR	●		●		●		Ä		●	●	●	Ä	Ä		Ä	●
NEUR		Ä	Ä			Ä		●		●	●			Ä	●	Ä
OPEN	●			●		●	Ä	Ä				Ä	●	Ä	Ä	●
Consistency	0.78	0.87	0.88	0.84	0.82	0.84	0.90	0.87	0.78	0.84	0.82	0.89	0.86	0.91	0.91	0.91
Raw coverage	0.58	0.32	0.34	0.31	0.40	0.43	0.20	0.24	0.45	0.44	0.46	0.50	0.33	0.35	0.26	0.24
Unique coverage	0.06	0.03	0.01	0.02	0.01	0.02	0.00	0.00	0.08	0.07	0.10	0.10	0.06	0.03	0.03	0.04
Solution consistency	0.77								0.75			0.84				
Solution coverage	0.78								0.62			0.70				

Note: black circles indicate the presence of a condition; circles with "x" indicate the absence; blank spaces indicate "not important"

Table A1
Big five dimensions.

Big five dimensions		Facet (and correlated trait adjective)
E	Extraversion	Gregariousness (sociable)Assertiveness (forceful)Activity (energetic)Excitement-seeking (adventurous)Positive emotions (enthusiastic)Warmth (outgoing)
A	Agreeableness	Trust (forgiving)Straightforwardness (not demanding)Altruism (warm)Compliance (not stubborn)Modesty (not show-off)Tender-mindedness (sympathetic)
C	Conscientiousness	Competence (efficient)Order (organized)Dutifulness (not careless)Achievement striving (thorough)Self-discipline (not lazy)Deliberation (not impulsive)
N	Neuroticism	Anxiety (tense)Angry hostility (irritable)Depression (not contented)Self-consciousness (shy)Impulsiveness (moody)Vulnerability (not self-confident)
O	Openness to experience	Ideas (curious)Fantasy (imaginative)Aesthetic (artistic)Actions (wide interests)Feelings (excitable)Values (unconventional)

Table B1
Professional skepticism dimensions.

Construct	Item	Measurement item
Self-Determining	PS1	I often accept other people's explanations without further thought (R)
	PS10	I tend to immediately accept what other people tell me (R)
	PS16	I usually accept things I see, read, or hear at face value (R)
	PS19	Most often I agree with what the others in my group think (R)
	PS25	It is easy for other people to convince me (R)
Self-Confidence	PS2	I feel good about myself
	PS6	I am confident of my abilities
	PS12	I am self-assured
	PS17	I do not feel sure of myself (R)
	PS21	I have confidence in myself
Suspension of Judgment	PS3	I wait to decide on issues until I can get more information
	PS9	I take my time when making decisions
	PS20	I dislike having to make decisions quickly
	PS22	I do not like to decide until I've looked at all of the readily available information
	PS27	I like to ensure that I've considered most available information before making a decision
Search for Knowledge	PS4	The prospect of learning excites me
	PS8	Discovering new information is fun
	PS15	I think that learning is exciting
	PS23	I like searching for knowledge
	PS29	I relish learning
Interpersonal Understanding	PS5	I am interested in what causes people to behave the way that they do
	PS11	Other people's behavior does not interest me (R)
	PS14	I like to understand the reason for other people's behavior
	PS26	I seldom consider why people behave in a certain way (R)
	PS30	The actions people take and the reasons for those actions are fascinating
Questioning Mind	PS7	I often reject statements unless I have proof that they are true
	PS13	My friends tell me that I usually question things that I see or hear
	PS18	I usually notice inconsistencies in explanations
	PS24	I frequently question things that I see or hear
	PS28	I enjoy trying to determine if what I read or hear is true

Reverse code the items labeled "R".

4.3. FsQCA analysis

4.3.1. Calibration procedure

The fsQCA method requires that the original data must be converted to fuzzy membership score on a scale ranging from zero to one. Each case can belong, to a certain degree, to a certain configuration and have varying degrees of membership in the various configurations studied (Ordanini and Maglio, 2009). Considering that no external references are available, we follow the suggestion of Ragin (2008) and Tóth, Thiesbrummel, Henneberg and Naudé (2015) to set the calibration anchors. Thus, we used the 10%, 50% and 90% percentiles to establish, respectively, the three anchors denoting full non-membership, crossover point and full membership. Whenever a calibrated case generates the exact value of 0.5, we replace it with 0.499 (Crilly, Zollo and Hansen, 2012). Table 2 presents the calibration values for all the variables.

4.3.2. Analysis of necessary conditions

Afterwards, we proceeded to the analysis of whether any of the five personality traits are considered necessary for causing or not a certain outcome in audit quality. A condition is necessary if it is always present (or absent) when the outcome occurs (or absent) (Ragin, 2008). A causal condition is regarded as necessary or almost always necessary if the consistency score exceeds, respectively, the value of 0.9 (Schneider, Schulze-Bentrop and Paunescu, 2010) and 0.8 (Ragin, 2008). The results show none of the causal conditions are necessary (Table 6). However, *CONS* and *EXTR* traits are almost always necessary to the presence of the

Table B2
Reduce audit quality practices dimensions.

Construct	Item	Measurement item
RAQP	RAQP1	Acceptance of weak client explanations
	RAQP2	Accepted audit evidence whose relevance and/or reliability was questionable
	RAQP3	Superficial reviews of client documents
	RAQP4	Biasing of sample selection in favour of less troublesome items
	RAQP5	Greater than appropriate reliance on client work
	RAQP6	Failure to research an accounting principle
	RAQP7	Premature sign-off
	RAQP8	Reduction in the amount of work on an audit step below what was considered reasonable
	RAQP9	Failure to complete procedures required in an audit programme step in ways other than those listed
	RAQP10	Reduction in the sample size specified in the audit programme without noting the reduction
	RAQP11	Reduction in the amount of documentation below that considered acceptable by the firm

Table B3
Personality traits dimensions.

Construct	Item	Measurement item
Extraversion	EX1	Is talkative
	EX2	Is reserved (R)
	EX3	Is full of energy
	EX4	Generates a lot of enthusiasm
	EX5	Tends to be quiet (R)
	EX6	Has an assertive personality
	EX7	Is sometimes shy, inhibited (R)
	EX8	Is outgoing, sociable
Agreeableness	AG1	Tends to find fault with others (R)
	AG2	Is helpful and unselfish with others
	AG3	Starts quarrels with others (R)
	AG4	Has a forgiving nature
	AG5	Is generally trusting
	AG6	Can be cold and aloof (R)
	AG7	Is considerate and kind to almost everyone
	AG8	Is sometimes rude to others (R)
	AG9	Likes to cooperate with others
Conscientiousness	CO1	Does a thorough job
	CO2	Can be somewhat careless (R)
	CO3	Is a reliable worker
	CO4	Tends to be disorganized (R)
	CO5	Tends to be lazy (R)
	CO6	Perseveres until the task is finished
	CO7	Does things efficiently
	CO8	Makes plans and follows through with them
	CO9	Is easily distracted (R)
Neuroticism	NE1	Is depressed, blue
	NE2	Is relaxed, handles stress well (R)
	NE3	Can be tense
	NE4	Worries a lot
	NE5	Is emotionally stable, not easily upset (R)
	NE6	Can be moody
	NE7	Remains calm in tense situations (R)
	NE8	Gets nervous easily
Openness	OP1	Is original, comes up with new ideas
	OP2	Is curious about many different things
	OP3	Is ingenious, a deep thinker
	OP4	Has an active imagination
	OP5	Is inventive
	OP6	Values artistic, aesthetic experiences
	OP7	Prefers work that is routine (R)
	OP8	Likes to reflect, play with ideas
	OP9	Has few artistic interests (R)
	OP10	Is sophisticated in art, music, or literature

Reverse code the items labeled "R".

PS outcome. Thus, the results suggest that individually, personality traits are not determinant for the outcome of the materiality judgment or the RAQP variable. Moreover, the results show that the causal conditions are not trivial, because the lowest coverage coefficient is 0.50.

4.3.3. Analysis of sufficient conditions

A causal condition is sufficient for a specific outcome, if by itself it generates the outcome (Rihoux and Ragin, 2009). The initial truth table for each outcome consisted of 32 different theoretical causal configurations. The identification of meaningful configurations was based on the minimum consistency threshold of 0.75 (Woodside, 2013) and the acceptability of the proportional reduction in inconsistency indicator. Table 7 displays the intermediate solutions for the presence of the three proxies' outcomes of the audit quality, following Ragin's (2008) suggestion that the intermediate solution is preferable because it is more interpretable. The configurations displayed for the different outcomes are informative, as they have a global coverage greater than 0.25 and a global consistency greater than 0.75 (Woodside, 2013).

The results show that there are two configurations for the presence of materiality, six configurations for the presence of RAQP and seven configurations for the presence of professional skepticism. Thus, we verified the existence of equifinal solutions, that is, multiple combinations of the auditors' personality traits make it possible to achieve the same audit quality outcome. Thus, audit firms can manage between different equally successful configurations given the personality traits of their auditors. Moreover, no personality traits have been found to be irrelevant, since any of them are considered in the *MAT*, *RAQP* and *PS* configurations. Additionally, we stress that the configurations found are specific to each outcome under analysis, thus there are no configurations transversal to the three proxies of audit quality. The configuration that explains the largest number of cases in the presence of each outcome was C1 in materiality (cov. 0.29), C5 in *RAQP* (cov. 0.37) and C7 in professional skepticism (cov. 0.61). With a few exceptions, the configurations of a given outcome reveal that a condition may be present or absent, depending on how it matches the other conditions. For instance, the *AGREE* causal condition is present in the C1 configuration of the materiality outcome and absent in the C2 configuration. This finding reveals the importance of the audit firms to fit the alignment of personality traits with the audit quality they intend to achieve.

The configurations identified in the presence of the audit quality outcomes might be quite different from those leading to the absence of outcomes. Based on the configurations of absence of each of the outcomes depicted in Table 8, the results show that there is causal asymmetry. The configuration that explains the largest number of cases in the absence of each outcome was C1 in materiality (cov. 0.58), C3 in *RAQP* (cov. 0.46) and C1 in professional skepticism (cov. 0.50). A drop in materiality and RAQP has a positive effect on improving audit quality, while a decrease in professional skepticism has the opposite effect. Thus, the configurations identified provide additional information about the relevance of audit firms find appropriate combinations of personality traits in their auditors.

4.4. Discussion of the results

Audit quality improves financial reporting quality by increasing the credibility of the financial statements (DeFond and Zhang, 2014), thus reducing their information risk for users. Considering the growing importance of credible information for the orderly functioning of markets and the economy in general, there is a need to understand how individual characteristics of auditors affect audit quality. The purpose of this study was to better understand the effects of auditors' personality traits on audit quality. We hypothesized the influence of the five personality traits prescribed by the Big Five theory on professional skepticism, materiality judgment and frequency of inappropriate practices in performing audits.

The first hypotheses ($H_{1a, b, c}$) proposes that extraversion trait has influence on audit quality constructs. Our PLS-SEM results did not support the hypotheses. However, fsQCA results show that *EXTR*

presence is almost always a necessary condition for greater professional skepticism and absence of RAQP. Furthermore, the presence or absence of *EXTR* is a sufficient condition in multiple configurations of materiality, skepticism and RAQP. An extrovert individual is someone energetic, assertive, active and emotionally positive (John et al., 2008); who likes to keep busy and tends to seek stimulating situations (McCrae and Costa, 2013). In the configurations of the presence of material, extroversion is an absent condition, that is, an auditor who is not extroverted tends to define superior levels of materiality. On the other hand, extroversion is a condition that is always present in the absence of RAQP, therefore auditors with this trait are less likely to adopt behaviors that increase audit risk. Finally, extroversion was a condition that was almost always present to reach higher levels of professional skepticism. As mentioned by Farag and Elias (2016), extroversion should be positively related to skepticism, because enthusiasm for new situations may have reflexes in decisions and behaviors that do not allow to lighten the work, and require more complete analysis. In synthesis, the configurational analysis allows $H_{1a,\ b,\ c}$ to be corroborated. The extroversion trait is a determinant of the audit quality.

The second hypothesis ($H_{2a,\ b,\ c}$) posits that agreeableness has influence on audit quality constructs. PLS results indicate that agreeableness affects professional skepticism positively and significantly, while configurational analysis also shows that this personality trait of auditors is a sufficient condition in multiple configurations of audit quality. Agreeableness is a causal condition that can be present or absent in a certain configuration when a certain outcome occurs or does not occur. The exception is in the absence of RAQP, where agreeableness is always an absent condition. Agreeableness refers to the way the individual relates to others, including traits such as altruism, tender-mindedness, modesty and trust (John and Srivastava, 1999). This characteristic can produce two opposite effects on auditing quality, which are somewhat corroborated by our results. The need to establish affective ties, to be sympathetic and complacent can negatively influence judgments, decisions, and behaviors (Yang, Brink and Wier, 2018). Thus, audit quality will be diminished by dysfunctional behaviors of the auditor that may be reflected in the judgment of materiality or risk assessment, decisions about the collection of audit evidence (e.g., choice of auditing procedures), and attitudes (e.g., questioning mind). This negative effect on audit quality is evident in the configurations C1 in the presence of materiality, C2, C4 and C6 in the presence of RAQP and C4 and C5 in the absence of skepticism.

On the other hand, the ability to relate to each other and cooperate may be useful in the audit process. Normally, an audit involves a great interaction of the auditor with the client's Board of Directors and its employees, in order to obtain sufficient and appropriate evidence supporting the audit opinion. The deeper knowledge of your interlocutor in the client may lead the auditor to become more skeptical or not produce higher materiality judgments or be less prone to RAQP. In synthesis, PLS-SEM and fsQCA results allows $H_{2a,\ b,\ c}$ to be corroborated. The agreeableness trait is a determinant of the audit quality.

Hypothesis $3_{a,\ b,\ c}$ ($H_{3a,\ b,\ c}$) predicts an effect of conscientiousness on audit quality constructs. A conscientious individual is someone who thinks before acting, following norms and rules, and planning, organizing and prioritizing tasks on the job (John and Srivastava, 1999). Literature reveals that this trait is important for auditors to detect fraud (e.g., Emerson and Yang, 2012; Wells, 2003). The more skeptical the auditors are, the more likely they are to confront the client or to perform additional audit procedures when they detect some material misstatement, and therefore the more likely they are to detect fraud. The PLS results show that this trait has a positive and significant effect on professional skepticism and is almost always a necessary condition for the presence of skepticism. On the other hand, the auditor must perform auditing according to what is prescribed in the auditing standards and meet other technical and ethical requirements emanating from the Supervisor of the profession. PLS results show that conscientiousness negatively and significantly affects the RAQP ($b = -0.465$), and this finding shows that auditors with the highest score in this trait are less likely to behave incorrectly, complying with the requirements of their profession.

Analysis of sufficient conditions provides a more nuanced understanding of how conscientiousness affects audit quality. First, consciousness is a causal condition that is always present in the absence of RAQP outcome. Secondly, conscientiousness is a causal condition that is always absent in the absence of skepticism. This finding reinforces the evidence that conscientious auditors tend to respect and comply with imposed standards, are self-disciplined and resist impulses that may compromise auditing quality. Additionally, conscientiousness is present or absent in multiple configurations when materiality is set at higher or lower levels. In synthesis, PLS-SEM and fsQCA results allows $H_{3a,\ b,\ c}$ to be corroborated. The conscientiousness trait is a determinant of the audit quality.

Hypothesis $4_{a,\ b,\ c}$ ($H_{4a,\ b,\ c}$) is specifically focused on the effect of neuroticism on audit quality constructs. PLS analysis shows that neuroticism has a negative and significant effect on the RAQP construct. Configurational analysis shows that there is a symmetry in the relationship between the two variables: neuroticism is absent (present) in some of the configurations when RAQP outcome occurs (does not occur). A neurotic individual reveals feelings of nervousness, temperedness, lack of self-confidence, worry and tension (John and Srivastava, 1999); they are self-conscious, moody, prone to stress and risk averse (Hrazdil et al., 2020). The auditing activity is exercised in an environment of high stress and pressure (Nor, Smith, Ismail and Taha, 2017). The literature points out that the stress (Utami and Nahartyo, 2013) and pressure of the client (Yang et al., 2018) may induce a decrease in auditing quality. Our results show a contrary effect. This finding can be explained by the constant concern of auditors to be effective and efficient, producing audits of good quality and responding positively to the increasing demands of the regulatory framework to which it is subject (e.g., International Standard on Quality Control 1). The psychological cost of not being successful is high for neurotic person (Hrazdil et al., 2020). Thus, the risk aversion present in a neurotic auditor may justify his propensity to indulge less in dysfunctional behaviors expressed in the RAQP concept.

Neuroticism is a sufficient condition both in the presence and absence of materiality. A configurational analysis indicates that the neurotic auditor presents superior levels of materiality. Emotional instability and vulnerability associated with the trait of neuroticism are negatively reflected in the judgment of materiality and consequently in the propensity to consider a certain distortion as immaterial. The neuroticism trait is present (absent) in various configurations when the professional skepticism outcome occurs (does not occur). Thus, the moody and lack of self-confidence characteristics can lead the auditor to be more or less skeptical. In synthesis, our results allow $H_{4a,\ b,\ c}$ to be corroborated. The neuroticism trait is a determinant of the audit quality.

Concerning openness to experience, hypotheses $5_{a,\ b,\ c}$ ($H_{5a,\ b,\ c}$) propose that this personality trait affects audit quality constructs. Openness is the extent to which the person is open to experiencing activities predisposing to change and innovative ideas, complexity, and ambiguity. PLS-SEM results partially support the hypothesis: professional skepticism is positively and significantly influenced by the openness trait. Farag and Elias (2016) state that these individuals, being more thoughtful and attentive to detail, will be more skeptical. Thus, our finding suggests that intellectual curiosity and imaginative ability to think "outside the box" may be determinant to promote the questioning mind, critical assessment of evidence and being alert to situations of possible material misstatements.

Complementing the PLS analysis, configurational analysis shows that the presence or absence of openness is a sufficient condition not only for the presence of professional skepticism, but also of materiality judgment and RAQP. Persons open to experience feel the need to update their knowledge, to improve their skills, because knowledge and experience affect audit quality (Knechel et al., 2013). The auditor's professional

judgment precisely reflects the auditor's knowledge and experience in deciding the actions to be taken in fulfilling the auditing and accounting standards requirements and the circumstances of the engagement. Therefore, the presence or absence of the openness trait in the configurations may be associated with the professional judgment produced by the auditor. For example, the materiality assessment reflects a heterogeneity in the professional judgment of the sample auditors (Table 2) that will necessarily be related to their background and interpretation of the case described. The knowledge and experience of the auditor may advise against having RAQP and hence the absence of openness in certain configurations of RAQP presence. Furthermore, an individual open to experience is positively associated with risk tolerance and willingness to experiment (Hrazdil et al., 2020). In the case of the auditors, this may be associated with their perception that the RAQP may not have a significant impact on audit risk or that it will not be detected by quality control mechanisms. In synthesis, our results allow $H_{5a, b, c}$ to be corroborated. The openness trait is a determinant of the audit quality.

Finally, hypothesis 6 (H_6) is focused on the existence of equifinality in the relationship between personality and audit quality. The results depicted in Tables 7 and 8 reveal multiple configurations of causal conditions that produce the same outcome in audit quality, thus supporting hypothesis 6. Personality is a system made up of idiosyncrasies that determine the thoughts and actions of individuals. The Big Five model represents the covariations among personality traits across peoples (John and Srivastava, 1999). As auditors present differentiated personality traits, the results of the fsQCA analysis allow us to reveal the complexity of the personality structure manifested in the configurational arrangements. In this sense, our finding shows that there is no optimal configuration of personality traits to reach higher (lower) levels of audit quality. Personality is in practice a complex and dynamic phenomenon that should be understood as a combination of individual traits that interact in a differentiated and complex way with audit quality. In this context, auditing firms should not focus on a certain trait but rather seek a holistic management of the characteristics of their professionals. This finding reveals the importance of the audit firms to fit the alignment of personality traits with the audit quality they intend to achieve.

5. Conclusions, contributions, limitations and future research

Overall, the results of our study show that there is a relationship between personality and audit quality. The PLS-SEM result reveals that agreeableness, conscientiousness and openness are positively associated with professional skepticism of auditors, while conscientiousness and neuroticism negatively affect RAQP. Additionally, configurational analysis has shown that there are different combinations (asymmetric) of personality traits that lead to the same outcomes in audit quality.

The findings provide important theoretical, practical and policy implications. First, our work shows that personality traits are a driver of audit quality. Audit quality is influenced by contextual factors (Kleinman, Lin and Palmon, 2014), as personality may be influenced by national culture (Church, 2016). Our finding agrees with the conclusions of studies conducted in other countries (e.g., Farag and Elias, 2016), showing that the relationship seems to be indifferent to the country context. Second, we used the 'Big Five' taxonomy to structure the dimensions of the auditor personality, a model that has been used more since the 90 s (John et al., 2008), being the grand theory that explains the functioning of the whole individual (McCrae and Costa, 2008a). However, auditing research has used other taxonomies, such as the type-A and type-B personality model. Third, fsQCA method allows exploring the complexity of the characteristics associated with the auditor's personality, accepting that there is more than one solution to achieve a desired outcome. Moreover, the causal asymmetry finding reveals that the linear causal methods provide limited understanding of the complexity of drivers of audit quality. Personality is a combination of individual traits that interact in a differentiated and complex way with audit quality. To the best of our knowledge, this is a pioneering study in the use of quantitative and qualitative methods in the relationship analysis between personality traits and audit quality. Moreover, the combination of two different statistical methods lends greater robustness and depth to our research. Fourth, the presence of equifinality in the personality and audit quality relationship shows the absence of an optimal audit professional prototype. Individuals are a heterogeneous strategic asset in audit firms (Samagaio and Rodrigues, 2016), being their main production factor. Consequently, the coexistence of persons with different personalities in an audit firm should call for redoubled care in defining policies for hiring and promoting its professionals and in assigning them to the various engagements, particularly those individuals (partners, managers, and seniors) who make the decisions that most influence the quality of the audit report (e.g., sufficiency and adequacy of audit evidence). A decrease in audit quality negatively impacts the prestige and performance of audit firms (Climent-Serrano, Bustos-Contell, Labatut-Serer and Rey-Martí, 2018). Finally, the relationship found between personality and audit quality has implications for policymakers. The Framework for Audit Quality (IAASB, 2014) recognizes that auditors' characteristics are one of the determinants of audit quality. Our finding suggests that regulators should consider personality in the entry process to the profession and indicators of quality assessment, broadening the range of human capital attributes normally considered (education, knowledge, and experience).

This study has certain limitations. First, the sample size may have influenced the purification process of the scales of the constructs analyzed. The sample size affects the statistical tests, and it is desirable that it is greater than 100 (Hair, Black, Babin and Anderson, 2019), although our study complies with the minimum size thresholds for the application of the PLS-SEM or fsQCA method. Another limitation stems from the sensitivity of the RAQP topic, and from the fact that we have asked auditors directly about the frequency of their incursions in RAQP. Some items of RAQP may be influenced by "political correctness". Future studies could control for social desirability direct effects on responses by using a ten-item social desirability scale from Strahan and Gerbasi (1972) and its interaction with other constructs. Other limitations include the specificity of the study's geographical focus, as well as the lack of control variables. An application in different cultural contexts, namely common-law countries, would be a natural extension. This study did not consider the mediating effect of the context in which the auditor is embedded. Future research may analyze whether the audit firm (Big4 versus no-Big4) or the time pressure suffered by the auditor influences the association between personality traits and audit quality. More research is needed to confirm our results.

CRediT authorship contribution statement

António Samagaio: Conceptualization, Formal analysis, Methodology. **Teresa Felício:** Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

See Table A1.

Appendix B. Scale items

See Table B1, Table B2 and Table B3.

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