

## Personality and student performance on evaluation methods used in business administration courses

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**Abstract** The objective of this study was to verify whether personality (Big Five model) influences performance on the evaluation methods used in business administration courses. A sample of 169 students enrolled in two compulsory undergraduate business courses responded to an online questionnaire. As it is difficult within the same course to assess students' performance on several evaluation methods, students' performance is rated in this study using a latent variable inferred from two self-reported measures: preference for evaluation methods and grades generally obtained on each of these methods. Two control variables (gender and age) were also included in the analyses. Multiple linear hierarchical regressions indicate that the Big Five factors explains 6 to 13 % of the variability in performance on group work, oral exams, written exams, multiple choice tests, and practical work. The discussion focuses on how different personality factors are called upon when it comes to performance on evaluation methods.

**Keywords** Big Five model of personality · Gender · Age · Preference · Performance · Evaluation methods · Business education

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## 1 Introduction

Poor academic performance (AP) is one of the main reasons why students drop out from university (Bean and Metzner 1985; Bennett 2003; Pascarella 1980; Tinto 1975, 1993). Different factors affecting AP have been studied over the past years. These factors include cognitive factors such as intellectual abilities, intelligence (Neisser et al. 1996; Sternberg and Kayfman 1998), and learning strategies (Biggs 1993), as well as noncognitive factors such as academic motivation (Fortier et al. 1995), stakes associated with the test's evaluative purpose (Ndinga 2004; Ndinga and Frenette 2010), self-esteem (Boehnke 2005; Naderi et al. 2009), and personality (O'Connor and Paunonen 2007; Poropat 2009; Trapmann et al. 2007).

Recent research suggests that personality appears to be effective in predicting AP, particularly at the university level (Chamorro-Premuzic and Furnham 2003a). Several studies have used the Big Five model of personality (Costa and McCrea 1992) to evaluate personality and to ascertain its influence on university students' AP (Bauer and Liang 2003; Conard 2006; De Fruyt and Mervielde 1996; Farsides and Woodfield 2003; Goff and Ackerman 1992; Gray and Watson 2002; Lievens et al. 2002; Paunonen 1998; Rothstein et al. 1994). These studies indicate that the most consistent relationship seems to be established between conscientiousness and AP. For the other four personality factors, the relationship appears to be unclear. Moreover, the directions of these relationships are sometimes contradictory. For example, Conard (2006), Farsides and Woodfield (2003), as well as Gray and Watson (2002) report a positive relationship between agreeableness and AP. For Paunonen (1998) and Rothstein et al. (1994), this relationship is negative. Therefore, relationships between personality and AP are possibly modulated by the different tools used to measure AP.

One possible explanation for the contradictory findings of these studies may lay in the different means used to measure AP: grade point average (Paunonen 1998; Rothstein et al. 1994) and course grade (Conard 2006) are some examples of this kind. Depending on what comprises the grade point average (GPA) or course grade, thus referring to the different evaluation methods used in the courses to measure students' performance, the direction of the relationship between agreeableness and AP may vary.

Therefore, it should be possible to clarify the relationship between personality and AP by measuring performance for each specific evaluation method (EM) used. In this regard, O'Connor and Paunonen (2007) suggest: "One could decompose a broad criterion variable of AP into its specific components. Those components might include grades on multiple-choice exams, written essays, oral presentations, and class participation" (p. 987).

In order to further clarify current understanding of the influence of personality on AP, this study aims to investigate the influence of the Big Five model of personality on performance on evaluation methods (PEEM) used in business administration courses. In an effort to single out the actual impact of personality, this study controls for gender and age, as these variables are known to influence personality (Donnellan and Lucas 2008; Schmitt et al. 2008), and PEEM (Dollinger and Orf 1991; Furnham et al. 2003; Sheard 2009).

This study considers some aspects of previous studies in that it includes EMs previously examined: case studies (Dollinger and Orf 1991), oral exams (Rothstein et al. 1994), written exams (Chamorro-Premuzic and Furnham 2003a, b; Rothstein

et al. 1994), multiple choice tests (Dollinger and Orf 1991), practical work (Dollinger and Orf 1991), and projects (Chamorro-Premuzic and Furnham 2003b). It differs from other studies with regard to three significant methodological aspects: it involves a sample of French Canadian students enrolled in an undergraduate business administration program, a population that has been rarely studied (Lakhal et al. 2012, 2013); it examines eight EMs simultaneously while including new methods often used in business administration courses (simulations and group work); and it controls for gender and age.

As it is difficult within the same course to assess students' performance on several EMs, students' performance is rated in this study using two self-reported measures: preference for EMs and grades generally obtained on each EM. In this regard, Chamorro-Premuzic et al. (2005) suggested that:

Because of the difficulties in the practicalities of collecting nonartificial performance data in which academic assessment is based on a variety of methodologies (that is, a sample in which each student is assessed through different methods, ideally on the same contents), it seems necessary to explore the relationship between personality and assessment methods in terms of self-report or tests of preferences, rather than performance (p. 249).

Several studies have demonstrated that self-reported grades are highly correlated with students' actual grades; the correlations reported vary between 0.84 and 0.97 (Cassady 2001; Gray and Watson 2002; Kirk and Sereda 1969). Moreover, self-reported grades have been found to be reliable and valid (Cole and Gonya 2010; Kuncel et al. 2005; Mayer et al. 2007). Several studies used self-reported grades instead of actual grades to measure students' performance in arts, humanities, architecture, law, social and historical sciences, life sciences, medicine, biomedical, engineering, mathematics, and physics (Furnham et al. 2013), in business administration (Davy et al. 2010; Smith et al. 2009), in marketing and management (Nonis and Swift 1998; Smith et al. 2004), in accounting (Smith et al. 2002; 2009), and in medicine (Schreiber et al. 2010). In order to avoid the risk for bias caused by the simultaneous self-reporting of preference and performance, the two self-reported measures are used as indicators of latent variables of PEEM.

## 2 Conceptual framework

### 2.1 Evaluation methods used in business schools

In this study, the different tools used by professors to gather data on the degree to which learning objectives of courses or study programs are attained by students will be referred to as EMs. Several synonyms are used within the literature to designate these methods such as assessment modalities, assessment strategies, classroom assessment of learning practices (Forgette-Giroux et al. 1996), as well as assessment of learning tools. A variety of EMs are used to evaluate the learning of business students. Depending on the level of studies (undergraduate, masters, doctoral) and students' major, some EMs are valued over others.

Different EMs are commonly used in undergraduate business programs: essays, oral exams, case studies, group work, simulations, multiple choice tests, individual or team oral presentations, dissertations, concept networks, reports, portfolios, *in-basket* exercises, laboratories, and capstone projects (Hindi and Miller 2000; Kottke and Shultz 1997; Martell 2007; Palomba 2001; Riggio et al. 1997, 2003). In MBA programs, capstone projects, case studies, portfolios, oral exams, and written exams are EMs that are more often used (Holmgren 2008). In doctoral programs, the oral exam is a very popular method (Jackson and Tinkler 2001).

## 2.2 Personality

The model of personality used in this study is called the Big Five, which is a five-factor model of personality. This model is one conceptualization of personality that has been increasingly studied and validated in the scientific literature (Costa and McCrea 1992; 1995; De Raad 1996; Furnham 1996, 1997; John et al. 2008). According to the Big Five model of personality, personality can be described by five factors (each defined by six groups of intercorrelated traits called facets): neuroticism or emotional instability (anxiety, anger, depression, self-consciousness, impulsiveness, and vulnerability), extraversion (warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotions), openness to experience (fantasy, esthetics, feelings, actions, ideas, and values), agreeableness (straightforwardness, altruism, trust, compliance, modesty, and tender-mindedness), and conscientiousness (competence, order, dutifulness, achievement-striving, self-discipline, and deliberation).

## 2.3 Personality and preference for evaluation methods

To our knowledge, five studies have examined the relationship between the Big Five model of personality and preference for EMs (Chamorro-Premuzic et al. 2005; Furnham and Chamorro-Premuzic 2005; Furnham Christopher, Garwood, & Martin 2008; Lakhali et al. 2013). A synthesis of these studies is presented in Table 1.

The information presented suggests different links between the Big Five personality factors and preference for EMs. Neuroticism is negatively related to preference for EMs whereas extraversion, openness to experience, agreeableness, and conscientiousness are positively or negatively linked to preference, depending on the EM.

## 2.4 Personality and performance on evaluation methods

Several studies examined the relation between the Big Five model of personality and university student PEEM. Most of these studies specifically looked at performance on written exams and were conducted among psychology students. A synthesis of these studies is presented in Table 2. In these studies, results of regression analyses suggest that personality has an influence on PEEM. Depending on the EM, different factors of the Big Five are significant predictors of performance. However, the reported percentages of variance in PEEM explained by the Big Five model of personality are quite low (between 6 and 22 %).

The findings indicate a clear positive relation between conscientiousness and performance on different EMs. For the other four personality factors, the direction of

**Table 1** Summary of studies examining relationships between the Big Five personality factors and students' preference for evaluation methods

| Studies  | Evaluation methods    | Correlations with preference for evaluation methods |              |              |              |              |
|--|-----------------------|---|--------------|--------------|--------------|--------------|
|  |                       | N   | E            | O            | A            | C            |
| Chamorro-Premuzic et al. (2005) ( $n=125$ )      | Multiple choice tests | 0.01  | 0.05         | <i>-0.25</i> | 0.06         | -0.02        |
|  | Written exams         | 0.02  | 0.12         | 0.17         | 0.07         | 0.05         |
|  | Oral exams            | <i>-0.21</i>  | <i>0.23</i>  | <i>0.18</i>  | -0.13        | 0.14         |
|  | Continuous assessment | <i>-0.20</i>  | -0.04        | -0.00        | 0.07         | 0.09         |
|  | Projects              | -0.01   | 0.11         | 0.04         | 0.10         | 0.00         |
|  | Group work            | -0.06   | <i>0.26</i>  | -0.02        | <i>0.20</i>  | 0.02         |
| Furnham and Chamorro-Premuzic (2005) ( $n=103$ ) | Multiple choice tests | 0.04  | -0.06        | -0.02        | -0.06        | -0.06        |
|  | Written exams         | <i>-0.21</i>  | <i>-0.04</i> | <i>-0.05</i> | <i>0.22</i>  | 0.08         |
|  | Oral exams            | <i>-0.24</i>  | <i>0.27</i>  | 0.10         | -0.03        | 0.16         |
|  | Continuous assessment | -0.10   | 0.16         | 0.01         | 0.16         | <i>0.25</i>  |
|  | Projects              | 0.09  | -0.05        | -0.02        | 0.05         | 0.02         |
|  | Group work            | 0.04  | 0.10         | -0.01        | 0.03         | 0.03         |
| Furnham and Chamorro-Premuzic (2005) ( $n=93$ )  | Multiple choice tests | 0.02  | 0.16         | 0.01         | 0.15         | 0.10         |
|  | Written exams         | <i>-0.28</i>  | 0.13         | 0.12         | -0.16        | 0.01         |
|  | Oral exams            | <i>-0.32</i>  | <i>0.29</i>  | 0.01         | -0.16        | <i>-0.14</i> |
|  | Continuous assessment | 0.05  | -0.02        | <i>-0.22</i> | -0.10        | <i>0.24</i>  |
|  | Projects              | 0.16  | <i>-0.33</i> | <i>-0.28</i> | 0.05         | <i>0.41</i>  |
|  | Group work            | -0.05   | -0.05        | -0.10        | 0.03         | 0.09         |
| Furnham et al. (2008) ( $n=430$ )                | Multiple choice tests | 0.00  | 0.10         | -0.13        | -0.09        | -0.01        |
|  | Written exams         | 0.01  | -0.06        | <i>0.24</i>  | 0.03         | 0.00         |
|  | Oral exams            | -0.10   | 0.10         | <i>0.15</i>  | 0.07         | 0.00         |
|  | Continuous assessment | -0.05   | 0.01         | -0.03        | <i>0.17</i>  | <i>0.21</i>  |
|  | Projects              | -0.02   | 0.02         | 0.05         | <i>0.15</i>  | 0.06         |
|  | Group work            | -0.09   | <i>0.31</i>  | -0.13        | 0.00         | -0.03        |
| Lakhal et al. (2013) ( $n=108$ )                 | Case studies          | -0.02   | 0.00         | 0.10         | 0.15         | <i>-0.19</i> |
|  | Simulations           | 0.03  | -0.02        | -0.01        | 0.10         | -0.05        |
|  | Group work            | -0.18   | <i>0.22</i>  | <i>-0.19</i> | <i>0.22</i>  | -0.11        |
|  | Oral exams            | -0.04   | <i>0.25</i>  | <i>0.25</i>  | -0.04        | 0.05         |
|  | Written exams         | -0.01   | -0.08        | 0.00         | <i>-0.19</i> | 0.10         |
|  | Multiple choice tests | 0.04  | -0.14        | <i>-0.20</i> | -0.08        | 0.07         |
|  | Practical work        | 0.05  | -0.05        | -0.13        | <i>0.21</i>  | 0.11         |
|  | Projects              | -0.11   | -0.00        | -0.13        | <i>0.23</i>  | 0.06         |

*N* neuroticism, *E* extraversion, *O* openness, *A* agreeableness, *C* conscientiousness Correlations that are significant at  $\alpha < 0.05$  are in italic characters

the relation seems to depend on the EM used. For example, extraversion is positively related to performance on projects and practical work but negatively related to performance on written exams and essays.

Table 2 Summary of studies examining relationships between the Big Five personality factors and performance on evaluation methods among university students

| Study                                 | Participants                       |          | Evaluation methods    | Correlations with performance on evaluation methods |       |       |       |      |      |
|---------------------------------------|------------------------------------|----------|-----------------------|---|-------|-------|-------|------|------|
|                                       | Academic major                     | <i>n</i> |                       | N   | E     | O     | A     | C    |      |
| Chamorro-Premuzic (2006)              | Psychology                         | 307      | Written exam          | -0.21   | 0.03  | 0.02  | 0.02  | 0.02 | 0.42 |
|                                       |                                    |          | Project               | -0.11   | 0.30  | 0.35  | 0.14  | 0.27 | 0.21 |
|                                       |                                    |          | Continuous assessment | -0.14   | -0.06 | -0.10 | 0.01  | 0.21 | 0.25 |
| Chamorro-Premuzic and Furnham (2003a) | Psychology                         | 247      | Written exam (year 1) | -0.01   | -0.17 | -0.03 | 0.07  | 0.25 |      |
|                                       |                                    |          | Written exam (year 2) | -0.22   | -0.02 | 0.06  | 0.04  | 0.36 |      |
|                                       |                                    |          | Written exam (year 3) | -0.21   | -0.13 | 0.02  | 0.08  | 0.39 |      |
| Chamorro-Premuzic and Furnham (2003b) | Psychology                         | 70       | Written exam (year 1) | -0.28   | 0.05  | 0.34  | -0.06 | 0.33 |      |
|                                       |                                    |          | Written exam (year 2) | -0.31   | 0.06  | 0.06  | 0.06  | 0.34 |      |
|                                       |                                    |          | Written exam (year 3) | -0.32   | -0.02 | 0.03  | 0.15  | 0.34 |      |
| Dollinger and Orf (1991)              | Psychology                         | 118      | Project               | -0.25   | -0.01 | 0.13  | -0.03 | 0.36 |      |
|                                       |                                    |          | Multiple choice test  | 0.10  | 0.01  | 0.30  | 0.10  | 0.21 |      |
|                                       |                                    |          | Practical work        | -0.11   | 0.22  | -0.08 | -0.07 | 0.24 |      |
| Furnham and Chamorro-Premuzic (2004)  | Statistics                         | 91       | Case study            | -0.12   | -0.04 | 0.06  | 0.18  | 0.17 |      |
|                                       |                                    |          | Written exam 1        | 0.07  | -0.22 | 0.00  | -0.02 | 0.14 |      |
|                                       |                                    |          | Written exam 2        | -0.01   | -0.21 | -0.12 | -0.06 | 0.32 |      |
| Furnham et al. (2003)                 | Psychology                         | 93       | Written exam (year 1) | 0.18  | -0.36 | -0.19 | 0.10  | 0.44 |      |
|                                       |                                    |          | Written exam (year 2) | 0.08  | -0.22 | -0.09 | 0.01  | 0.34 |      |
|                                       |                                    |          | Essay                 | 0.08  | -0.36 | -0.20 | -0.20 | 0.47 |      |
| Phillips et al. (2003)                | Arts, sciences and social sciences | 125      | Continuous assessment | -0.05   | -0.14 | -0.02 | 0.20  | 0.40 |      |
|                                       |                                    |          | Written exam          | 0.04  | -0.04 | 0.19  | 0.20  | 0.26 |      |

Table 2 (continued)

| Study                   | Participants  |          | Evaluation methods | Correlations with performance on evaluation methods |             |             |             |             |
|-------------------------|---|----------|--------------------|---|-------------|-------------|-------------|-------------|
|                         | Academic major  | <i>n</i> |                    | N   | E           | O           | A           | C           |
| Rothstein et al. (1994) | Business administration   | 450      | Oral exam          | -0.09   | <i>0.19</i> | <i>0.17</i> | -0.20       | 0.10        |
|                         |   |          | Written exam       | -0.02   | -0.09       | -0.00       | -0.07       | 0.09        |
| Fumham et al. (2013)    | Arts, humanities, architecture, law, social and historical sciences, life sciences, medicine, biomedical, engineering, mathematics, and physics |          | Written exam       | -0.04   | -0.02       | 0.04        | <i>0.15</i> | <i>0.13</i> |
|                         |   |          | Coursework         | -0.04   | -0.05       | <i>0.10</i> | <i>0.13</i> | <i>0.15</i> |

*N* neuroticism, *E* extraversion, *O* openness, *A* agreeableness, *C* conscientiousness

Correlations that are significant at alpha <0.05 are in italic characters

## 2.5 Control variables, personality, and performance on evaluation methods

In the present study design, in order to assess the unique effect of personality on PEEM, two variables, gender and age, are analyzed and factored out given their link to personality and to PEEM. These variables are used as control variables.

### 2.5.1 Gender, personality, and performance on evaluation methods

Previous studies reported significant differences for gender on the Big Five personality factors and PEEM.

Some tendencies are observed regarding the relationship between gender and some of the Big Five personality factors. Schmitt et al. (2008) found that women are less emotionally stable than men, but they are more extraverted, more agreeable, and more conscientious. This tendency holds true for most of the 55 cultures studied ( $n=17,637$ ). Budaev (1999) reported that women ( $n=303$ ) are more agreeable and less emotionally stable than men ( $n=225$ ). As for Rubinstein (2005), he found that women ( $n=160$ ) are more agreeable and conscientious than men ( $n=160$ ).

Research also suggests that there are significant differences between men and women with regard to PEEM. In a study conducted among university physical education and sport pedagogy students, Sheard (2009) reported that female students ( $n=56$ ) perform better than male students ( $n=78$ ) on projects. For psychology students, Dollinger and Orf (1991) revealed that female students ( $n=66$ ) perform better than male students ( $n=24$ ) on multiple choice tests, and Furnham et al. (2003) reported that female students ( $n=70$ ) perform better than male students ( $n=23$ ) on the latter EM.

### 2.5.2 Age, personality, and performance on evaluation methods

Previous studies reported significant relationships between age, the Big Five personality factors, and PEEM.

A relationship between age and the Big Five personality factors is found within the literature. In a study conducted among two samples, one consisted of 14,039 English people and a second consisted of 20,852 German people, Donnellan and Lucas (2008) reported that extraversion and openness decrease with age, while agreeableness increases. Moreover, conscientiousness is greater among individuals of middle age. Neuroticism is positively related to age in the English sample, but is negatively related to age in the German sample. The authors attribute this difference to sociohistorical factors without providing more detailed explanations. In another study conducted among a sample of 12,618 Australian people, Lucas and Donnellan (2009) reported a negative relationship between age and respectively neuroticism, extraversion, and openness to experience and a positive relationship between age and agreeableness and conscientiousness.

Several studies have demonstrated that older students tend to perform better academically than younger students (El Ansari 2002; Kevern et al. 1999; McKenzie and Schweitzer 2001; Sheard 2009), possibly because older students manifest greater motivation to succeed, a higher level of locus of control, a greater learning efficiency, and a greater investment in their studies as compared to younger students (McKenzie and Gow 2004). In these studies, AP was measured using either course grade or GPA



(McKenzie and Schweitzer 2001; Sheard 2009). To our knowledge, no study has been conducted on the link between age and PEEM.

## 2.6 Study hypotheses

The aim of this study is to investigate the influence of the Big Five model personality factors on PEEM<sup>1</sup> used in business administration courses. In an effort to quantify the actual impact of personality, this study controls for gender and age as these variables are known to influence personality and PEEM. The first research hypothesis can thus be formulated as follows:

*H<sub>1</sub>: When controlling for gender and age, personality as defined by the Big Five model has an effect on students' PEEM.*

As mentioned above, relationships between personality and AP are possibly modulated by the different EMs used to measure AP. Depending on the EM used in the courses to measure students' performance, the direction of the relationship between some personality factors and AP may vary. Based on our literature review and on the construct specification of each of the Big Five factor, other hypotheses can be stated as follows. Note that all these hypotheses take into account gender and age as control variables and all the Big Five personality factors in the statistical model. Eight EMs are being studied in the present research, among them, six have already been examined by previous studies: case studies (Dollinger and Orf 1991), oral exams (Rothstein et al. 1994), written exams (Chamorro-Premuzic and Furnham 2003a, b; Rothstein et al. 1994), multiple choice tests (Dollinger and Orf 1991), practical work (Dollinger and Orf 1991), and projects (Chamorro-Premuzic and Furnham 2003b), and two are new methods often used in business education: simulations and group work.

### 2.6.1 Neuroticism

The neurotic students tend to experience negative emotions such as anxiety, fear, sadness, embarrassment, anger, depression, hostility, and guilt. They often have irrational ideas and they have more difficulty managing their stress. Chamorro-Premuzic (2006), Chamorro-Premuzic and Furnham (2003a, b), and Furnham and Chamorro-Premuzic (2004) reported that students who are less neurotic perform better on written exams, probably because they experience less stress than other students. The neurotic students are not able to cope with stressful situations (Costa and McCrea 1992), such as oral exams, written exams (Furnham and Chamorro-Premuzic 2005), and multiple choice tests.

<sup>1</sup> All over the text and the research hypotheses, PEEM is expressed as a measure of performance, while in fact it reflects a mixture of preference and self-reported performance. Indeed, as mentioned in the introduction, students' performance is rated in this study using two self-reported measures: preference for EMs and grades generally obtained on each EM.

Indeed, multiple choice tests are timed and often solicit memorization under stressful conditions. In this mean, Hembree (1988) reported the existence of a negative correlation between anxiety and performance on memorization tasks.

*H<sub>2</sub>: Neuroticism has a negative effect on performance on oral exams, written exams, and multiple choice tests.*

### 2.6.2 Extraversion

Extraverted students are sociable, affirmed, active, talkative, and person-oriented. They like interactions with others and are able to maintain interpersonal relationships. They are energetic and like challenge. Introverted students are reserved, task-oriented, and quiet (Costa and McCrea 1992). EMs based on participation in class such as simulations, group work, and oral exams may all favor extraverts (Chamorro-Premuzic and Furnham 2005). Indeed, Furnham and Medhurst (1995) found a positive relationship between extraversion and grade obtained on seminar behavior ( $r=0.38$ ). Long untimed EMs such as written exams may be beneficial for introverts (Chamorro-Premuzic and Furnham 2003a, 2005; Busato et al. 2000; Furnham and Chamorro-Premuzic 2004; Furnham et al. 2003). This advantage may lay in the fact that introverted students spend more time studying than more extraverted students who spend more time socializing and distracting themselves (Furnham et al. 2003; Rolfhus and Ackerman 1999; Sanchez-Marin et al. 2001).

*H<sub>3</sub>: Extraversion has a positive effect on performance on simulations, group work, and oral exams.*

*H<sub>4</sub>: Extraversion has a negative effect on performance on written exams.*

### 2.6.3 Openness to experience

Open to experience students appreciate art and esthetics. They like variety and are intellectually curious. They are able to appreciate new experiences, to tolerate uncertainty, and to explore. They are not conventional in their ideas, their values, and their beliefs. Less open to experience students are conventional and narrow interests (Costa and McCrea 1992). Oral exam is an EM that requires readjustment and adaptation from the student depending on the questions asked. Openness to experience has often been associated with intelligence (Chamorro-Premuzic and Furnham 2005) and creativity (Chamorro-Premuzic 2006) which are characteristics called upon for performance on written exams. Project is a method that often requires creativity, curiosity, and critical thinking (Chamorro-Premuzic 2006). Open-to-experience students may better perform on these EMs than less open to experience students. Moreover, in business administration courses, multiple choice tests often aim to measure content memorization and comprehension. Students less open to experiences may be more attracted to this EM which requires little or no analysis and may perform better on such method.

*H<sub>5</sub>: Openness to experience has a positive effect on performance on oral exams, written exams, and projects.*

*H<sub>6</sub>: Openness to experience has a negative effect on performance on multiple choice tests.*

#### 2.6.4 Agreeableness

Agreeable students are basically altruistic. They like to cooperate with others and are always willing to help people. Students who are less agreeable are egocentric and skeptic about the intentions of others (Costa and McCrea 1992). Agreeable students will be at ease with EMs that recall for help and solidarity with others. Moreover, students who are more agreeable make a good impression on their teachers. They are at an advantage when it comes to nonanonymous EMs such as group work and oral exams. Anonymous EMs such as written exams and multiple choice tests may give some advantage to less agreeable students (Chamorro-Premuzic and Furnham 2005), which are known to be competitive rather than cooperative (Costa and McCrea 1992).

*H<sub>7</sub>: Agreeableness has a positive effect on performance on group work and oral exams.*

*H<sub>8</sub>: Agreeableness has a negative effect on performance on written exams<sup>2</sup> and multiple choice tests.*

#### 2.6.5 Conscientiousness

Conscientious students are tidy, self-disciplined, and determined. They are known to perform well at university and in their work. They are scrupulous, punctual, and reliable. Less conscientious students are unreliable, lazy, lax, weak-willed, and hedonistic (Costa and McCrea 1992). Conscientious students will perform better than less conscientious students on all EMs, including those requiring much effort on a long period of time such as practical work and projects (Chamorro-Premuzic 2006; Chamorro-Premuzic and Furnham 2003a, b; Furnham et al. 2003; Furnham and Chamorro-Premuzic 2004; Phillips et al. 2003; Dollinger and Orf 1991).

*H<sub>9</sub>: Conscientiousness has a positive effect on performance on all the EMs considered in this study.*

#### 2.6.6 Control variables

No specific hypotheses are stated with regard to the relationships between gender, age, and PEEM.

<sup>2</sup> We gave this direction to the hypothesis even though Furnham et al. (2013) reported a positive link between agreeableness and performance on written exams. These authors did not justify this result. We preferred to follow the rationale given by Chamorro-Premuzic and Furnham (2005).

**Table 3** Frequency distributions for gender and age

|                          | Study sample |        | Total |
|--------------------------|--------------|--------|-------|
|                          | Male         | Female |       |
| 20 years old and younger | 26           | 34     | 60    |
| Between 21 and 25 years  | 31           | 45     | 76    |
| 26 years and older       | 13           | 20     | 33    |
| Total                    | 70           | 99     | 169   |

### 3 Method

#### 3.1 Participants

Participants were students enrolled in two compulsory and undergraduate courses in business at a large Association to Advance Collegiate Schools of Business (AACSB)- and European Quality Improvement System (EQUIS)-accredited Faculty of Business Administration in Quebec City, Canada, offering higher education in French, English, and Spanish. A total of 169 voluntary students responded to an online questionnaire. The distribution of these 169 students according to gender and age is presented in Table 3. Of the 169 students, 139 had been assessed by case studies, 128 by simulations, 168 by group work, 146 by oral exams, 168 by written exams, 164 by multiple choice tests, 158 by practical work, and 138 by projects. The distribution of the study sample by EM is explained later (see Section 3.3.1).

#### 3.2 Procedure

At the beginning of the 2009 winter semester, all seven teachers of the two compulsory courses were contacted and asked for permission to enter into their classes in order to invite students to participate in the study. Five teachers accepted and student participation was voluntary. The experimenter visited each class and explained the purpose of the study and the potential involvement of the students. The questionnaire used in this study consisted of 65 items and required 15 to 20 min to be completed. It was put online during the final 5 weeks of the 2009 winter semester. To encourage students' participation, three gift certificates of C\$100 were randomly drawn at the end of data collection. During the data collection period, a reminder message was sent to students by email to invite them to participate in the study.

#### 3.3 Measures

##### 3.3.1 Preference and performance on evaluation methods

The EMs studied are those commonly used in university undergraduate business administration courses. These methods were identified through content analysis of the Business Administration Faculty course outlines over a period of a year at the university where the research took place. The EMs identified were case studies,

simulations, group work, oral exams, written exams, multiple choice tests, practical work, and projects.

In order to measure preference for each of the study's EMs, the student indicated on a scale ranging from 1 (weak preference) to 5 (strong preference) to what extent he or she would like to be assessed via each of the eight methods targeted by the study. Students also reported their grades generally obtained on each of the EMs considered in the present study. As mentioned in the introduction, several studies have showed that self-reported grades are very highly correlated with students' actual grades (Cassady 2001; Gray and Watson 2002; Kirk and Sereda 1969). In fact, according to Conard (2006), this correlation varies between 0.84 and 0.97. Students in the present study had to choose between the following six alternatives: (1) I have never been assessed by this EM; (2) My mean score on this EM is less than 60 %; (3) My mean score on this EM is between 60 % and 70 %; (4) My mean score on this EM is between 71 % and 80 %; (5) My mean score on this EM is between 81 % and 90 %; and (6) My mean score on this EM is between 91 % and 100 %. These mean scores are based on scores obtained on evaluations in five compulsory courses taken during the first year of their study program. Thus, the mean scores reported by students are based on the same courses and the same contents, as these courses must be completed in the same sequence for all students.

Responses to the first choice (I have never been assessed by this EM) were processed as missing data, which explains the different sample numbers for each of the following statistical analyses. No method was used to handle these missing data; they were simply removed from the data set. Among the study sample, 30 students answered that they had never been assessed by case studies, 31 by simulations, 1 by group work, 23 by oral exams, 1 by written exams, 5 by multiple choice tests, 11 by practical work, and 31 by projects. The missing data led to different samples for the EMs considered by the present study: case studies ( $n=139$ ), simulations ( $n=128$ ), group work ( $n=168$ ), oral exams ( $n=146$ ), written exams ( $n=168$ ), multiple choice tests ( $n=164$ ), practical work ( $n=158$ ), and projects ( $n=138$ ).

### 3.3.2 Personality

Personality was measured using the French version (Sabourin and Lussier 1992) of the NEO-Five Factor Inventory (NEO-FFI; Costa and McCrea 1992). This questionnaire is a short version of the more general Neo Personality Inventory Revised (NEO-PI-R; Costa and McCrea 1992). The NEO-FFI questionnaire used in the present study consisted of 60 items, with 12 items measuring each factor: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The items describe typical behaviors or reactions and are rated on a five-point Likert-type scale (from 0=strongly disagree to 4=strongly agree). The raw score for each factor is obtained by adding the ratings on each factor item. The higher the factor score, the more the student possesses the characteristic measured.

A study among English speakers and another among French speakers report adequate reliability coefficients. In the English version of the questionnaire, Costa and McCrea (1992) obtained a Cronbach's alpha coefficient of 0.86 for neuroticism, 0.77 for extraversion, 0.73 for openness, 0.68 for agreeableness, and 0.81 for conscientiousness. In its French version, Bouchard et al. (1999) reported similar

Cronbach's alpha coefficients: 0.85 for neuroticism, 0.72 for extraversion, 0.68 for openness, 0.69 for agreeableness, and 0.79 for conscientiousness. There is a great deal of empirical literature providing evidence for the adequate validity of the NEO-FFI (Costa and McCrea 1992; Furnham 1996, 1997; McCrae and Costa 1997; Ozer and Benet-Martínez 2006).

### 3.3.3 Gender and age

Students were asked to identify their gender on the questionnaire (coded 1 for male and 2 for female). They were also asked to indicate their age category from among the following selection: (a) 20 years and less, (b) 21 to 25 years, and (c) 26 years and older (coded 1 for category a, 2 for category b, and 3 for category c).

## 4 Results

### 4.1 Internal consistency, descriptive statistics, and analyses of variance

The means and standard deviations for the scores on each of the Big Five personality factors for the overall sample are presented in Table 4. These descriptive statistics are also presented according to gender and age in Table 4. A Cronbach's alpha coefficient was calculated for each factor of the Big Five in order to verify the internal consistency of the personality scales used and to make sure that they adequately measure the core construct (Crocker and Algina 1986; Cronbach 1951). These coefficients are presented in Table 4. Cronbach's alpha coefficient values are considered to be satisfactory and comparable to those reported in previous studies (Bouchard et al. 1999; Costa and McCrea 1992), except for the openness factor which is quite low in the present study.

In order to ensure the relevance of controlling for gender and age, analyses of variance (ANOVAs) were conducted (Table 4). These analyses revealed significant differences between male and female students on the following factors: neuroticism [ $F(1,168)=4.76, p<0.05, \eta^2=0.03$ ], agreeableness [ $F(1,168)=10.08, p<0.01, \eta^2=0.06$ ], and conscientiousness [ $F(1,168)=15.64, p<0.001, \eta^2=0.09$ ]. Female students are less emotionally stable than male students, but are more agreeable and more conscientious. These analyses also revealed significant differences between age groups on the conscientiousness factor [ $F(2,166)=5.86, p<0.01, \eta^2=0.07$ ]. Results on the Bonferroni multiple comparison tests (Field 2005) showed that students belonging to the 20 years and younger group are less conscientious than students of 26 years of age and older.

### 4.2 Hypotheses testing

As mentioned in the introduction, students' performance is rated in this study using a latent variable inferred from two self-reported measures: preference for evaluation methods and grades generally obtained on each of these methods. These latter variables were not considered as different dependent variables in the analyses in order to avoid the risk for bias caused by the simultaneous self-reporting of preference and performance. A confirmatory factor analysis was performed on the data of the two self-

**Table 4** Descriptive data associated with the Big Five personality factors, Cronbach's alpha coefficients, means, standard deviations, and ANOVA tests of the Big Five personality factors according to gender and age

| $\alpha$ | Total ( $n=169$ ) |       | Gender          |       | $F$  | $p$   | $\eta^2$ | Age (years)       |        |                           |                    |                     |                     | $F$  | $p$                | $\eta^2$ |                         |        |      |
|----------|-------------------|-------|-----------------|-------|------|-------|----------|-------------------|--------|---------------------------|--------------------|---------------------|---------------------|------|--------------------|----------|-------------------------|--------|------|
|          |                   |       | Male ( $n=70$ ) |       |      |       |          | Female ( $n=99$ ) |        | 20 and younger ( $n=60$ ) |                    | 21 to 25 ( $n=76$ ) |                     |      |                    |          | 26 and older ( $n=33$ ) |        |      |
|          | $M$               | $SD$  | $M$             | $SD$  |      |       |          | $M$               | $SD$   | $M$                       | $SD$               | $M$                 | $SD$                |      |                    |          | $M$                     | $SD$   |      |
| N        | 0.79              | 18.73 | 6.98            | 17.36 | 6.05 | 19.71 | 7.44     | 4.76              | 0.03*  | 0.03                      | 20.08              | 7.51                | 18.58               | 6.55 | 16.64              | 6.55     | 2.69                    | 0.07   | 0.03 |
| E        | 0.72              | 32.08 | 5.49            | 31.67 | 6.06 | 32.36 | 5.05     | 0.65              | 0.42   | 0.00                      | 32.05              | 5.48                | 32.42               | 5.59 | 31.33              | 5.33     | 0.45                    | 0.64   | 0.01 |
| O        | 0.59              | 26.40 | 5.51            | 26.77 | 5.59 | 26.14 | 5.47     | 0.53              | 0.47   | 0.00                      | 25.75              | 5.31                | 26.46               | 5.83 | 27.46              | 5.10     | 1.03                    | 0.36   | 0.01 |
| A        | 0.72              | 33.88 | 5.12            | 32.43 | 5.28 | 34.89 | 4.76     | 10.08             | 0.00** | 0.06                      | 32.72              | 4.53                | 34.84               | 5.38 | 33.76              | 5.20     | 2.97                    | 0.05   | 0.04 |
| C        | 0.84              | 36.29 | 6.66            | 33.99 | 7.28 | 37.93 | 5.67     | 15.64             | 0.00** | 0.09                      | 34.48 <sup>a</sup> | 6.74                | 36.43 <sup>ab</sup> | 6.62 | 39.27 <sup>b</sup> | 5.56     | 5.86                    | 0.00** | 0.07 |

Significant differences are found between a and b

N neuroticism, E extraversion, O openness, A agreeableness, C conscientiousness,  $\alpha$  Cronbach alpha coefficient,  $M$  mean,  $SD$  standard deviation

\* $p<0.05$ ; \*\* $p<0.01$

**Table 5** Factor loadings and total of variance extracted for the factor analyses of the two self-reported measures: preference for EMs and grades generally obtained on each evaluation method

| Latent variable:<br>performance on | Factor loading<br>on preference | Factor loading<br>on performance | Total of variance<br>extracted |
|------------------------------------|---------------------------------|----------------------------------|--------------------------------|
| Case studies                       | 0.80                            | 0.80                             | 0.63                           |
| Simulations                        | 0.82                            | 0.82                             | 0.68                           |
| Group work                         | 0.76                            | 0.76                             | 0.58                           |
| Oral exams                         | 0.80                            | 0.80                             | 0.63                           |
| Written exams                      | 0.82                            | 0.82                             | 0.67                           |
| Multiple choice tests              | 0.84                            | 0.84                             | 0.70                           |
| Practical work                     | 0.82                            | 0.82                             | 0.67                           |
| Projects                           | 0.72                            | 0.72                             | 0.51                           |

reported measures and confirmed that they formed a latent variable of PEEM.<sup>3</sup> For each EM, a single factor emerged which explained 72% and more of the variance, with factor coefficients ranging from 0.51 to 0.70. Factor loadings and total of variance extracted for the factor analyses of the two self-reported measures are presented in Table 5.

In order to examine the influence of personality on each PEEM, eight series of multiple linear hierarchical regressions were conducted on the factor scores of PEEM obtained by the factor analyses, one per EM. In these regressions, gender and age were entered into the first block of predictors as control variables, followed by the second block consisting of the Big Five personality factors. This is done so in order to assess the unique effect of personality on PEEM. Gender and age were analyzed and factored out given their relationship to personality as well as their relationship to PEEM. The results of these regressions are presented in Table 6.

#### 4.2.1 Personality ( $H_1$ )

Five multiple linear hierarchical regressions<sup>4</sup> were significant for group work [ $F(7,168)=4.37, p<0.01$ ], oral exams [ $F(7,146)=3.03, p<0.01$ ], written exams [ $F(7,168)=4.41, p<0.01$ ], multiple choice tests [ $F(7,164)=2.43, p<0.05$ ], and practical work [ $F(7,158)=2.68, p<0.05$ ]. Thus, the first study hypothesis  $H_1$  is confirmed for these EMs but must be rejected for case studies, simulations, and projects. The  $R^2$  coefficients of determination indicate that 12 % of variance in performance on group work, 9 % of variance in performance on oral exams, 13 % of variance in performance

<sup>3</sup> Correlations among PEEM are presented in Appendix 1.

<sup>4</sup> For each of the EMs, analyses verified whether the theoretical model fits the data. To do so, the chi-square to degrees of freedom ratio ( $\chi^2/df$ ), the Comparative Fit Index (CFI), and the root mean square error of approximation (RMSEA) were reported (see table in Appendix 2). During analyses, the robust methods of the maximum likelihood were used because the data were not normally distributed. EQS version 6.2 software was used to test the proposed model. Lagrange multiplier tests (LM tests) were conducted on the data, and a more parsimonious model for each EM was developed in this study by allowing gender, age, and personality variables to correlate, as did Phillips et al. (2003). For simulations, group work, oral exams, written exams, multiple choice tests, practical work, and projects, results showed a good fit to the data.



**Table 6** Multiple hierarchical linear regressions: personality predicting preference for evaluation methods

| Independent/dependent variables  | Case studies (n=139)  |      |        | Simulations (n=128)           |      |       | Group work (n=168)     |      |        | Oral exams (n=146) |      |        |
|----------------------------------|-----------------------|------|--------|-------------------------------|------|-------|------------------------|------|--------|--------------------|------|--------|
|                                  | St. $\beta$           | t    | p      | St. $\beta$                   | t    | p     | St. $\beta$            | t    | p      | St. $\beta$        | t    | p      |
| Gender                           | -0.10                 | 1.11 | 0.13   | -0.08                         | 0.84 | 0.20  | -0.14                  | 1.88 | 0.03*  | -0.11              | 1.26 | 0.10   |
| Age                              | -0.03                 | 0.33 | 0.37   | -0.03                         | 0.28 | 0.39  | -0.28                  | 3.75 | 0.00** | -0.06              | 0.71 | 0.24   |
| Adj. $R^2$                       | -0.01                 |      |        | -0.01                         |      |       | 0.09                   |      |        | 0.00               |      |        |
| Neuroticism                      | -0.11                 | 1.10 | 0.14   | 0.16                          | 1.66 | 0.05* | 0.06                   | 0.73 | 0.23   | 0.03               | 0.37 | 0.35   |
| Extraversion                     | 0.00                  | 0.00 | 0.50   | 0.14                          | 1.77 | 0.04* | 0.18                   | 2.39 | 0.01** | 0.22               | 2.57 | 0.01** |
| Openness                         | 0.08                  | 0.87 | 0.19   | -0.12                         | 1.37 | 0.09  | -0.14                  | 1.94 | 0.03*  | 0.19               | 2.42 | 0.01** |
| Agreeableness                    | 0.04                  | 0.45 | 0.33   | -0.07                         | 0.67 | 0.25  | 0.11                   | 1.38 | 0.08   | -0.10              | 1.08 | 0.14   |
| Conscientiousness                | -0.08                 | 0.83 | 0.20   | -0.04                         | 0.42 | 0.34  | -0.03                  | 0.31 | 0.38   | 0.19               | 2.04 | 0.02*  |
| Adj. $R^2$                       | -0.02                 |      |        | 0.02                          |      |       | 0.12                   |      |        | 0.09               |      |        |
| F                                | 0.61                  |      |        | 1.27                          |      |       | 4.37**                 |      |        | 3.03**             |      |        |
| Independent /dependent variables | Written exams (n=168) |      |        | Multiple choice tests (n=164) |      |       | Practical work (n=158) |      |        | Projects (n=138)   |      |        |
|                                  | St. $\beta$           | t    | p      | St. $\beta$                   | t    | p     | St. $\beta$            | t    | p      | St. $\beta$        | t    | p      |
| Gender                           | 0.24                  | 3.23 | 0.00** | 0.16                          | 2.09 | 0.02* | 0.13                   | 1.60 | 0.06   | -0.00              | 0.05 | 0.48   |
| Age                              | 0.12                  | 1.59 | 0.06   | 0.12                          | 1.59 | 0.06  | 0.20                   | 2.55 | 0.01** | -0.04              | 0.48 | 0.31   |
| Adj. $R^2$                       | 0.06                  |      |        | 0.03                          |      |       | 0.05                   |      |        | -0.01              |      |        |
| Neuroticism                      | -0.08                 | 1.01 | 0.16   | -0.03                         | 0.40 | 0.35  | 0.07                   | 0.81 | 0.21   | 0.01               | 0.05 | 0.48   |
| Extraversion                     | -0.04                 | 0.49 | 0.31   | -0.13                         | 1.67 | 0.05* | 0.01                   | 0.12 | 0.45   | 0.05               | 0.51 | 0.31   |
| Openness                         | 0.10                  | 1.33 | 0.09   | -0.13                         | 1.69 | 0.05* | -0.08                  | 1.03 | 0.15   | -0.08              | 0.93 | 0.18   |
| Agreeableness                    | -0.25                 | 3.19 | 0.00** | -0.11                         | 1.28 | 0.10  | 0.06                   | 0.65 | 0.26   | 0.11               | 1.16 | 0.12   |
| Conscientiousness                | 0.22                  | 2.67 | 0.00** | 0.15                          | 1.70 | 0.05* | 0.21                   | 2.41 | 0.01** | 0.04               | 0.44 | 0.33   |
| Adj. $R^2$                       | 0.13                  |      |        | 0.06                          |      |       | 0.07                   |      |        | -0.03              |      |        |
| F                                | 4.41**                |      |        | 2.43*                         |      |       | 2.68*                  |      |        | 0.53               |      |        |

\* $p < 0.05$ ; \*\* $p < 0.01$

on written exams, 6 % of variance in performance on multiple choice tests, and 7 % of variance in performance on practical work can be explained by personality as defined by the Big Five model while controlling for gender and age.

Study hypotheses  $H_2$ ,  $H_3$ ,  $H_4$ ,  $H_5$ ,  $H_6$ ,  $H_7$ ,  $H_8$ , and  $H_9$  are tested at a unilateral significance level of 0.05 because of the direction they were given during formulation of the hypotheses following the literature review. The  $t$  tests are thus one-tailed and the  $p$  values detailed in Table 6 according to these hypotheses are adjusted for unidirectionality (a  $p$  value smaller than 0.05 represents a statistical significance).

#### 4.2.2 Neuroticism ( $H_2$ )

According to the analyses presented in Table 6,  $H_2$  by which neuroticism has a negative effect on performance on oral exams, written exams, and multiple choice tests must be rejected.

#### 4.2.3 Extraversion ( $H_3$ , $H_4$ )

Extraversion has a positive effect on performance on group work ( $\beta=0.18$ ,  $t=2.39$ ,  $p<0.01$ ) and oral exams ( $\beta=0.22$ ,  $t=2.57$ ,  $p<0.01$ ), but not on simulations.  $H_3$  is thus partially supported. However, extraversion is not related to performance on written exams.  $H_4$  must be rejected.

#### 4.2.4 Openness to experience ( $H_5$ , $H_6$ )

Openness to experience has been found to have a positive effect on performance on oral exams ( $\beta=0.19$ ,  $t=2.42$ ,  $p<0.01$ ). However, this factor of personality is not related to performance on written exams and projects.  $H_5$  is partially supported. Openness to experience has a negative effect on performance on multiple choice tests ( $\beta=-0.13$ ,  $t=1.69$ ,  $p<0.05$ ).  $H_6$  is thus supported.

#### 4.2.5 Agreeableness ( $H_7$ , $H_8$ )

Agreeableness is not related to performance on respectively group work and oral exams.  $H_7$  must be rejected. Agreeableness has a negative effect on performance on written exams ( $\beta=-0.25$ ,  $t=3.19$ ,  $p<0.01$ ), but not on multiple choice tests.  $H_8$  is partially confirmed.

#### 4.2.6 Conscientiousness ( $H_9$ )

$H_9$  by which conscientiousness has a positive effect on performance on all the EMs considered in this study is confirmed for oral exams ( $\beta=0.19$ ,  $t=2.04$ ,  $p<0.05$ ), written exams ( $\beta=0.22$ ,  $t=2.67$ ,  $p<0.01$ ), multiple choice tests ( $\beta=0.15$ ,  $t=1.70$ ,  $p<0.05$ ), and practical work ( $\beta=0.21$ ,  $t=2.41$ ,  $p<0.01$ ), but not for case studies, simulations, group work, and projects.

There are other significant relationships which were not predicted. Gender has an effect on performance on group work ( $\beta=-0.14$ ,  $t=1.88$ ,  $p<0.05$ ), written exams ( $\beta=0.24$ ,  $t=3.23$ ,  $p<0.01$ ), and multiple choice tests ( $\beta=0.16$ ,  $t=2.09$ ,  $p<0.05$ ), while age

has an effect on performance on group work ( $\beta=-0.28$ ,  $t=3.75$ ,  $p<0.01$ ) and practical work ( $\beta=0.20$ ,  $t=2.55$ ,  $p<0.01$ ). Extraversion has a negative effect on performance on multiple choice tests ( $\beta=-0.13$ ,  $t=1.67$ ,  $p<0.05$ ), while openness to experience has been found to have a negative effect on performance on group work ( $\beta=-0.14$ ,  $t=1.94$ ,  $p<0.05$ ).

Table 7 presents a synthesis of the results according to each hypothesis tested in this study.

## 5 Discussion

This study aimed to assess the influence of personality as defined by the Big Five model on PEEM used in business administration courses. As mentioned in the introduction, the present study differs from other studies with regard to three significant aspects: it involves a sample of French Canadian students enrolled in an undergraduate business administration program, a population that has been rarely studied before; it examines eight EMs simultaneously while including new methods often used in business administration courses (simulations and group work); and it controls for

**Table 7** Summary of the study hypotheses confirmed and rejected

| Study hypotheses   | Results  |
|--|--|
| H <sub>1</sub> When controlling for gender and age, personality as defined by the Big Five model has an effect on students' PEEM | Confirmed for group work, oral exams, written exams, multiple choice tests, and practical work. Rejected for case studies, simulations, and projects |
| H <sub>2</sub> Neuroticism has a negative effect on performance on oral exams, written exams, and multiple choice tests          | Rejected   |
| H <sub>3</sub> Extraversion has a positive effect on performance on simulations, group work, and oral exams                      | Confirmed for group work and oral exams. Rejected for simulations  |
| H <sub>4</sub> Extraversion has a negative effect on performance on written exams  | Rejected   |
| H <sub>5</sub> Open to experience has a positive effect on performance on oral exams, written exams, and projects                | Confirmed for oral exams. Rejected for written exams and projects  |
| H <sub>6</sub> Open to experience has a negative effect on performance on multiple choice tests                                  | Confirmed  |
| H <sub>7</sub> Agreeableness has a positive effect on performance on group work and oral exams                                   | Rejected   |
| H <sub>8</sub> Agreeableness has a negative effect on performance on written exams and multiple choice tests                     | Confirmed for written exams. Rejected for multiple choice tests  |
| H <sub>9</sub> Conscientiousness has a positive effect on performance on all the EMs considered in this study                    | Confirmed for oral exams, written exams, multiple choice tests, and practical work. Rejected for case studies, simulations, group work, and projects |

gender and age. The analyses conducted considered preference for and self-reported grades on EMs as indicators of latent variables: PEEM.

The findings of this study showed that personality has an influence on performance on group work, oral exams, written exams, multiple choice tests, and practical work while using gender and age as control variables. However, personality is not related to performance on case studies, simulations, and projects. The first study hypothesis is thus confirmed for the EMs considered in this study except for case studies, simulations, and projects. The present study is the first of its kind dealing with a sample of French Canadian students enrolled in undergraduate studies in business. No prior research, to our knowledge, has used this kind of sample while studying the effect of personality on PEEM neither compared it to English-speaking students in regard to the Big Five personality factors. For these reasons, we are not able to compare our results to previous ones. This study should be considered as a preliminary study and should be replicated on other samples of the same nature. To our knowledge, only one previous study examining the influence of personality on PEEM has been conducted among graduate business administration students (Rothstein et al. 1994). In Rothstein and colleagues' study, two EMs were considered, written exams and oral exams. The results showed that personality was related to performance on oral exams, but not on written exams ( $n=450$ ). Yet, these authors expected conscientiousness to be related to performance on written exams. They explain their findings by the fact that written exams in MBA program often involve problem solving, whereby elements of spontaneity and creativity might contribute to better performance rather than self-discipline and order (which are facets of conscientiousness).

One of the important findings of this study relates to the effect of personality on performance on group work. To our knowledge, no previous research examining the effect of personality on PEEM has studied group work, despite the fact that this EM is increasingly used in academic settings.

### 5.1 Big Five personality factors

Chamorro-Premuzic (2006), Chamorro-Premuzic and Furnham (2003a, b), and Furnham and Chamorro-Premuzic (2004) reported that students who were less neurotic perform better on written exams, likely because they experience less stress than other students. These studies were conducted among psychology students. We hypothesized that neuroticism would have a negative effect on performance on oral exams for the same reason. In the present study, no relationship was established between neuroticism and performance on written exams, oral exams, and multiple choice tests.  $H_2$  but must be rejected. This is probably due to the characteristics of business students. In fact, students registered in a business program have been found to be more emotionally stable than students registered in other programs (Lounsbury et al. 2009).

Extraversion has a positive effect on performance on group work and oral exams, but not on simulations.  $H_3$  is partially supported. To our knowledge, no previous study has established a link between extraversion and performance on group work. However, according to Chamorro-Premuzic and Furnham (2005), extraverted students appear to be at an advantage for classroom EMs. Indeed, Furnham and Medhurst (1995) reported a positive link between extraversion and grade obtained on seminar behavior ( $r=0.38$ ). These findings may be explained by the fact that students who are more extraverted

have developed social skills, which provides them with an advantage over other students on EMs that are not anonymous (Chamorro-Premuzic and Furnham 2005). For these reasons, more introverted students possess an advantage over more extraverted students, when it comes to performance on anonymous EMs, such as multiple choice tests. This may explain the nonhypothesized negative effect of extraversion on performance on multiple choice tests.

As for the finding regarding oral exams, it could be explained by the fact that students who are more extraverted are more sociable and open to others. They are thus less reticent to speak in front of a group, which enables them to perform better on this EM. The only study reviewed that examined the link between extraversion and performance on oral exams is that of Rothstein et al. (1994). These authors reported a positive relationship between extraversion and performance on this EM ( $r=0.19$ ). Previous research reported that students who are more introverted perform better on written exams (Busato et al. 2000; Chamorro-Premuzic and Furnham 2003a; Furnham and Chamorro-Premuzic 2004; Furnham et al. 2003). Their advantage may lay in the fact that more extraverted students spend more time socializing and distracting themselves than introverted students who spend more time studying (Furnham et al. 2003; Rolfhus and Ackerman 1999; Sanchez-Marin et al. 2001). Indeed, time spent studying may be one of the explanatory factors for these findings. However, the present study failed to show that extraversion has an effect on performance on written exams.  $H_4$  is thus rejected. This is probably due to the little variability in the extraversion factor among the sample used or to the characteristics of business students who were found to be more extraverted than students registered in other programs (Lounsbury et al. 2009).

Openness to experience has a positive effect on performance on oral exams.  $H_5$  is thus confirmed for this EM. Openness to experience, by definition, refers to proactive seeking, to the ability to appreciate new experiences, as well as to the ability to tolerate uncertainty and to explore (Costa and McCrea 1992) and affects performance on oral exams, an EM that requires readjustment and adaptation from the student depending on the questions asked. Openness to experience is not related to performance on written exams and projects.  $H_5$  and  $H_6$  must be rejected for these EMs. However, previous studies reported that openness to experience was positively related to performance on written exams (Chamorro-Premuzic and Furnham 2003b; Phillips et al. 2003) and projects (Chamorro-Premuzic 2006). These studies were conducted among psychology, arts, sciences, and social sciences students. The results of the present study are probably due to the little variability in the openness to experience factor among the sample used or to the fact that business students are in general less open to experience than other students (Lounsbury et al. 2009), despite the fact that business courses support innovation, change, and continuous improvement. According to Lounsbury et al. (2009), a possible explanation relates to the fact that business people, business students, and business faculty demonstrate more conservative behavior than other people. Note that conservatism is negatively related to openness to experience, according to Van Hiel and Mervielde (2004). The result of the present study in regard to written exams could be explained by the nature of this EM in undergraduate business courses, which may be different from written exams in other fields of study such as psychology (Chamorro-Premuzic and Furnham 2003a; Furnham et al. 2003). In undergraduate business courses, written exams often enclose open-ended questions (in management, human resources management, and marketing courses) which call for comprehension of the

course content, or they involve problem-solving tasks (in finance, accounting, and operations management courses), which require hypothetical-deductive thinking. Yet, in psychology courses, as reported by a previous study, written exams comprise essay-type responses (Chamorro-Premuzic and Furnham 2003a), which call for inductive, creative, thinking.

Openness to experience has a negative effect on performance on multiple choice tests.  $H_6$  is thus confirmed. In business administration courses, multiple choice tests often aim to measure content memorization and comprehension (McKeachie and Svinicki 2006). The level of difficulty for such tests is not high. One must only be up to date on their studies to obtain a good mark. Students less open to experiences have less developed analytical thinking skills (Costa and McCrea 1992). They may be more attracted to this EM that requires little or no analysis such as multiple choice tests and may perform better on such an EM.

Openness to experience has been found to negatively impact performance on group work. A possible explanation of the present finding pertains to the fact that the more the student is open to experience, the less is his preference for this EM, as preference for an EM is positively linked to performance on this method (Birenbaum 1997; Schleigh 2008; Zoller and Ben-Chaim 1988, 1990), the less would be his performance on group work. In fact, this EM does not allow him to stand apart from other students, since all members of a group work tend to receive the same mark, whatever their contribution (Lakhal et al. 2013).

Agreeableness is not related to performance on group work and oral exams.  $H_7$  must be rejected. This result can be explained by the fact that business students have been found to be less agreeable than other students (Lounsbury et al. 2009). Agreeableness has a negative effect on performance on written exams.  $H_8$  is confirmed for this EM. This effect may be explained by the fact that less agreeable students are competitive (Costa and McCrea 1992). They may perform better on anonymous EMs such as written exams (Chamorro-Premuzic and Furnham 2005). No significant relationships were found between agreeableness and performance on multiple choice tests.  $H_8$  must be rejected for this EM.

The findings indicate that conscientiousness positively impacts upon performance on oral exams, written exams, multiple choice tests, and practical work.  $H_9$  is thus confirmed for these EMs, but not for case studies, simulations, group work, and projects. These results corroborate those reported by Chamorro-Premuzic (2006), Chamorro-Premuzic and Furnham (2003a, b), Furnham et al. (2003), Furnham and Chamorro-Premuzic (2004), and Phillips et al. (2003) regarding performance on written exams. They are also similar to those obtained by Dollinger and Orf (1991) for practical work. Conscientious students are known to be careful, organized, and perseverant in their studies (Chamorro-Premuzic and Furnham 2005). They have a strong will and are determined. They are scrupulous, punctual, and reliable. Students who are little conscientious are reputed to be impulsive, to not think things through, to be unreliable, and to be little ambitious (Costa and McCrea 1992). These are characteristics that would explain the effect of conscientiousness on performance on these EMs (Chamorro-Premuzic and Furnham 2005). The role played by conscientiousness on AP is well documented (O'Connor and Paunonen 2007). The findings of the present study indicate that this link is especially valid for performance on oral exams, written exams, multiple choice tests, and practical work. No effect was observed for

performance on the other EMs considered. The present findings thus further clarify the findings of previous studies.

## 5.2 Control variables

The results indicate that student gender differentiates performance on group work, written exams, and multiple choice tests. The findings relating to group work are innovative as, to our knowledge, no study has examined performance on this EM while controlling for gender. Results regarding performance on written exams and multiple choice tests corroborate those already reported by Furnham et al. (2003) and Dollinger and Orf (1991) who reported that female students perform better than male students on these EMs.

The findings also reveal that student age differentiates between performances on group work and practical work. The younger the student, the more likely he or she will better perform on group work. The older the student, the more likely he or she will better perform on practical work. This finding is innovative as, to our knowledge, no study has examined the effect of age on PEEM. The present findings clarify the results of previous studies that examined overall AP and that found that older students tend to perform better academically than younger students (El Ansari 2002; Kevern et al. 1999; McKenzie and Schweitzer 2001; Sheard 2009). Other studies should be conducted to add other elements to these results, as only two EMs differentiated between students from the different age groups considered in the present study.

## 6 Conclusion and direction for future research

When controlling for gender and age, there are relationships between personality and students' performance on group work, oral exams, written exams, multiple choice tests, and practical work. However, no single model can be retained to describe these relationships as it is not always the same personality factors that are determinants from one method to another. This may explain differences in results obtained on previous studies regarding the relationship between personality factors and AP. Suffice to recall that Rothstein et al. (1994) reported a negative relationship between AP measured using GPA and agreeableness, while for Conard (2006) who measured AP using course grade, this relationship was positive. Divergence in findings may also be due to student academic major. Indeed, in the two studies cited earlier, the first sample consisted of graduate students in business administration while the second sample consisted of undergraduate psychology students. Future research may wish to extend this study by incorporating business major as a control variable while exploring the role of personality in PEEM used in business schools.

Depending on the EM used to evaluate students' AP, some personality factors have an effect on performance. Knowledge of this finding is important for professors. In order to favor student success, they could use EMs that are better adapted to their students' personality and to which they are more attracted, as long as they know them of course and as long as these EMs measure what professors hope to achieve in their courses. It would also be justified to diversify assessment practices in order to give a



fair chance of success to all students. This study was conducted among a voluntary sample of undergraduate business students. This raises the question concerning the existence of differences between those who responded and those who did not respond to the online questionnaire. Therefore, the results of this study must be generalized with care. This study should be replicated on larger randomly selected samples of business students.

In the present study, PEEM was measured indirectly. The analyses conducted considered preference for and self-reported grades on EMs as indicators of latent variables of PEEM. It would have been relevant to measure PEEM by using students' marks on these methods, but this would not be feasible at a practical level. Given that it is difficult within the same course to assess students' performance using several EMs, PEEM would have to be obtained through grades in several courses. The issue of data consistency is also raised. Is a mark on a written exam in accounting equivalent to a written exam mark on human resources management? In the present study, students' performance on the EMs was rated using a self-report measure of preference for EMs and the grade generally obtained on each of these methods. Students had to report their mean score on each EM considered by the study. This mean is based on scores obtained on evaluations for five compulsory courses taken during the first year of their study program. Thus, the mean reported by students is based on the same courses and the same contents.

The research design used in the present study is quite unilateral. The study is limited to the influence of personality on performance on EMs while controlling for gender and age. As a possible consequence, the percentages of variance explained by personality, as defined by the Big Five model, when testing its effect on performance on group work, oral exams, written exams, multiple choice tests, and practical work are low (6 to 13 %) and comparable to those reported by previous studies (6 and 22 %). This suggests the existence of other important nonacademic factors impacting PEEM, such as approaches to learning (Biggs 1993), creative thinking (Chamorro-Premuzic 2006), thinking styles, and modes of thinking (Zhang 2002). In order to predict PEEM among business students, and among students from other academic majors, future research designs may use these variables in conjunction with personality in order to improve the prediction of PEEM.

From a theoretical standpoint, this study added new elements to the little knowledge regarding the influence of personality as defined by the Big Five on students' PEEM used in business education. Indeed, as compared to previous studies, it considered eight EMs simultaneously while including new methods often used in business courses (simulations and group work). These EMs are not only commonly used in business courses but also in other fields of study such as medicine. Further studies should be conducted on these same EMs among students from other fields of studies, as well as among business students using other EMs applied by business faculty such as portfolios.

From a practical perspective, this study offers several avenues of reflection for both students and professors. The results make it possible to assist students in their choice of courses according to the course content in combination with the EMs used by taking into account their psychological characteristics. Professors could also be led to think about assessment strategies that are better adapted to students' personalities. In a context of seeking to improve academic



achievement, this might have a significant impact and might increase the likelihood of successful student outcomes.

## Appendix 1

**Table 8** Correlations among PEEM

|                          | 1     | 2      | 3      | 4      | 5      | 6      | 7      | 8      |
|--------------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| 1. Case studies          | 1.00  | 0.22*  | 0.08   | 0.10   | -0.14  | -0.11  | 0.21*  | 0.11   |
| 2. Simulations           | 0.22* | 1.00   | 0.22*  | 0.07   | -0.12  | 0.05   | 0.26** | 0.09   |
| 3. Group work            | 0.08  | 0.22*  | 1.00   | 0.26** | -0.09  | -0.08  | 0.11   | 0.36** |
| 4. Oral exams            | 0.10  | 0.07   | 0.26** | 1.00   | 0.09   | -0.07  | 0.18*  | 0.20*  |
| 5. Written exams         | -0.14 | -0.12  | -0.09  | 0.09   | 1.00   | 0.41** | 0.20*  | 0.07   |
| 6. Multiple choice tests | -0.11 | 0.05   | -0.08  | -0.07  | 0.41** | 1.00   | 0.20*  | -0.19* |
| 7. Practical work        | 0.21* | 0.26** | 0.11   | 0.18*  | 0.20*  | 0.20*  | 1.00   | 0.34** |
| 8. Projects              | 0.11  | 0.09   | 0.36** | 0.20*  | 0.07   | -0.19* | 0.34** | 1.00   |

1 case studies, 2 simulations, 3 group work, 4 oral exams, 5 written exams, 6 multiple choice tests, 7 practical work, 8 projects

\* $p < 0.05$ ; \*\* $p < 0.01$

## Appendix 2

**Table 9** Quality of adjustment indicators for model data

|   | Case studies<br>( $n=139$ )  | Simulations ( $n=128$ )              | Group work ( $n=168$ )        | Oral exams ( $n=146$ ) |
|---|------------------------------|--------------------------------------|-------------------------------|------------------------|
| Chi-square<br>(SATORRA-<br>BENTLER)/ $df$ | 1.57                         | 1.12                                 | 1.47                          | 1.52                   |
| CFI                                       | 0.89                         | 0.97                                 | 0.93                          | 0.91                   |
| RMSEA                                     | 0.06                         | 0.03                                 | 0.05                          | 0.06                   |
|   | Written exams<br>( $n=168$ ) | Multiple choice<br>tests ( $n=164$ ) | Practical work<br>( $n=158$ ) | Projects ( $n=138$ )   |
| Chi-square<br>(SATORRA-<br>BENTLER)/ $df$ | 1.47                         | 1.36                                 | 1.50                          | 1.45                   |
| CFI                                       | 0.94                         | 0.93                                 | 0.92                          | 0.92                   |
| RMSEA                                     | 0.05                         | 0.05                                 | 0.06                          | 0.06                   |

A  $\chi^2/df$  value between 5 and 2, a CFI between 0.90 and 0.95, and a RMSEA value between 0.08 and 0.06 represent acceptable adjustment

A  $\chi^2/df$  value inferior to 2, a CFI between 0.95 and 0.99, and a RMSEA between 0.06 and 0.01 represent good adjustment

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