(Research Article)

Check for updates

# Leveraging machine learning and data analytics to predict academic motivation based on personality traits in university students

Akinkunmi Rasheed APAMPA [1, *], Olusegun Afolabi [2] and Samson Ohikhuare Eromonsei [3]

[1] College of Business and Social Sciences, Aston University, Birmingham, UK.
[2] Department of Information Systems and Business Analysis, Aston Business School, Aston University, Birmingham, UK.
[3] Department of Computer Science, Prairie View A & M University, Prairie View, Texas USA.

## Abstract

In an era where education increasingly intersects with technology, understanding the drivers of academic motivation is crucial for developing effective educational strategies. This study, research article explores the predictive power of personality traits on academic motivation through the application of machine learning techniques. The research builds upon the foundational psychological theories that link personality traits to motivation, utilizing advanced data analytics to offer a more refined and predictive model. The study involves a comprehensive analysis of personality traits and motivational factors among university students from diverse cultural backgrounds, specifically focusing on two distinct populations. Using a combination of machine learning algorithms, including regression models, decision trees, and neural networks, the research aims to predict students' motivational dimensions—intrinsic, extrinsic, and amotivation—based on their personality profiles. Data was collected using established psychometric tools, and the resulting dataset was subjected to rigorous preprocessing to ensure the accuracy and reliability of the predictive models.

This research contributes to the existing literature by offering a novel application of machine learning in educational psychology, particularly in the context of predicting academic motivation. The integration of data analytics not only enhances our understanding of the complex interplay between personality and motivation but also provides practical tools for educators and policymakers. By identifying students who may require additional support or intervention, the models developed in this study can inform personalized educational strategies that foster motivation and improve academic outcomes. The article represents a significant advancement in the field of educational psychology, demonstrating the potential of machine learning to transform how we assess and address academic motivation. It provides a valuable framework for future research and offers practical implications for enhancing student engagement and performance in higher education.

The findings demonstrate that machine learning models can effectively predict academic motivation with a high degree of accuracy, outperforming traditional statistical methods. Conscientiousness, openness, and neuroticism emerged as significant predictors of intrinsic and extrinsic motivation, while neuroticism showed a strong correlation with amotivation. The study also highlights the differences in motivational patterns across different cultural contexts, providing insights into how personality traits influence motivation in varied educational environments.

**Keywords:** Machine Learning; Data Analytics; Academic Motivation; Personality Traits; University Students

* Corresponding author: Akinkunmi Rasheed APAMPA

## 1. Introduction

### 1.1. Research Aim

There has been significant prior research that has examined the relationships between individual differences and academic performance, but very few have looked at its effect on motivation, as the focus has been mainly on academic achievement, with no clear evidence regarding the extent to which traits influence motivation. Notwithstanding, strong evidence exists that academic success is strongly influenced by motivation (Linnenbrink and Pintrich, 2002; Jenkins and Demaray, 2015) and personality trait is seen as a predictor of attitudes, motivation and leadership (Ariani, 2013). Given this significance, examining the impact of individual differences through the lens of trait research on academic motivation, to unveil its impacts, clearly deserves more attention and further examination.

The purpose of this research is to investigate the association between individual differences via construct of personality traits and academic motivation. It aims to provide explanations to the variations in students' academic motivation in university students via an assessment of the role of the Big five Traits as described by the Five Factor Model of Personality (McCrae and John, 1992). The results will also play a crucial role to investigate if relationships hitherto uncovered between personality traits and academic success are consistent with its hypothesized associations with academic motivation.

The study utilizes the discoveries of the Big Five Traits as described in the Five Factor Model of Personality to explore the academic motivation for university students drawn from two universities in separate geographical and cultural settings: Aston University, UK, and the University of Lagos in Nigeria. Historically, studies exploring the interaction between personality factors and academic motivation/performance tend to focus on a single cultural context when selecting participants. Several examples exist: Schoeman & Kotzee (2022) of Stellenbosch University (South Africa) base their study on a single institution. Similarly, Fuertes et al (2020), of University of Leon (Spain) draw their sample from Leon University's Faculty of Education.

By drawing sample from two separate universities located across different continents (Africa and Europe), this study rises above the one-academic-institution and mono-cultural context limitation providing a greater level of heterogeneity and consequently reduces bias. Additionally, the results from the study can be analysed to investigate if the cultural context in which a university is set is a factor that impacts the relationship between personality traits and academic motivation by observing the consistencies across the data sets.

Furthermore, a deeper understanding of academic motivation and its correlates can provide important cues and valuable information on how best to design educational offerings to maximise student potentials, based on the logic that students will be best motivated in an academic environment that provides the best fit with their personality trait.

### 1.2. Research Background

Trait theory is one of the major approaches to the study of human personality. In the framework to this approach, personality traits are defined as habitual patterns of behaviour, thoughts and emotion that manifest in a wide range of situations. The most important features of traits are its relative stability over time, different degrees of expression in individuals and influence on behaviour (Judge and Robbins, 2017).

Historically, attempts to expound human behaviour using the trait theory have been met with heavy criticisms and backlash, and largely unsuccessful (Edwards, 1957; Christie and Lindauer, 1963; Argyle and Little, 1972). However, following decades of doubt and defensiveness, there has now been a growing acceptance in personality psychology that traits not only exists, but that they can also be measured reliably, and these measurements of the individual differences in traits can serve as a crucial tool in the prediction of human behaviour (McCrae and Costa Jr, 2004). Unlike the 70s, 80s and 90s when traits were seen as poor predictors of human behaviour (Mischel and Peake, 1982), the last two decades have witnessed a remarkable turnaround following the development of the Five Factor Model as an acceptable framework for understanding the universe of personality traits (McCrae, 2009).

The reanalysis of classic peer-rating studies, and the empirical demonstration of substantial longitudinal consistency in personality traits subsumed within the five-factor framework (McCrae, Costa and Arenberg, 1980) have all led to the convergence of researchers on the value and acceptance of the Big Five as the major conceptual and empirical framework in the field of personality psychology. One major view of organizational research is that disposition (personality), alongside situational factors remain a major determinant of human behaviour and motivation (Erez,

1997). In addition, personality traits may be a source of motivation, as personality has been evidenced as a vital factor in this regard (Hazrati-Viari, Rad and Torabi, 2012).

Motivation has been described as a set of energetic forces that originates within, as well as beyond an individual, to initiate behaviour and to determine its trajectory, form, intensity and duration (Borah, 2021). Motivation is a conscious process, that includes a series of assessment: whether to engage in a behaviour, how much effort to exert, and how to control the behaviour once the individual takes the decision to engage in the chosen task. It is a force that provokes enthusiasm and persistence to deliver a certain cause of action. Motivation can either be intrinsic or extrinsic. Extrinsic motivation is rooted in the desire to attain a goal that is separate from the work itself, like a promised reward or winning a competition, while with intrinsic motivation individuals engage in tasks because they derive satisfaction from performing the tasks themselves (Deci, Koestner and Ryan, 2001)

Similarly, in the academic context, we can look at the motivation construct as being driven either by intrinsic or extrinsic factors. Extrinsic motivation will refer to external sources of influence, such as interactions that provide a support system and tangible rewards or intangible incentives (Goodman et al., 2011) whereas intrinsic motivation is driven by keen interest and involvement in the work, curiosity, enjoyment, or a personal sense of challenge.

Understanding the relationship between personality traits and academic motivation will be crucial in improving academic success, from a number of perspectives. For example, it could help educators identify students that may be at risk for poor academic performance, and consequently help aid the design of structures and strategies to help those struggling with academic motivation. Furthermore, it is important to appreciate that the preferred styles of learning vary from one student to another. Biggs (1993) explains that the learning approaches of students fall into three categories namely: surface style, deep style and achieving style. Variations in terms of preferred learning styles and sources of motivation can also offer significant insights on how educational offerings could be designed to help students optimize performance in various educational settings.

It is important to note that academic motivation is a complex and multifaceted construct influenced by various individual, social, and cultural factors. Understanding these factors and implementing targeted interventions can contribute to fostering a positive and motivating academic environment.

## 1.3. Research Questions and Objectives

The following research questions and objectives were formulated, to aid the achievement of the overall research goal of the study.

### 1.3.1. Research Questions

- How can personality types be effectively measured?
- What personality traits are the best predictors of academic motivation?

### 1.3.2. Research Objectives

- To investigate the personality traits or group of traits that is most influential in academic motivation.
- To investigate personality traits or group of traits that may be linked with a lack of academic motivation.

## 2. Literature review

**Table 1** Key Concepts, Indicative Literature, and Theoretical Focus in Personality and Motivation Research

| S/N | ASSOCIATED CONCEPTS | INDICATIVE LITERATURE | THEORETICAL FOCUS |
|---|---|---|---|
| 2.1 | Exploring the concept of motivation | Britannica, E. (2008) *Britannica concise encyclopedia*. Encyclopaedia Britannica, Inc. | Etymology and meaning of 'motivation' |
| | | Borah, M., 2021. Motivation in learning. *Journal of Critical Reviews*, 8(2), pp.550-552. | An articl on understanding and influencing learner's motivation |
| | | Ryan, R.M. and Deci, E.L., 2000. Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, 25(1), pp.54-67. | The article discusses the relations of both classes of motives to basic human needs for autonomy, competence and relatedness are discussed. |
| | | Goodman, S. *et al.* (2011) 'An investigation of the relationship between students' motivation and academic performance as mediated by effort', *South African Journal of Psychology*, 41(3), pp. 373–385. | An investigation on the relationship betweeen motivation, effort and academic performance, with specific reference to tertiary level institutions in the South African context |
| 2.2 | Investigating the concept of Academic Motivation | Cayubit, R.F.O., 2022. Why learning environment matters? An analysis on how the learning environment influences the academic motivation, learning strategies and engagement of college students. *Learning Environments Research*, 25(2), pp.581-599. | An article on how environment influences academic motivation of college students |
| | | Deci, E.L., Koestner, R. and Ryan, R.M., 2001. Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of educational research*, 71(1), pp.1-27. | This article discusses the interplay of extrinsic rewards on intrinsic motivation, in terms of its relevance in academic practice |
| | | Vallerand, R.J. *et al.* (1992) 'The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education', *Educational and psychological measurement*, 52(4), pp. 1003–1017. | The article discusses Academic Motivation Scale by drawing on the Self determinant Theory |
| 2.3 | Analysing the concept of personality and individual differences | Judge, T.A. and Robbins, S.P., 2017. *Essentials of organizational behavior*. Pearson Education (us). | The chapter examines the concept of personality as an individual difference, and introduces the concept of trait thoery |
| | | Chamorro-Premuzic, T., 2016. *Personality and individual differences*. John Wiley & Sons. | A state of the art academic textbook that covers the salient and recent literature on personality, intellectual activity, motivation and other individual differences |
| 2.4 | Investigating the relationship between personality traits and academic motivation/ performance | Komarraju, M., Karau, S.J. and Schmeck, R.R., 2009. Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and individual differences*, 19(1), pp.47-52. | A study of the relationship between the Big Five traits decribed by Five factor Model and academic achievement among college students in the United States. |
| 2.5 | Applicable Theories | Marsh, H.W. *et al.* (2003) 'Evaluation of the Big-Two-Factor Theory of academic motivation orientations: An evaluation of jingle-jangle fallacies', *Multivariate Behavioral Research*, 38(2), pp. 189–224. | Investigates the two-factor theory of Academic Motivation |
| | | Deci, E.L. and Ryan, R.M. (1985) 'The general causality orientations scale: Self-determination in personality', *Journal of research in personality*, 19(2), pp. 109–134. | Investigates the SDT theory of Academic Motivation |
| | | McCrae, R.R. and John, O.P., 1992. An introduction to the five-factor model and its applications. *Journal of personality*, 60(2), pp.175-215. | An intorduction to the Five Factor model and its application |
| | | McCrae, R.R. and Allik, I. eds., 2002. *The five-factor model of personality across cultures*. Springer Science & Business Media. | An insight into the FFM, observed from a socio-cultural context |
| 2.6 | The analysed case study | O'Connor, M.C. and Paunonen, S.V. (2007) 'Big Five personality predictors of post-secondary academic performance', *Personality and Individual differences*, 43(5), pp. 971–990. | A study of big 5 personality traits as predictors of academic performance |
| | | Komarraju, M., Karau, S.J. and Schmeck, R.R., 2009. Role of the Big Five personality traits in predicting college students' academic motivation and achievement. *Learning and individual differences*, 19(1), pp.47-52. | A study of big 5 personality traits as predictors of achievement |

Table 1 provides a comprehensive overview of the key concepts, indicative literature, and theoretical focuses that underpin research in personality and motivation studies. It serves as a valuable reference for understanding how various theoretical frameworks and empirical studies contribute to the field. The table categorizes essential concepts, aligns them with relevant scholarly works, and highlights the primary theoretical lenses through which these concepts

are examined. This structured approach not only aids in organizing the vast body of literature but also underscores the interdisciplinary nature of research in personality and motivation, drawing connections between educational psychology, organizational behavior, and personality studies.

## 2.1. Exploring the Concept of Motivation

An etymological deep dive into this concept, reveals that the word "motivation" is derived from the Latin word "motivus" literally translated in the English lexicon as – a moving cause (Britannica, 2008). This lends credence to the activating properties of the processes involved in psychological motivation. Simply speaking, motivation is a force that causes you to act in a way that gets you closer to your goals. As far back as decades ago, Motivation has been operationalized as the underlying "why" of behaviour" (Vallerand et al., 1992). Psychologists have long been interested in the study of motivational forces to expound the spectrum of observed behavioural changes that occur in an individual. Motivation is the reason for which humans and other animals initiate, continue, or terminate a behaviour at a given time. Motivation is the reason for which humans, and indeed all animals, initiate, maintain or terminate a behaviour at any given time (Toates, 2002).

Psychologists focus on changes in behaviours when studying motivation forces because motivation cannot be measured overtly; it is inferred from observed changes in behaviour that occur after interaction with a stimulus, which could be external or internal. Therefore, motivation is majorly a performance variable, that promotes changes in behaviour (Hammar, 2023). Motivation encompasses the aims, determining factors, foundations and motives for various human activities. The term motivation is used in social research and in real life to offer descriptions and predictions of human behaviours. Historically, metaphors such as 'godlike' and "machine" have been used to elaborate on the concept of human motivation (McReynolds et al., 1990).

Motivation is driven by intrinsic or extrinsic factors. This Intrinsic-Extrinsic Motivation theory is a dualism that divides motivation into two dimensions: Intrinsic and Extrinsic. Intrinsic motivation is generally best described as doing something for its own sake. It refers to a natural tendency towards exploration, interest and mastery that represent a critical source of enjoyment. With intrinsic motivation, tasks are undertaken by individuals because they find them rewarding and satisfying by themselves (Deci, Koestner and Ryan, 2001). This type of motivation is driven by deep interests, curiosity, enjoyment or a personal sense of challenge. Consequently it is measured along the dimensions of will to succeed, mastery in relation to challenging tasks and meaningfulness of academic performance. (Goodman et al., 2011). Extrinsic motivation on the other hand, is driven by motives other than the task itself, such as a promised reward, a deadline, or winning a competition (Legault, 2020). Extrinsic motivation uncovers the individuals inclination to perform tasks for the purpose of attaining separate consequence, such as tangible or even intangible (e.g. praises, accolades) rewards (Ryan and Deci, 2000) .Intrinsic motivation is more connected to basic affective reaction, whereas extrinsic motivation are majorly influenced by social demands and normative inducements.

However, both intrinsic and extrinsic motivation determines what an individual is capable of doing within a given domain. Notwithstanding, it is important to note that Intrinsic-Extrinsic dualism construct has fallen under severe criticisms, with many researchers agreeing that is fails on at least three counts: construct validity, measurement reliability and experimental control (Galang, 2021) . Consequently, a few are beginning to move beyond the study of Intrinsic-Extrinsic to multifaceted theories which recognize a plethora of genetically distinct motives like hunger, curiosity, fear, sex, positive self-esteem, etc.

Unlike dualistic theories, which divide motivation into intrinsic and extrinsic categories, multifaceted theories recognize a broader range of motives, including the influence of emotions on motivation. Some examples of multifaceted theories that explain the role of emotions in motivation include the following:

### 2.1.1. Multifaceted Model of Intrinsic Motivation

This model challenges the reduction of human motives to just two categories, such as intrinsic and extrinsic motivation. It recognizes that goals are diverse and delineates various fundamental motives, many with different evolutionary histories (Reiss, 2004).

### 2.1.2. Emotion Theory and Research

Emotion theory and research highlight the central role of emotions in the evolution of consciousness, the influence on the emergence of higher levels of awareness during ontogeny, and their significant impact on motivating cognition and action (Izard, 2009).

These examples demonstrate how multifaceted theories encompass a broader range of motives, including the influence of emotions on motivation, in contrast to dualistic theories that divide motivation into intrinsic and extrinsic categories.

## 2.2. Exploring the Concept of Academic Motivation

Motivation remains a homogenous concept across several domains, and in populations of students, it is a key part of learning. Academic motivation is a multi-faceted psychological construct that is a main determinant of overall student satisfaction with curricular and extra-curricular activities, and a predictor of academic achievement (Jenkins and Demaray, 2015). In its simplest form, academic motivation has been defined as the factors that influence an individual in the pursuit of an academic goal, such as to attend school and obtain a degree.

According to Vallerand et al. (1992) who developed the Academic Motivation Scale (AMS) by drawing on the self-determination theory (SDT) proposed by Deci and Ryan (1985), Academic motivation asks the question "Why do you go to college?" (Vallerand et al., 1992). Thus, academic motivation can be understood as the motivation to decide for and continue with university studies. Given this significance, the role of academic motivation in academic achievement cannot be overemphasized, and It has been conceptualised as major predictor of academic success (Jenkins and Demaray, 2015).

Research has shown demonstrated that students can be either intrinsically or extrinsically motivated, with some students displaying keen sense of interest, marked by intellectual curiosity while others remain disengaged (Deci and Ryan, 1985) showing a complete lack of motivation - amotivation. Amotivation arises when students are not enthusiastic about learning and do not feel compelled to engage in the learning activities (Hidajat et al., 2020). This lack of motivation in learners is characterized by passiveness, failure to attend lectures, absenteeism and in many cases has led to dropping out of school (Stoeber et al., 2011).

In more recent times, academic motivation has become a conspicuous, recurrent, high-frequency topic in educational research, given that it is the inspiration that drives students in pursuing and sustaining their academic goals. Academic motivation is defined by a student's desire reflected via approach, consistency, degree of enthusiasm regarding academic subjects when the student's competence is judged against a performance standard or excellence (Spitzer and Keller, 1978). Academic motivation is a broad term incorporating many concepts studied by scholars to include self-efficacy, determination, resilience, etc. All these terms incorporate characteristics related to motivation.

Brophy (1983) identifies the prominent dimensions of student motivation as: State motivation vs. Trait motivation. State motivation describes the attitude that learners have towards a specific course while Trait motivation applies to learners' overall attitude towards the process of learning as a whole. State motivation is dependent on the viewpoints of learners, content of courses, attitudes towards their teachers and the learning environment (Hiver, Al-Hoorie and Mercer, 2020). By the same token, Dornyei (2020) elucidates, students' perceptions about their teachers and the various interpersonal issues impact the students' motivation. Therefore, if teachers depict appropriate behaviours in classrooms, they increase the learners' state motivation (Bernaus and Gardner, 2008).

The relationship between academic motivation and performance is well-established. Numerous studies indicate a positive correlation between high levels of academic motivation and improved performance. Motivated students tend to set challenging goals, persist in the face of difficulties, and adopt effective learning strategies. Conversely, low academic motivation is associated with disengagement, lower achievement, and increased dropout rates. Recognizing this link is fundamental for educators and policymakers seeking to improve educational outcomes. Consequently, understanding the factors that shape academic motivation is crucial for educators and researchers. Individual factors, including self-esteem, self-efficacy, and goal orientation, significantly impact students' motivation. Likewise, social factors, such as peer relationships, teacher-student interactions, and family support, play vital roles in shaping motivation. Cultural factors also contribute, as cultural values and expectations influence the importance placed on education within a particular context. Striking a balance between intrinsic and extrinsic motivation is essential, as both play unique roles in driving students toward academic engagement.

Educators employ various interventions and strategies to enhance academic motivation. Autonomy-supportive teaching, where teachers acknowledge students' perspectives and choices, fosters higher levels of motivation (Reeve, 2016). Goal setting, providing specific, challenging, and realistic objectives, is another effective strategy (Locke and Latham, 2019). Constructive feedback and appropriate rewards can positively impact motivation, but their type and timing are critical considerations. Counselling and support programs, addressing individual needs and challenges, contribute to increased motivation. As technology and artificial intelligence continue to play a significant role in education, researchers are exploring how online platforms, gamification, and educational apps can positively influence

academic motivation. This intersection of technology and academic motivation is an evolving area of research. Online learning platforms strive to offer interactive and engaging methods, potentially enhancing motivation. Gamification, incorporating game-like elements into educational activities, has shown promise in capturing students' interest (Caponetto, Earp and Ott, 2014). Educational apps catering to diverse learning styles contribute to a more personalized and motivating learning experience. However, challenges such as accessibility and individual preferences must be considered to maximize the positive impact of technology on academic motivation.

## 2.3. Personality Traits and Five Factor Model (FFM)

Personality has been described as the totality of ways in which an individual reacts to and interacts with others (Judge and Robbins, 2017). Theories of personality conceptualize individual differences in terms of traits, which are partly inherited, but more importantly as psychological characteristics that remain relatively stable throughout life, particularly in adulthood. In much the same way as we describe individuals according to their physical characteristics e.g. tall, short, blonde, pale etc, personality theorists have attempted to develop a taxonomy for individuals in terms of their psychological characteristics (Chamorro-Premuzic, 2016).

Early trait theories, such as Allport's trait theory and Cattell's 16 Personality Factors laid the groundwork for understanding stable patterns of behaviour (Novikova, 2013) . However, it was the Five Factor Model that provided the foundations for a comprehensive and widely accepted nomenclature. The five factor model (FFM) is the result of ground- breaking work in this area of trait research and has come to be arguably the most accepted taxonomy for explaining personality structure and individual differences (McCrae and John, 1992). It marked a turning point in personality psychology, and provided and efficient and integrated model, devoid of the redundancy that hitherto plagued the results of measuring the same constructs under dozens of names. Its widespread use in personality assessment and cross-cultural relevance (McCrae and Allik, 2002) speaks volumes as to its reliability and acceptance.

The FFM provides a universal language for psychologists and personality theorists across various cultures, to explain a natural framework for organising research, and a guide to comprehensive assessment of individuals that is of tremendous value in several spheres of psychology – educational, organizational, and even clinical. It describes individual differences in five dimensions viz: (i) Extraversion, (ii) Agreeableness, (iii) Openness to Experience, (iv) Conscientiousness and (v) Neuroticism/ Emotional Stability (Soto and Jackson, 2013)

Extraversion is characterized by adventure, sociability, and spontaneity. Extraverts often seek social stimulation, enjoy the company of others and are generally assertive. Agreeableness is characterized by honesty, courtesy and kindness. This trait is synonymous with interpersonal warmth, altruism and the tendency to avoid conflict. Openness to experience is characterized by intellect, imagination, and preference variety. High scorers are open minded and very imaginative, while low scores are comfortable with routine and familiarity. Conscientiousness reflects a deep sense of responsibility, organisation and reliability. Conscientious individuals are goal-oriented with a high level of self-discipline and in many cases indicate a strong preference for structured environments. Neuroticism on the other hand, is characterized by emotional instability, insecurity and immaturity. High scorers are prone to anxiety, moodiness, and stress, while low scorers are more emotionally resilient and composed (Wiggins, 1996).

The Five-Factor Model has found applications in various fields, including psychology, business, and health. Research suggests that personality traits influence academic and occupational outcomes, interpersonal relationships, and even health behaviours. For example, conscientious individuals may excel in academic and professional settings, while extraverts may thrive in social and leadership roles. Studies exploring the relationship between personality traits and well-being have gained prominence. High levels of conscientiousness and agreeableness are associated with greater life satisfaction, while neuroticism is linked to higher levels of stress and lower subjective well-being (Mohiyeddini, Bauer and Semple, 2015). Understanding these associations has implications for interventions aimed at enhancing individuals' overall life quality.

While the Five-Factor Model has garnered widespread support, critics have highlighted its cultural specificity and the potential oversimplification of personality as major challenges. Researchers continue to explore cultural variations in trait expression and refine the model to capture the nuances of individual differences more accurately. The Five-Factor Model has significantly shaped our understanding of personality, providing a comprehensive framework for studying stable patterns of behaviour. Its practical applications in diverse fields underscore its relevance in explaining and predicting human behaviour. As research in personality psychology advances, the Five-Factor Model continues to be a foundational construct, enriching our comprehension of the complexities of individual differences.

## 2.4. Relationship Between Personality Traits and Academic Motivation

As proven by several credible studies conducted in diverse environments, personality traits, particular the Big Five traits, have an incontestable bearing on academic motivation and academic performance. Relationships between personality and academic motivation examined in college students indicated that those who were intrinsically motivated to attend college tended to be extroverted, agreeable, conscientious, and open to new experiences; while those who were extrinsically motivated tended to be extroverted, agreeable, conscientious, and neurotic; depending on the type of extrinsic motivation. Those who lacked motivation tended to be disagreeable and careless (Clark and Schroth, 2010) These results suggest that students with different personality characteristics have different reasons for pursuing college degrees and different academic priorities.

Conscientiousness is the predominant determinant of academic accomplishments at various levels of education including tertiary. Conscientiousness impacts the students' regulatory tendencies such as focusing on tasks, attainment of goals and retention of information all of which are critical ingredients of academic achievements. Conscientiousness, characterized by traits such as organization, responsibility, and self-discipline, emerges as a key predictor of academic success. In the realm of academic motivation, conscientious students exhibit a strong sense of purpose, goal setting, and a disciplined approach to their studies. Their motivation is deeply intertwined with a desire to excel academically, meet expectations, and attain long-term objectives. Conscientiousness has been linked to success in almost every professional field (Barrick and Mount, 1991).

Lai (2011) elaborates how motivation entails making a choice about making effort, identifying the level of effort and persisting in making the effort. Consequently, there is an inherent relationship between general performance and conscientiousness; the relationship is subject to motivation, particularly the extrinsic sources of motivation (Hart et al., 2007). Dweck & Leggett (1988) explain that learners who view intelligence as something that is fixed, tend to embrace performance-oriented goals and are more likely to despair in the face of obstacles; whereas learners who view intelligence as something that is changeable, embrace learning goals and they persevere when they encounter obstacles along the way. According to Muntean et al. (2022), emotional stability, conscientiousness, and agreeableness have a positive association with academic motivation in Romanian medical students. Conversely, extraversion and openness exhibit a negative relationship with academic motivation. However, other scholars such as Nayak (2016) and Isa (2019) argue that extraversion has no impact on academic results whereas others such as Riba et al (2020) conclude that extraversion has a positive association with academic performance. Begum et al. (2021) completed a study focusing on students pursuing healthcare studies at Ras AI Khaimah Medical and Health Sciences University, United Arab Emirates. The findings demonstrate that the highest GPAs were reported by learners who selected the agreeableness dimension whereas the lowest GPAs were reported by learners who selected the dimension of neuroticism.

Conscientiousness and agreeableness depicted a significant and positive correlation with academic performance. Of all the Big Five traits, conscientiousness has the strongest significance in academic performance gauged using grade point average (GPAs) whereas neuroticism has a negative relationship with academic scores. These conclusions are supported by Noftle & Robins (2007) who affirm the significance of conscientiousness in predicting academic performance. Particularly, they affirm that the main facets of conscientiousness that impact GPA scores include self-discipline, achievement striving and competence for students at University of California, Davis and University of California, Berkeley.

Ross, Rausch & Canada (2003) and Kanfer, Ackerman & Heggestad (1997) conclude that the strongest orientation towards learning is among students who are conscientious, extroverted and open. Conscientiousness has a strong correlation with intrinsic motivation. Similarly, conscientiousness has a positive correlation with extrinsic motivation. In addition to being achievement-oriented, students who are extraverted and conscientious have a preference for direct learning styles, in comparison with students who have high levels of neuroticism and are afraid of failure. They experience difficulties in processing important materials, and have low motivation for achievement and prefer an undirected style of learning (Busato et al., 2000).

According to Entwistle and Entwistle (1970) it is possible for stable introverts to report better performance than extraverts who are emotionally unstable as long as they (stable introverts) employ effective study methods. Perfectionists are likely to score high GPAs and their chances of staying in school are higher than the students experiencing low self-esteem issues, which increase their chances of dropping out of school (Pritchard & Wilson, 2003). Intrinsic motivation has a positive correlation with academic performance. Intrinsically motivated learners expend lots of effort in acquiring knowledge since they are inspired by the pleasure of getting knowledge. Intrinsic motivation makes learners discover challenges within themselves. In a study focusing on the motivation of medical students, Liu et al.(2020), report that intrinsic motivation impacts academic achievement more than extrinsic motivation. A study

completed by Clark & Schroth (2010), demonstrates that intrinsically motivated college students are open to new experiences, extroverted and agreeable. The college students who lack motivation report high levels of carelessness and they are disagreeable.

Komarraju & Karau (2005) report that there are significant associations between personality traits and academic motivation. Notably, conscientious learners derive motivation from the desire for achievement whereas neurotic learners report relatively higher avoidance score. By the same token, Komarraju et al. (2009) argue that intrinsically motivated learners are likely to be conscientious and their openness to new experiences is high. In comparison, extrinsically motivated college students exhibit relatively higher levels of conscientiousness, extroversion and neuroticism. College students lacking motivation report high levels of disagreeableness and low levels of conscientiousness.

Psychoticism is a personality dimension that has been linked to poor academic performance. To elaborate, Maqsud (1993) explains that Psychoticism has a negative relationship with academic achievement whereas academic attainment has a positive relationship with academic self-concept. Consequently, Psychoticism has the potential of influencing learners' self-conceptions, which impact their academic performance. The extent of academic success could be limited by Psychoticism. Notwithstanding, some studies have shown that there is a positive association between Psychoticism and creativity (Acar and Runco, 2012) and creativity has a positive correlation with academic attainment (Alice Lalchhandami, 2016). Heaven (1990) concludes that extraversion has a positive correlation with achievement motivation whereas impulsiveness and psychoticism has a negative association with academic achievement.

Openness to new experiences can impact academic achievements both positively and negatively. There are various variants of openness that can impact educational processes. To elaborate, academic achievement is negatively impacted by openness to things such as feelings, fantasy and aesthetics Accordingly, when a student has a low level of openness towards these facets, they will report good academic performance. Having a high level of openness towards these negative facets reduces a learner's capacity to accommodate knowledge since the facets impact the discipline, determination and focus of learners (Gatzka, 2021).

Given the complexity and multidimensionality of amotivation, Legault, Green-Demers & Pelletier (2006) have proposed a taxonomy that identifies the constructs that contributes to academic amotivation. First, insufficient academic values create perceptions that make learners devalue the importance of academic work. Second, is a deficiency in the individual's ability beliefs. Ability beliefs refers to the beliefs that make learners to feel that their abilities or competencies are insufficient to complete academic work. Third, unappealing task characteristics make learners to feel that academic work is neither attractive nor inspiring. Fourth, deficient effort beliefs are a construct that depicts the learners' belief about their lack of capacity which is required to engage in academic work. This multifaceted taxonomy has been endorsed by Shen et al. (2010) because it depicts the structural complexities of academic motivation better than it is portrayed in the one-dimensional conceptualization.

## 2.5. Applicable Theories

### 2.5.1. Theories of Motivation

Several theories and perspectives have been proposed to expound on the concept of motivation. First, the psychodynamic perspective explains the unconscious and biological factors that influence motivation. Human behaviours are dictated by key motivators such as sex and aggression and these drives, which create tension that results in satisfaction could be expressed overtly or covertly (McClelland, 1985).

Second, the humanistic perspective deals with people's desire for growth and attainment of fulfilment. Abraham Maslow's hierarchy of needs is a predominant theory in the humanistic perspective which postulates that motivation is driven by unmet needs that are ranked in a hierarchy (Neher, 1991). The hierarchy moves from the low-level to high-level needs: physiological needs, safety needs, love needs and self-esteem needs. In Maslow's hierarchy, the lower needs ought to be fulfilled before one progress to the upper needs. Notably, the fulfilment of the lower needs is not an "all—or-none" scenario, thus their fulfilment need not be 100% for the next level of needs to emerge (Maslow, 1987).

The first four categories of needs are classified as deficiency needs whereas the needs in the uppermost category are classified as growth/being needs. Deficiency needs are attributed to deprivation such as deprivation of food; the deficiency needs cause motivation in people who have not met them. Denying people the deficiency needs for long increases the strength of the motivation to acquire them. Comparatively, growth needs are attributed to the longing for growth. Upon the reasonable satisfaction of growth needs one attains self-actualization.

**Figure 1** Abraham Maslow's hierarchy of needs

Third, the behaviourist perspective deals with operant conditioning. Operant condition suggests that people have a preference for pursuing rewards and circumventing punishments. Therefore, the behaviourist perspective dwells on drive-reduction such that unmet needs make drives to achieve a status of homeostasis which is a state of equilibrium that is instrumental in motivating humans ((Beeton, Weiler and Ham, 2005).

Fourth, the cognitive perspective, which is applied in various disciplines liken the human mind to a computer and expounds on the way information is processed by the human brain (Trautwein et al., 2012). The expectancy theory, which falls under the cognitive perspective, explains that motivation is founded on perceived ability and the link between achievement and effort. Goals are at the heart of cognitive theories since they are based on individuals' desires (Bandura, 2000). The goal-setting theory, which is endorsed by Locke (1991) underscores that gaols results in desirable outcomes that move away from a status quo. There should be particular conditions that make it possible for goals to motivate performance. Goals should be precise and they are related to the gap between an existing situation and the preferred situation.

### 2.5.2. Self Determinant Theory

Though, many of theories of motivation exist, the Self determinant theory (SDT) is arguably one of best-known theories of motivation (Marsh et al., 2003). SDT dissects motivating factors into three dimensions: Intrinsic, Extrinsic, and a third factor– amotivation which reflects a lack of motivation (Adams, Little and Ryan, 2017). Unlike behaviouristic approaches, which attempt to shape and control motivation from the outside, SDT places its emphasis on people's inherent motivational propensities for learning and growing, and how they can be supported (Ryan and Deci, 2017). SDT specifically argues that for healthy development to unfold, individuals require support for basic psychological needs (Ryan et al., 2019). Three needs are seen as particularly fundamental, namely those for autonomy, competence and relatedness.

### 2.6. Case Study

The current study examines how the Big Five personality traits relate to 3 factors academic motivation domains in university students selected across two separate universities – Aston University and University of Lagos (Unilag). Many previous studies have examined academic motivation using 2-factor model (Intrinsic and Extrinsic) which doesn't consider amotivation (lack of motivation) a distinct dimension of the motivation scale. This study seeks to extend the research using a 3-factor scale and observe the relationships between the five personality traits or groups of traits that may have significant relationships with any of the dimensions of the motivation scale, particularly amotivation.

Furthermore, because study relies on the use of separate population samples drawn from distinct geographies – Europe and Africa, it provides a lens to examine the cultural nuances and significance of ethnic differences in the consistency or otherwise of the relationships investigated.

# 3. Research methodology

## 3.1. Research Philosophy

The study's research philosophy is based on interpretivism. According to Bell, Bryman and Harley (2022), Interpretivism is as a research philosophy that is concerned with understanding the subjective meanings of social actions and the context in which they occur. In interpretivism, researchers tend to interpret the world according to their understanding and interpretation (Bell, Bryman and Harley, 2022). Similarly, Saunders, Lewis and Thornhill (2016) describes Interpretivism as a research philosophy that refers to the way humans make sense of the world around them, which bears many different perceptions of the way they judge, think and feel about organisational operation such as organisation behaviour, marketing, and human resource management.

Interpretivism focuses on the meanings that research subjects attach to social phenomena in an attempt by the researcher to understand what is happening and why is it happening. It is about understanding the differences between humans in their roles as social actors. The research philosophy is the outermost layer of the Saunder's research onion. It is related to a set of beliefs on the nature of the investigation of reality. (Saunders, Lewis and Thornhill, 2016). It is a framework that guides how research should be conducted based on ideas about reality and the nature of knowledge.

In this case of academic motivation and personality traits in university students, interpretivism can be used to understand how students perceive their own motivation and personality traits. This is done by administering questionnaires that ask students about their experiences and perceptions. Interpretivism can also be used to understand how students' motivation and personality traits are influenced by their social context, such as their peers, family.

## 3.2. Research Approach

The research approach refers to the way in which the theory is related to research (Åsvoll, 2014). There are three main approaches in this sense: induction, deduction and abduction. Induction is the process of generating theory from data, deduction is the process of testing theory with data, and abduction is the process of finding the best explanation for data using existing theory or creating new theory. These approaches are not mutually exclusive and can be combined in different ways depending on the research question and context.

The research approach for this study is based on induction. According to Saunders, Lewis and Thornhill (2016), inductive research is a research approach that involves the generation of theory from data. Inductive research is often used in qualitative research and involves the collection of data through observation, interviews or other methods. The data is then analysed to identify patterns and themes, which are used to develop theories or hypotheses. Inductive research is often used when little is known about a topic and the aim is to generate new knowledge. Likewise Bryman, describes induction as a process of moving from specific observations to broader generalisations and theories (Bryman, 2016)

In this case study involving personality types, inductive research is most appropriate because its flexibility allows for a rigorous exploration of the topic which can give rise to observations and new insights.

## 3.3. Research Strategies

The research strategy for this work is based on a case study, questionnaires and archival research. Robert K. Yin defines case study research as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 2018). A case study is a research method that involves an in-depth examination of a single instance or event. It is often used in qualitative research and can involve the collection of data through observation, interviews or other methods likes questionnaires and surveys. According to Saunders, Lewis and Thornhill (2016), some of the advantages of a case-study research include the ability to study different phenomena in their real life context, provide rich a detailed description of such phenomena, the use of multiple methods and sources of data and the ability to uncover and explore casual relationships, interactions and mechanisms.

In this research paper on personality types and motivation, case study is appropriate because it provides for exploration of the topic, and allows for discovery of new insights, that may ignite more extensive research. Moreover, the in-depth interaction provides a contextual understanding that is unmatched in comparison to theoretical engagement alone. Notwithstanding, it is crucial to bear in mind some shortcomings that have been associated with case studies, most

importantly the potential for a research bias, which may result from the case study being too narrow in scope, or homogeneity of the chosen sample data (Yin, 2018)

Questionnaires have been well utilized in research methods because of the speed, efficiency and low cost they offer in gathering large amount of information from sizeable sample volumes. These tools are particularly effective for measuring subject behaviour, preferences, intentions, attitudes and opinions, particularly for sensitive and ego-related information (Bryman, 2016), hence its appropriateness for this case study involving the measurement of academic motivation and personality traits among students.

The purpose of archival research is to use existing sources of information for the purposes of research. Archival research can be used to explore historical events, social trends, and other phenomena that have been documented over time. It can also be used to study changes in language use, cultural practices, and other aspects of society (Bell, Bryman and Harley, 2022). The value of archival research in studying personality traits and motivation in university students cannot be overemphasized because it allows for the examination historical records and other sources of information that may provide insights into these phenomena. For example, archival research could be used to examine student records, such as transcripts and disciplinary records, to identify patterns in academic performance or behaviour that may be related to personality traits or motivation.

## 3.4. Research Choice and Time Horizons

The research choice for this paper is based on mixed methods. This involves the use of a combination of quantitative and qualitative analysis in a single study (Ridder, 2014; Miles, Huberman and Saldaña, 2020). Conceptually, this approach allows for the use of a diversity of methods, combining inductive and deductive thinking, and offsetting limitations of exclusively quantitative and qualitative research through a complementary approach that maximizes strengths of both techniques.

In this particular study, quantitative approach will be used in the analysis of the data generated via questionnaires and surveys, while the qualitative technique will provide an interpretation of the results of the analysed data, via the lens of applicable sociological theories. The inductive research approach and philosophy of interpretivism are consistent with the research choice, and using all these in concert provides coherence for the conclusions that will be drawn.

This research design will apply cross-sectional analysis. Cross-sectional analysis involves the collection of data at a point in time from a given population. Cross sectional studies are useful in assessing prevalence and testing for associations and differences between groups (Saunders, Lewis and Thornhill, 2016) This is an appropriate choice since data concerning personality traits, and motivation will be collected from the participants at a point in time, to be used in the analysis, to investigate relationships that may exist.

## 3.5. Research Data and Analytical Techniques

The quantitative educational research methodology chosen for the project relied on a correlative, single subject design, as well as a multiple linear regression that relied on the utilization of two pre-validated questionnaires – Academic Motivation Scale (AMS-28), and Five Factor Inventory (NEO-FFI) (available in Appendix 1 and Appendix 2). Selected participants provided self-reported responses in the use of both inventories. The participant responses, together with pre-existing data provided by participants and demographic data about participants were used.

The aim of the project was to determine the nature and strength of relationships between personality traits and academic motivation for the pursuit of academics in the university. Since correlation does not imply causation, consideration of the findings by regression analysis for modelling of causation was made for the purpose of enhancing value of the project.

Both inventories (NEO-FFI and AMS-28) were used without modifications, since the reliability and validity provided by the authors provided sufficient comfort. Descriptive data relationships were identified and studied, and variables were naturally analysed and not manipulated. Strength of the linear association between studies variables were measured using Pearson product-moment correlation coefficient. Multivariate and hierarchical regression analysis was then used to explore causality amongst the variables examined in the study.

Data for the study was generated via structured questionnaires distributed to university students. The 60 item NEO-FFI(Five factor Inventory) and 28-item AMS (Academic Motivation Scale) questionnaires were used to investigate personality traits and academic motivation respectively. The NEO-FFI is a more objective than subjective questionnaire which was developed to provide a concise measurement of the five basic personality dimensions, using a standardised

list of questions and a 5-point Likert scale from strongly disagree to strongly agree (McCrae and Costa Jr, 2004). It is widely accepted with well-established reliability and validity (McCrae and Costa Jr, 2004; Novikova and Vorobyeva, 2019). Similarly, there has been extensive support for the psychometric properties of the AMS scale which measure students' academic motivation (Vallerand et al., 1992).

This data will be subsequently reviewed, pattern-matched through a process of exploratory factor analysis, and analysed and investigated for relationships with motivation via correlation analysis and multiple regression using Microsoft Excel. The research is supported by narrative analysis. Narrative analysis is a qualitative research method that involves the interpretation of narratives and stories (Nasheeda et al., 2019). Narrative analysis will be used to investigate the relationship between personality traits and academic motivation by analysing the stories, or narratives of students who have intrinsic, extrinsic or amotivation via the observed patterns and themes in their personality traits. The analysis can reveal patterns in the stories that are associated with high and low levels of academic motivation (Mertova and Webster, 2019)

### 3.5.1. Population Sampling and Testing

The project was conducted across two universities – Aston University, UK and the University of Lagos, Nigeria. Invitations were randomly extended to undergraduate students within the university, sequel to an explanation purpose of the study. Care was also taken to answer students' questions and inquisitions were encouraged. Each student was also provided a written explanation about the rationale, methodology and objectives of the project including contact details of the researcher for any further enquiries.

The data was collected via the use two measurement instruments:

- Neuroticism-Extraversion-Openness Five Factor Inventory -3 (NEO FFI3)
- Academic Motivation Scale (AMS-28)

These two instruments are included as Appendices 1 and 2 .

### 3.5.2. Administering the NEO-FFI 3

The NEO-FFI 3 is a questionnaire with 60 items distributed over the 5 personality domains – Openness to Experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism; and thus has 12 items allocated for each domain which is evaluated using a 5-point Likert scale. Respondents simply select the appropriate choice on the form from 5 options: Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), or Strongly disagree (SD). The questionnaire was administered to all selected participants via google forms.

Guidance on the keys was provided viz: Strongly Agree (SA) was used when the statement is definitely or always true; Agree (A) if the statement is mostly true; Neutral was appropriate if respondents were undecided on the statement or in situations where the frequency was about equally true as it was false; Disagree (D) was used when the statements were mostly false, and Strongly Disagree (SD) when the statements was adjudged by respondent to be definitely or always false. These scores were translated to nominal scale with SA – 4, A -3 , N-2, D-1, SD – 0. The scoring was also performed in the opposite direction for reversed scored items where SA – 0 and SD- 4; however, N remained 2 for standardised and reversed scored items.

Participants were provided with glossary within the inventory to that simplified the meanings and provided illustrations for words and questions that they may find confusing. They were also encouraged to seek further clarification from the researcher when required. Responses were examined in line with the recommended validity checks, and professional manual instructions were strictly adhered to with regards to acceptable inclusion of completed questionnaires when utilizing the NEO FFI 3. In line with the instructions, where ten or more questions were left unanswered, the respondent's test should be disqualified from being used as part of the dataset, and where nine or fewer were blank, they should be scored as neutral – N.

Using the google forms, the feedback from all respondents was collated and downloaded for subsequent analysis using Microsoft Excel. The raw scores for each domain were subsequently aggregated and averaged for each participant.

- The raw score for neuroticism (N) is the average the items 1, 6, 11, 16, 21, 26, 31, 36, 41, 46, 51, and 56. Note that Items 1,16, 31,46 are reversed scored.
- The raw score for extraversion (E), is the average of the items 2, 7, 12, 17, 22, 27, 32, 37, 42, 47, 52, and 57. Note that Items 12, 27, 42 and 57 are reversed scored.

- The raw score for openness (O), is the average of items 3, 8, 13, 18, 23, 28, 33, 38, 43, 48, 53, and 58. Items 3,8, 18, 23, 33, 38, and 48 are reversed scored
- The raw score for agreeableness (A), is the average of items 4, 9, 14, 19, 24, 29, 34, 39, 44, 49, 54, and 59. Items 9, 14, 24, 29, 39, 44, and 54 are reversed scored.
- The raw score for conscientiousness (C) is the average of items 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55 and 60. Items, 15, 30, 45, 55]

### 3.5.3. Administering the AMS C28

The AMS-C28 is a 28-item self -questionnaire designed to measure student's academic motivation. The AMS was designed to assess the degree to which students are motivated to engage in academic activities and tasks, as well as the underlying reasons for their motivation. The AMS was distributed, via google forms, just like the NEO FFI3 and participants were asked to rate how much they agree using a Likert scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly). The raw scores were downloaded to Microsoft Excel, aggregated and then averaged, such that each respondent received a score across three dimensions of Intrinsic, Extrinsic and Amotivation.

- The raw scores for Intrinsic Motivation is the average of items 2,4,6, 9, 11,13,16, 18, 20, 23, 25, and 27
- The raw scores for Extrinsic Motivation is the average of items 1,3,7, 8, 10,14,15, 17, 21, 22, 24, and 28
- The raw scores for Amotivation were the average of items 5, 12, 19 and 16

Interpretation of the averaged scores were used to assess how individuals were motivated. High average scores in intrinsic motivation suggests that students are engaged in the academic activities because they find them inherently enjoyable and satisfying. On the other hand, high average scores on extrinsic motivation may indicate engagement in academic activities driven by external rewards, pressure or the outcomes associated with the activities. However, low scores on both intrinsic and extrinsic dimensions with corresponding high average scores on amotivation could be indicative of a lack of interest in academic activities.

### 3.5.4. Multiple Regression Analysis

Multiple linear regression was used to analyse the impact of personality traits on each dimension of academic motivation. It is employed to investigate how much of the variability in academic motivation is attributable to the Big Five traits.

Multiple linear regression is a statistical technique used to model the linear relationship between multiple independent variables and a dependent variable. It is a generalization of simple linear regression, allowing the assessment of the relationship between a dependent variable and several independent variables. The goal of multiple linear regression is to understand how the dependent variable changes when the independent variables are varied. It is used to make predictions and understand the strength of the relationship between the independent and dependent variables (Nathans, Oswald and Nimon, 2012). The model is based on the assumption of a linear relationship between the variables.

In simple linear regression, the coefficient ($\beta1$) associated with the predictor variable (X) represents the expected change in the outcome variable (Y) for a one-unit change in X. This means that increasing the predictor X by 1 unit is associated with a change of $\beta1$ units in the outcome Y. For example, if the coefficient for a predictor variable such as X is 2.94, it means that for every one-unit increase in X, the expected change in the outcome Y is 2.94 units, assuming a linear relationship between X and Y and all other factors remain constant.

The basic regression model for this particular study is:

$$AM = \alpha0 + \beta1A + \beta2C + \beta3E + \beta4O + \beta5N + \varepsilon t$$

where
AM is academic motivation (dependent variable Y)
$\beta$ is the regression coefficients
A,C,E,O,N are dependent variables X representing (Agreeableness, Conscientiousness, Extraversion, Openness, and Neuroticism)

$\varepsilon t$ – error term

## 3.6. Ethical Considerations

Ethical considerations are of significance in research because they promote truth, knowledge and ultimately minimise the occurrence of errors, thus leading to achievement of research objectives . Ethical considerations prohibit false interpretations and misrepresentation of facts in deriving conclusions from any research undertaking. It is important not subject participants to harm, avoid misleading information, and respect the dignity of participants. Ethical considerations are necessary to promote trust, collaboration, and mutual respect (Smythe and Murray, 2000).

Given this significance, the following ethical considerations were prioritized:

- Voluntary participation: Voluntary participation is an ethical principle protected by international law (Ritter et al., 2020) and many scientific codes of conduct. Students will be given the option to participate in the survey without any coercion or pressure. They were properly informed about the purpose of the survey and how their responses will be used.
- Informed consent: Not only were the students informed about the nature of the survey, its purpose, and how their responses will be used, but they were also informed about their right to withdraw from the survey at any time. Even after the receipt of the questionnaires, there was a notice period which provided a hiatus for those who want to withdraw their participation, before the data is used.
- Anonymity and confidentiality: Students' identities were kept confidential, and their responses have been kept anonymous to protect their privacy. The questionnaires were administered via google forms, and personal information including such as names and email addresses were excluded from the information taken.
- Avoidance of harm: The survey will be designed to avoid any form of discomfort, distress or harm to the students. The questions were not too personal or intrusive.
- Respect for dignity: Students will be treated with respect and dignity throughout the survey process.

Throughout the period of data collection research ethics should was upheld to promote scientific integrity, human rights and dignity, and encourage collaboration between science and society. These principles make sure that participation in studies is voluntary, informed, and safe (Leentjens and Levenson, 2013).

## 3.7. Limitations

### 3.7.1. Common Method Bias

A major limitation of this study is common is its proneness to common method bias. Common method bias (CMB) is a well-documented phenomenon in behavioural research, particularly in studies based on self-reported measures, that occurs when the measures of the independent and dependent variables are obtained using the same method. (Podsakoff et al., 2003). This can lead to spurious relationships between the variables, potentially distorting the true relationships among the constructs being studied. CMB can arise due to various factors, including the presence of errors in the measurement items, social desirability, or other contextual influences (Kock, Berbekova and Assaf, 2021). The extent of the bias caused by CMB can significantly impact research findings, emphasizing the importance of understanding its sources and implementing strategies to mitigate its effects.

To address CMB, researchers can employ strategies such as separating the measures of independent and dependent variables temporarily, using different response scales for the variables, and obtaining measures from different sources. By implementing these strategies, researchers can reduce the impact of CMB and improve the validity and reliability of research findings (Podsakoff et al., 2023).

### 3.7.2. Opacity of ethnic segmentation

Though the purpose of using compartmentalised populations (Nigeria and UK) was to investigate the ethnic influences on the impacts of the relationship between the traits and academic motivation, these results should be interpreted with great caution. This is because while the Unilag population may be representative of Black ethnic majority, the Aston student population is highly reputed for its cultural diversity, and as such, makes it more challenging to generalize the population to any ethnic group. Subsequent research could explore the possibility of including ethnic demographic information at time data collection.

### 3.7.3. Weaknesses of the Five Factor Model

Though the Five Factor Model has been widely adopted and validated and may even be considered, in many quarters, as the gold standard of foundational models in personality research, it is important to consider some of its major weaknesses and criticisms, previously discussed in the last paragraph of section 2.3 under the literature review. One

major argument beyond its oversimplicity, has been its failure to address the core constructs of personality beyond the five factors. The FFM has significant, when considered , for example ,in the context of the Dark Triad comprising narcissism, Machiavellianism and psychopathy (Furnham, Richards and Paulhus, 2013).

Research has shown that the dark triad traits have been linked counterproductive work behaviour (CWB) and antisocial tendencies in various contexts, including academic settings (Crysel, Crosier and Webster, 2013). This study, thus recognizes that the use of the FFM as a personality framework, has limitations in capturing the entire universe of personality traits available in the populations being examined.

### 3.8. Data Analyses and Visualisations

Data Analysis was conducted using Microsoft Excel. For ease of interpretation, the Likert Scale on the NEO FFI Inventory (SA, A, N, D, SD) was converted to numbers 0-4, and average for each personality domain calculated. Similarly, the scores on the AMS motivation scale using the 1-7 Likert scale was averaged for each respondent, across the three motivation scales.

Subsequently, for the purpose of this study, a personality nomenclature was developed for each respondent based on a combination of 3 factors: their two most dominant personality domains as well as most suppressed personality domain, based on the averages reported from the NEO FFI3 Inventory, by respondents. The dominant domains were represented using an upper-case abbreviation and suppressed domain using a lower case. For example, an individual with a personality nomenclature defined as "CAn" is indicative of a respondent whose dominants traits are Conscientiousness and Agreeableness, with suppressed traits of neuroticism.
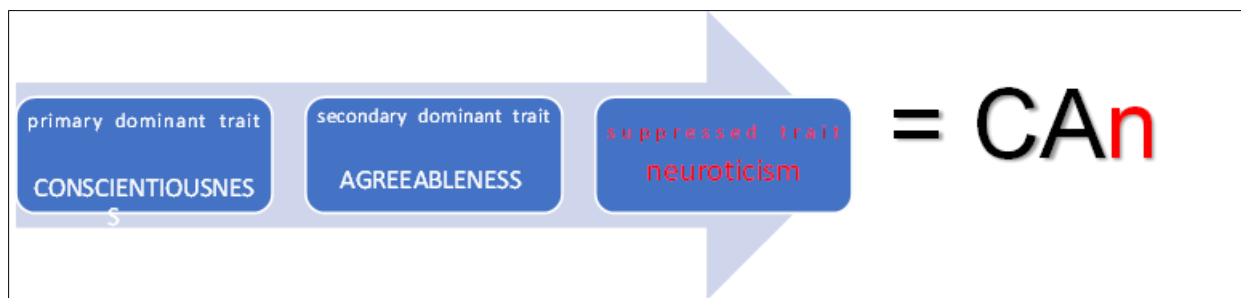


**Figure 2** Hierarchy of Personality Traits: Dominant and Suppressed Characteristics

Figure 2 illustrates the hierarchy of personality traits for an individual, highlighting three key traits: conscientiousness as the primary dominant trait, agreeableness as the secondary dominant trait, and neuroticism as the suppressed trait. The flow of the arrow suggests a progression or relationship between these traits, with conscientiousness and agreeableness being more prominent in the individual's personality, while neuroticism is less expressed or suppressed.

This nomenclature provided a qualitative framework to provoke a clustering for personality types, based on primary and secondary personality traits, as well as the supressed traits. The observed clusters were then grouped by themes and examined for relevance and association with each of the three scales of academic motivation – Intrinsic, Extrinsic and Amotivation. Of particular interest in this study, is to investigate personality domains or clusters of personality domains that may be a predictor of motivation and amotivation.

Secondly, descriptive statistics were calculated and visualised across all 3 variables (Intrinsic, Extrinsic and Amotivation) before a zero-order univariate Pearson correlation test was conducted to examine the correlations with each of the personality domains – Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. Analyses were processed separately for both samples – Aston University and Unilag, providing an opportunity to compare the results across geography and culture.

Lastly, a series of multiple regression analyses was conducted to clarify the results in a more systematic manner and to provide insights on which personality traits or cluster of traits may be significant predictors of academic motivation. The use of multiple regression analysis enables the study to examine statistically how much of the variance in academic motivation was explained by the Big Five traits.

# 4. Results

## 4.1. Data Demography

The entire dataset consists of 200 datapoints representing 100 respondents each, from both universities examined in this study: Aston University in the United Kingdom and University of Lagos, in Nigeria. The analyses were conducted separately to allow for comparison of results and provide greater comfort for the consistencies that may be ubiquitous across the two population samples. All respondents in the study identified as either male or female, notwithstanding, the other available options which ensured inclusivity and respect for individual's gender identities.

For Aston University, 58% of the respondents were male and the remaining 42% identified as female.46 respondents were in the 19-23 age bracket and 45 respondents in 24-28 bracket; while 29-33 and Above33 brackets were marginally represented with just 2 and 7 respondents respectively.

At Unilag, the gender disparity was marginal with 53 male and 47 female respondents. The 19-23 age bracket represented 41% of the population as against 43% in the 24-28 age bracket, while 29-33 and Above 33 age brackets accounted for 9% and 7% respectively. Since the eligibility for the study was based undergraduate students, the concentration of the respondents around the younger age brackets (19-23, 24-28) was in line with the study's expectation. The 19-23 bracket accounted for 46%, while the 24-28 accounted for 45% of the Aston population. At Unilag, they represented 41% and 43% respectively

## 4.2. Distribution Of Motivation Dimension

A summary of the aggregate motivation scores using the AMS C28 inventory, provided a basis for categorization of the motivation dimension that principally influenced each respondent. This was evaluated by ranking the aggregate scores for each motivation dimension for every respondent to
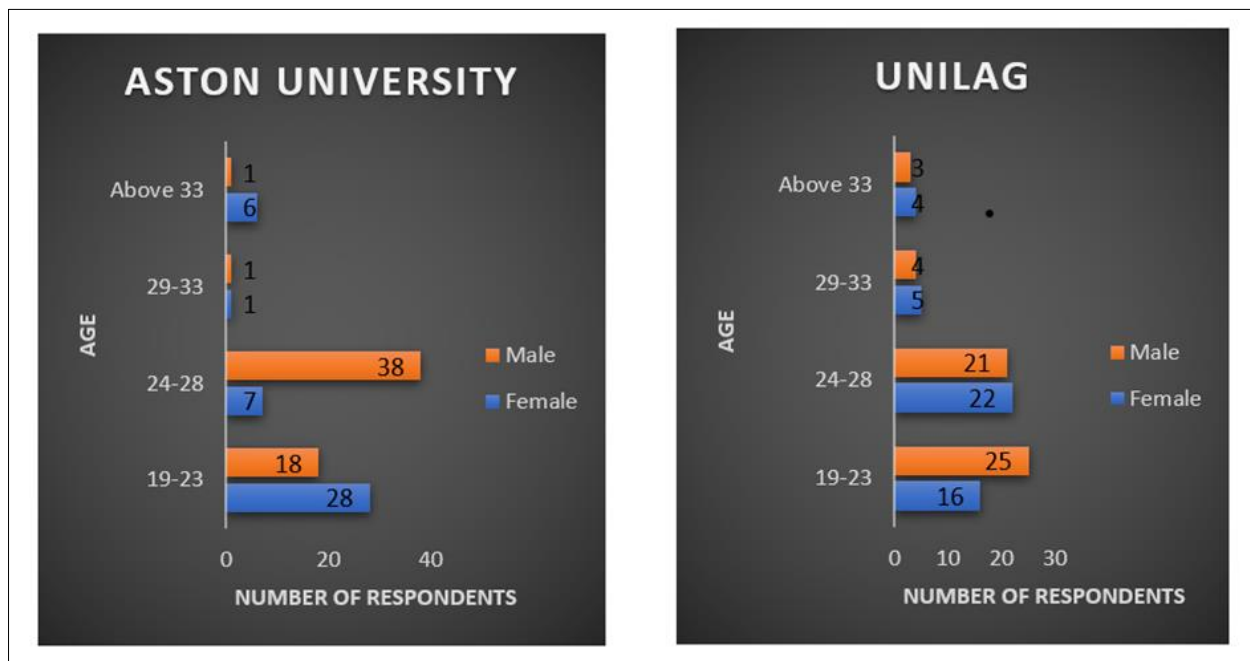


**Figure 3** Determine the most influential dimension

Figure 3 provides a comparative analysis of the age and gender distribution of respondents from Aston University and UNILAG. At Aston University, the majority of respondents fall within the 24-28 age group, with a significant gender imbalance—38 males compared to 7 females. The 19-23 age group shows a more balanced distribution, with 18 males and 28 females, while the older age groups (29-33 and above 33) have minimal representation, predominantly female. In contrast, UNILAG displays a more evenly distributed respondent population across age groups. The 19-23 age group has 25 males and 16 females, and the 24-28 age group is nearly evenly split, with 21 males and 22 females. The 29-33 and above 33 age groups also show slight female predominance. This comparison highlights a pronounced age

concentration in the 24-28 bracket at Aston University, while UNILAG exhibits a broader age distribution with relatively balanced gender representation across age groups.

**Table 2** Primary Motivation Dimensions of Respondents Based on Average Scores of AMS 28 Questionnaire

| Respondents | Intrinsc aggregate | Extrrinsic aggregate | Amotivation aggregate | Primary            motivation dimension |
|---|---|---|---|---|
| Respondent 1 | 1.25 | 2.5 | 5.5 | Amotivation |
| Respondent 2 | 5.92 | 6.83 | 1 | Extrinsic |
| Respondent 3 | 5.92 | 6.42 | 1 | Extrinsic |
| Respondent 4 | 6.42 | 4.08 | 1 | Intrinsic |
| Respondent 5 | 6.08 | 2.92 | 1 | Intrinsic |
| Respondent 6 | 1.25 | 4.17 | 1 | Extrinsic |
| Respondent 7 | 6 | 2.92 | 1 | Intrinsic |
| Respondent 8 | 6 | 2.92 | 1 | Intrinsic |
| Respondent 9 | 2.5 | 4.5 | 1 | Extrinsic |
| Respondent 10 | 2.92 | 5.92 | 1 | Extrinsic |

Table 2 further illustrates how this was characterised, based on a sample of 10 respondents. The average scores for all individual items on the AMS 28 questionnaires for intrinsic, extrinsic and amotivation (refer to chapter 3.5.3) were calculated and tabulated in the excel sheet as above. Then, a formula was inserted the next column – to extract the primary motivation dimension, based on the highest-ranking score. For example, respondent 1, averaged 1.25 in intrinsic motivation, 2.50 in extrinsic, and highest in amotivation scoring an average of 5.50, therefore his primarily influenced by amotivation. This was done for all 200 respondents across the study (see appendix 3).
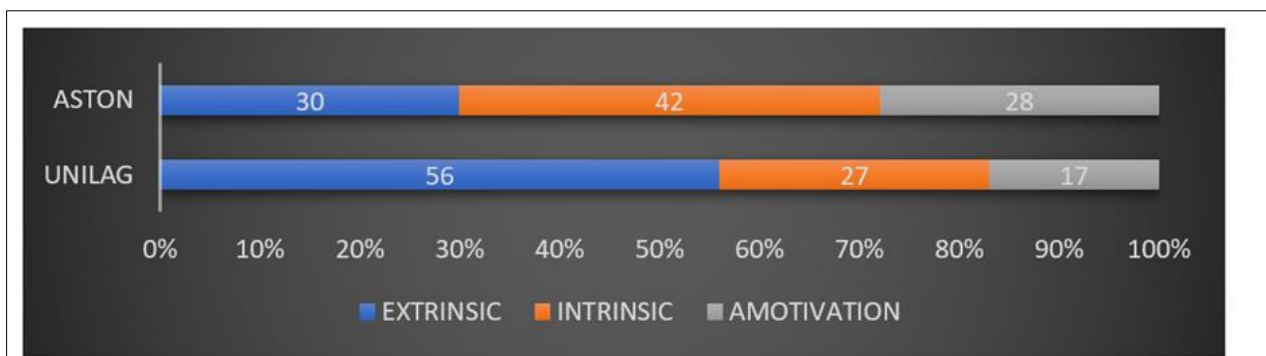


**Figure 4** Motivation Dimensions Among Students at Aston University and UNILAG

Figure 4 shows that at Aston University, 30% of the respondents experienced extrinsic motivation, 42% experienced intrinsic motivation while 28% showed a complete lack of motivation towards academic pursuit. For Unilag, on the other hand, results indicated that a majority of the students experienced extrinsic motivation (56%), and 27% experienced intrinsic motivation with just 17% experiencing amotivation.

### 4.3. Understanding Personality Clusters

Based on the personality trait nomenclature developed for this study (refer to chapter 3.8), a total of 20 different personality clusters were observed. 13 of these were represented in the Aston population, and 15 were represented in the Unilag population, with 8 clusters having an overlap across both populations.
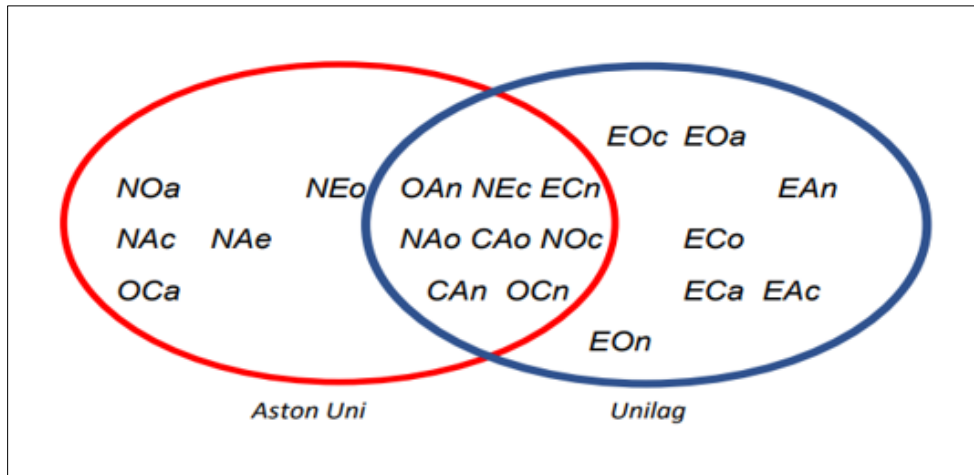
**Figure 5** Distribution and Overlap of Personality Clusters Between Aston University and UNILAG Populations

Figure 5 illustrates the distribution of 20 distinct personality clusters identified in a study. Out of these, 13 clusters are found in the Aston University population, 15 clusters are observed in the UNILAG population, and 8 clusters are common across both populations. The overlapping section of the Venn diagram represents the clusters shared by both universities, highlighting similarities in personality traits between the two groups while also showcasing the unique clusters present in each population.

**Table 3** Formation of Personality Clusters Based on NEO-FFI3 Questionnaire Scores

| Respondents | Consci aggregate | Openness aggregate | Neuroticism aggregate | Extraver aggregate | Aggreabl aggregate | Personality cluster |
|---|---|---|---|---|---|---|
| Respondent 1 | 1 | 1.25 | 0.92 | 1.08 | 2.25 | Aon |
| Respondent 2 | 0.08 | 0.75 | 2.17 | 1.67 | 1.92 | Nac |
| Respondent 3 | 1.67 | 0.83 | 3.83 | 0.67 | 2 | Nae |
| Respondent 4 | 0.33 | 1.08 | 1.83 | 2 | 1.67 | Enc |
| Respondent 5 | 0.42 | 1 | 1.83 | 2.58 | 1.58 | Enc |
| Respondent 6 | 0.42 | 0.5 | 2.92 | 1.75 | 2.08 | Nac |
| Respondent 7 | 0.42 | 0.5 | 2.92 | 1.75 | 2.08 | Nac |
| Respondent 8 | 0.42 | 0.5 | 2.92 | 1.75 | 2.08 | Nac |
| Respondent 9 | 0.5 | 0.17 | 3.25 | 1.75 | 2.42 | Nao |
| Respondent 10 | 2.58 | 1.75 | 0.5 | 2.92 | 1.92 | Ecn |

Table 3 demonstrates how these personality clusters were conceived, based on a sample of 10 respondents. The average scores for all individual items on the NEO-FFI3 questionnaires for conscientiousness, openness, neuroticism, extraversion and agreeableness (refer to chapter 3.5.2) were calculated and tabulated in the excel sheet as above. Then, a formula was inserted in the next column – to extract the personality cluster, based on the highest-ranking trait, second-highest ranking trait, and least ranking. For example, respondent 1 who averaged 2.25 in agreeableness, 1.25 in openness, and 0.92, is depicted as being in the cluster "AOn". This was done for all 200 respondents across the study (refer to Appendix 3).

The results are summarised graphically in Figure 5 and Figure 6 It shows the distribution of the personality clusters, with the horizontal bars representing the pairs of dominant personality traits and colour codes representing the suppressed traits as indicated by the legend. Reading this graph, Aston has the following cluster distribution: CAn(5%), CAo(1%), ECn(16%), NAc(13%), NAe (2%), NAo(4%), NEc(6%), NEo(1%), NOa(1%), NOc(5%), OAn(1%), OCa(1%) and OCn (44%)

Unilag cohort had CAn(14%), CAo(2%), EAc(3%), EAn(2%), ECa(1%), ECn(36%), ECo(2%), EOa(11%), EOc(1%), EOn(12%), NAo(2%), NEc(1%), NOc(2%), OAn(1%), and OCn (10%). Neuroticism appeared to be most prevalent suppressed/ recessive trait across the entire study, which is indicative of a moderate to high level of emotional stability among all respondents.
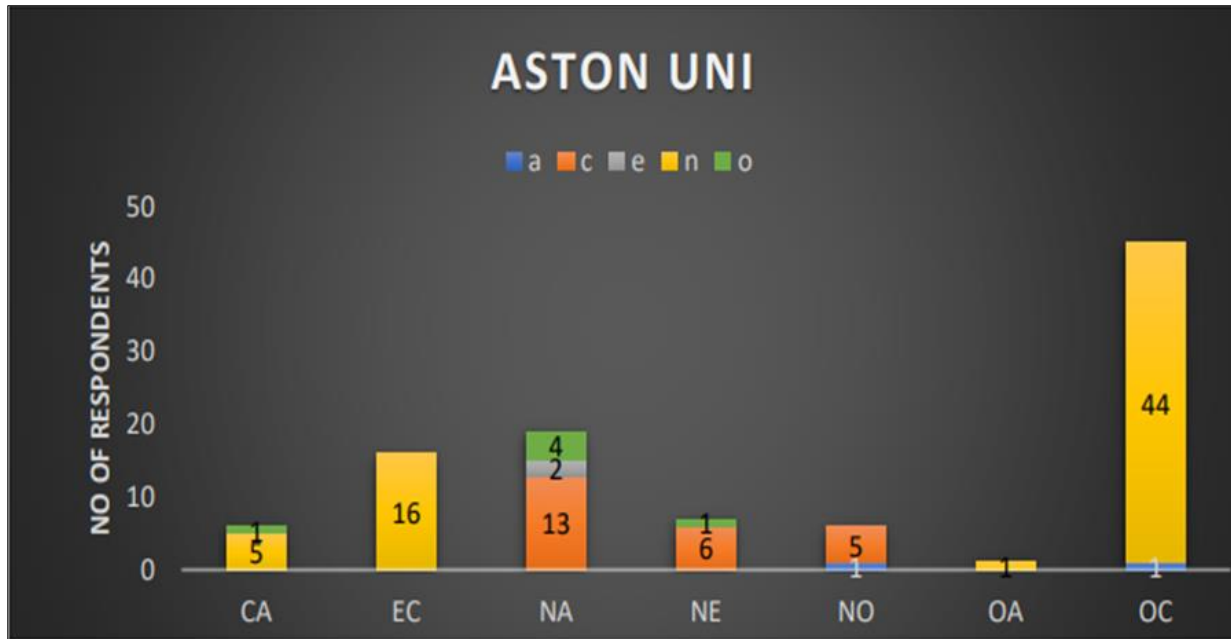


**Figure 6** Distribution of Personality Clusters Among Respondents at Aston University

Figure 6 displays the distribution of various personality clusters among respondents at Aston University. Each bar represents a different personality cluster, labeled as CA, EC, NA, NE, NO, OA, and OC. The height of the bars indicates the number of respondents classified into each cluster. The most prominent cluster is OC, with 44 respondents, followed by EC with 16 respondents and NA with 13 respondents. The other clusters have significantly fewer respondents, with some clusters like OA, NE, and NO having only 1 to 6 respondents. This distribution suggests a concentration of certain personality traits within the university population.
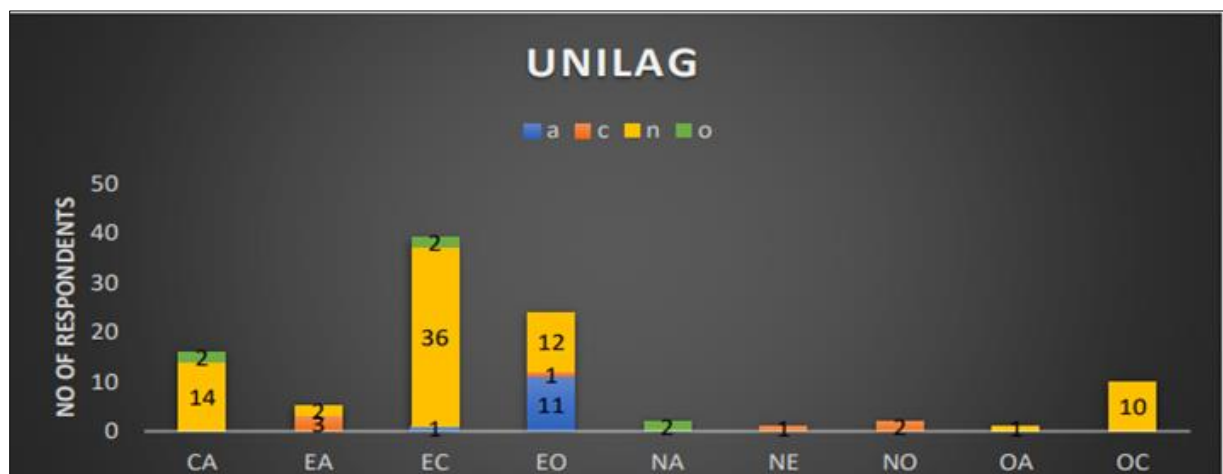


**Figure 7** Distribution of Personality Clusters Among Respondents at Unilag

Figure 7 illustrates the distribution of personality clusters among respondents at UNILAG. Each bar corresponds to a different personality cluster, labeled as CA, EA, EC, EO, NA, NE, NO, OA, and OC. The EC cluster has the highest number of respondents, with 36 individuals, followed by the EO cluster with 12 respondents. The CA cluster also has a notable representation with 14 respondents. Other clusters, such as EA and OC, have fewer respondents, with 3 and 10 respectively. Clusters like NA, NE, NO, and OA have very few respondents, ranging from 1 to 2 individuals. This chart

indicates a diverse distribution of personality traits within the UNILAG population, with certain clusters being more prominent than others.

## 4.4. Personality Cluster Associations with Motivation

To gain more detailed perspective of the relationships of these personality clusters with academic motivation, we distilled the data based on the predominant motivation dimension i.e intrinsic, extrinsic and motivation and visualised each of the fractionates separately to investigate the personality clusters that may be predictors of academic motivation. This exploratory factor analysis is illustrated in figs 4.4.1 and 4.4.2 below for Aston University and Unilag respectively. The first part illustrates how the population distils into the three fractionates – Intrinsic, extrinsic and amotivation . It then takes the population segment for each motivation dimension and visualises the different personality cluster domains using a bar chart, with the bars representing the dominant personality traits and colour codes representing the suppressed traits.

The results show Neuroticism and low levels of conscientiousness was the most influential to amotivation at Aston university with NAc, NEc, and NOc (Fig4.4.1) being the major drivers. However, at Unilag extraversion and secondary openness to experience, as well as low levels of agreeableness reflected stronger associations with EOa personality cluster (Fig 4.4.2) being the key driver.

Conscientiousness and secondary openness to experience, and low levels neuroticism was the most observable personality trait influencing intrinsic motivation at Aston University with COn being the strongest determinant. All 42 respondents that were categorised as being intrinsically motivated reflected extremely high levels of conscientiousness and 36 of them exhibited secondary O dominance (Fig4.4.1). At Unilag while Conscientiousness remained a key factor, it was Extraversion and Agreeableness that appeared to play significant secondary roles. Interestingly, low levels of neuroticism remained consistent reflecting stable levels of emotional stability remained key to Intrinsic motivation. All 27 respondents categorised that showed deep levels of intrinsic motivation exhibited suppressed levels of neuroticism.

Similarly, conscientiousness and low levels of neuroticism were major predictors of extrinsic motivation across both populations, though extraversion was a more significant subordinating predictor with CEn, dominating both populations.

Figure 8 provides a comparative analysis of the age and gender distribution of respondents from Aston University and UNILAG. At Aston University, the majority of respondents fall within the 24-28 age group, with a significant gender imbalance—38 males compared to 7 females. The 19-23 age group shows a more balanced distribution, with 18 males and 28 females, while the older age groups (29-33 and above 33) have minimal representation, predominantly female. In contrast, UNILAG displays a more evenly distributed respondent population across age groups. The 19-23 age group has 25 males and 16 females, and the 24-28 age group is nearly evenly split, with 21 males and 22 females. The 29-33 and above 33 age groups also show slight female predominance. This comparison highlights a pronounced age concentration in the 24-28 bracket at Aston University, while UNILAG exhibits a broader age distribution with relatively balanced gender representation across age groups.
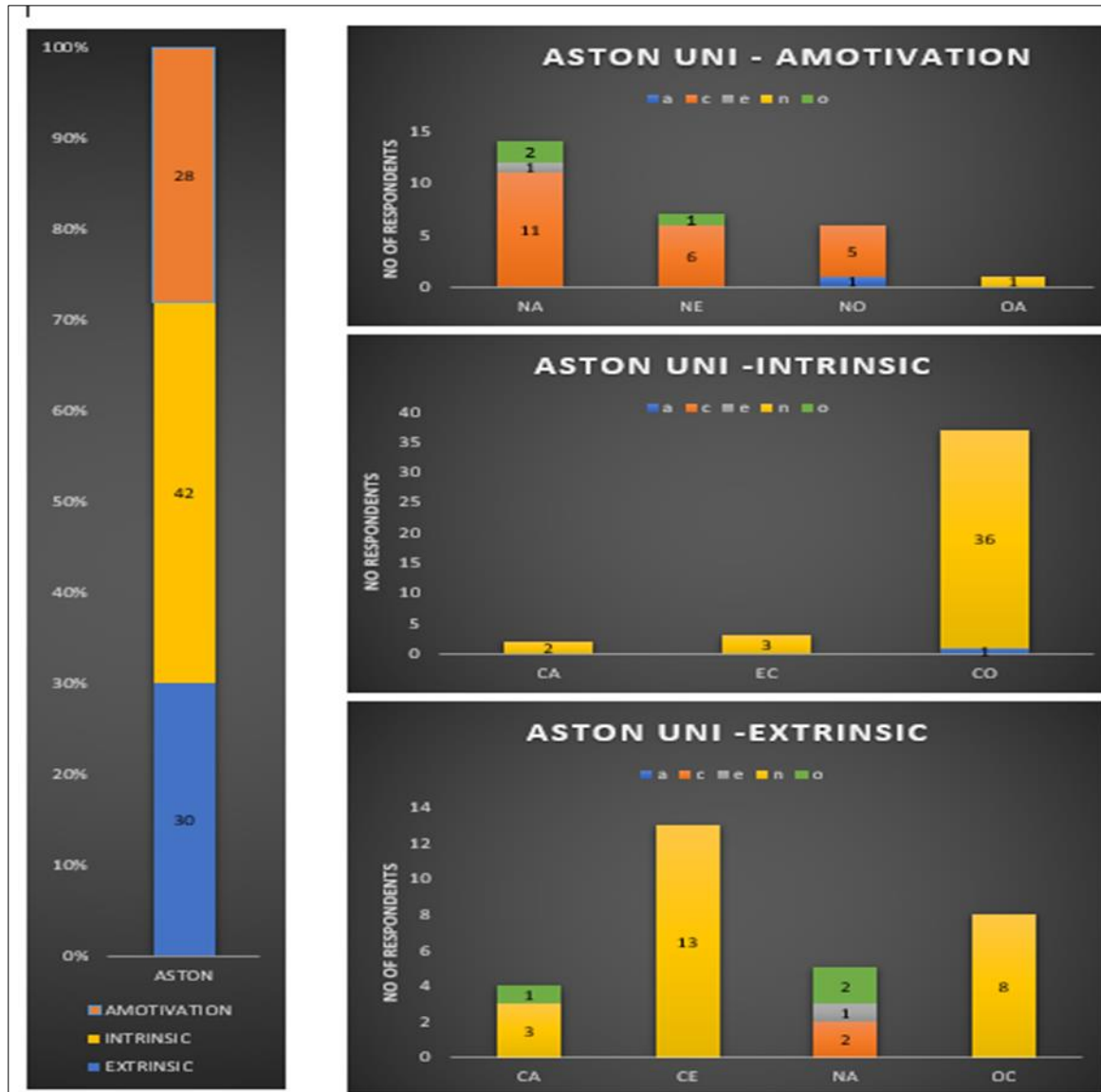
**Figure 8** Motivational Dimensions and Personality Cluster Distributions at Aston University

Figure 9 illustrates the distribution of motivational dimensions and personality clusters among respondents at UNILAG. The leftmost vertical bar chart shows the overall distribution of motivational types, with a significant majority (56%) of respondents exhibiting extrinsic motivation, followed by intrinsic motivation (27%) and amotivation (17%). The other three charts break down these motivational types by specific personality clusters. In the amotivation category, the EO cluster dominates with 11 respondents, while EA and NE clusters have very few respondents. For intrinsic motivation, the CE cluster has the highest representation with 12 respondents, followed by CA with 9 respondents. In the extrinsic motivation category, the CE cluster again leads with 24 respondents, with a notable presence in the OC cluster as well. This data highlights the prevalence of extrinsic motivation among UNILAG respondents, with particular clusters like CE being strongly associated with both extrinsic and intrinsic motivational types.
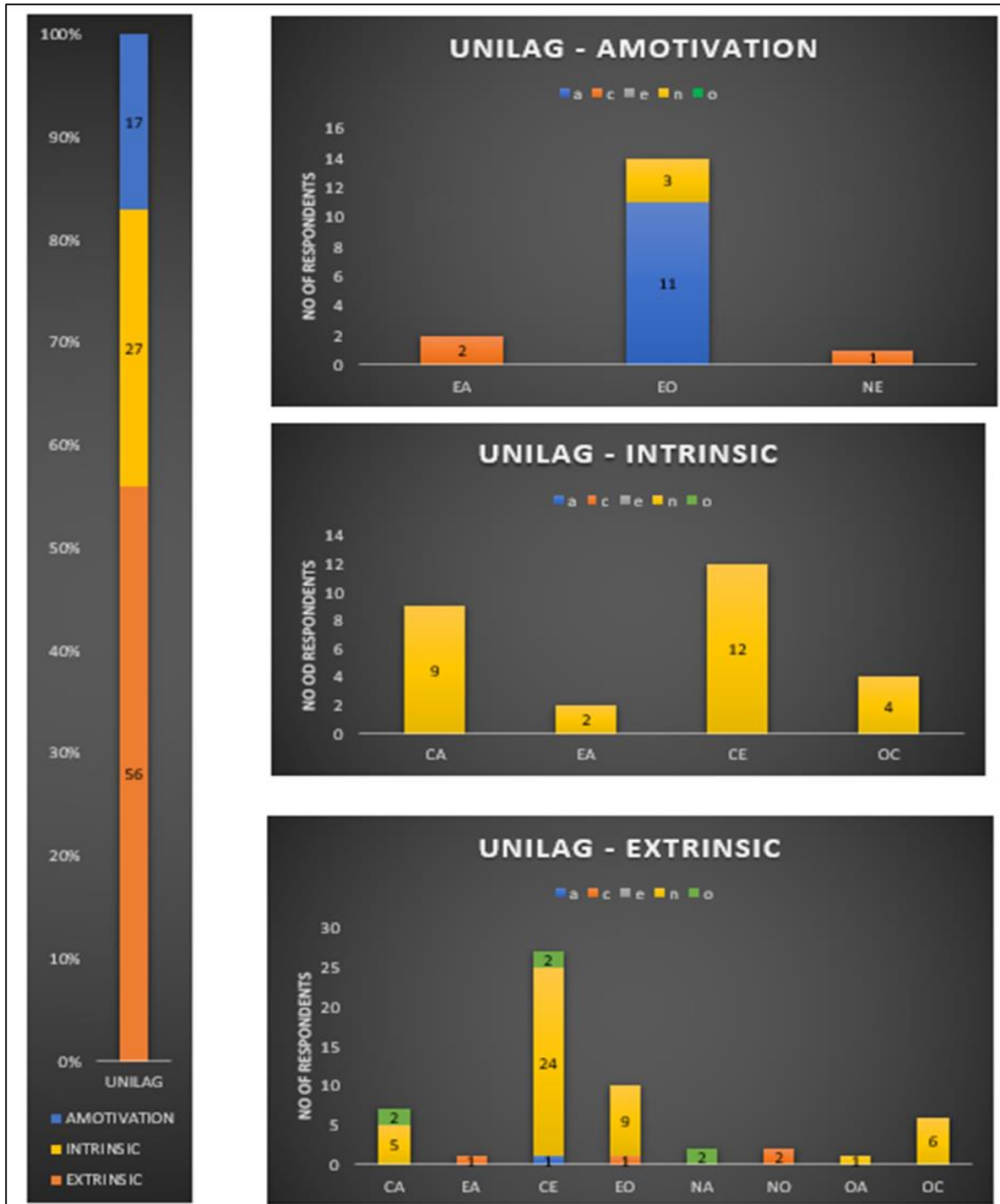
**Figure 9** Motivational Dimensions and Personality Cluster Distributions at Unilag

## 4.5. Holistic Analysis of Motivation Spectrums

In the previous section (4.4), analyses of the three motivation dimensions – amotivation, extrinsic and intrinsic for personality cluster associations was limited to only datapoints that reflected that motivation spectrum as highest ranking. Consequently, in the analysis of extrinsic motivation 30 datapoints were analysed at Aston, and 56 at Unilag; Intrinsic motivation reviewed 42 datapoints at Aston and 27 at Unilag, while amotivation dataset was limited to 28 and 17 datapoints respectively.
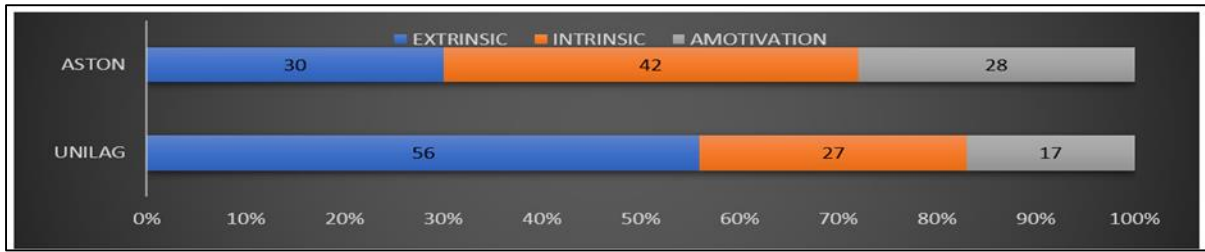
**Figure 10** Comparison of Motivational Profiles Between Students at Aston University and UNILAG

This current section takes a more holistic view and analyses each motivation dimensions using all the 200 datapoints, regardless of its ranking, given that each respondent has a score for each motivation dimension. By so doing, it broadens the dataset for the analysis, creating greater heterogeneity.

Figure 10 is a visual depiction of extrinsic motivation spectrum, with a frequency distribution, descriptive statistics, correlation analytics, as well as a bar chart overlay with dominant personality traits. Figures 4.5.2 and 4.5.3 illustrate same for intrinsic and amotivation dimensions respectively.



**Figure 11** Extrinsic Motivation – A holistic view
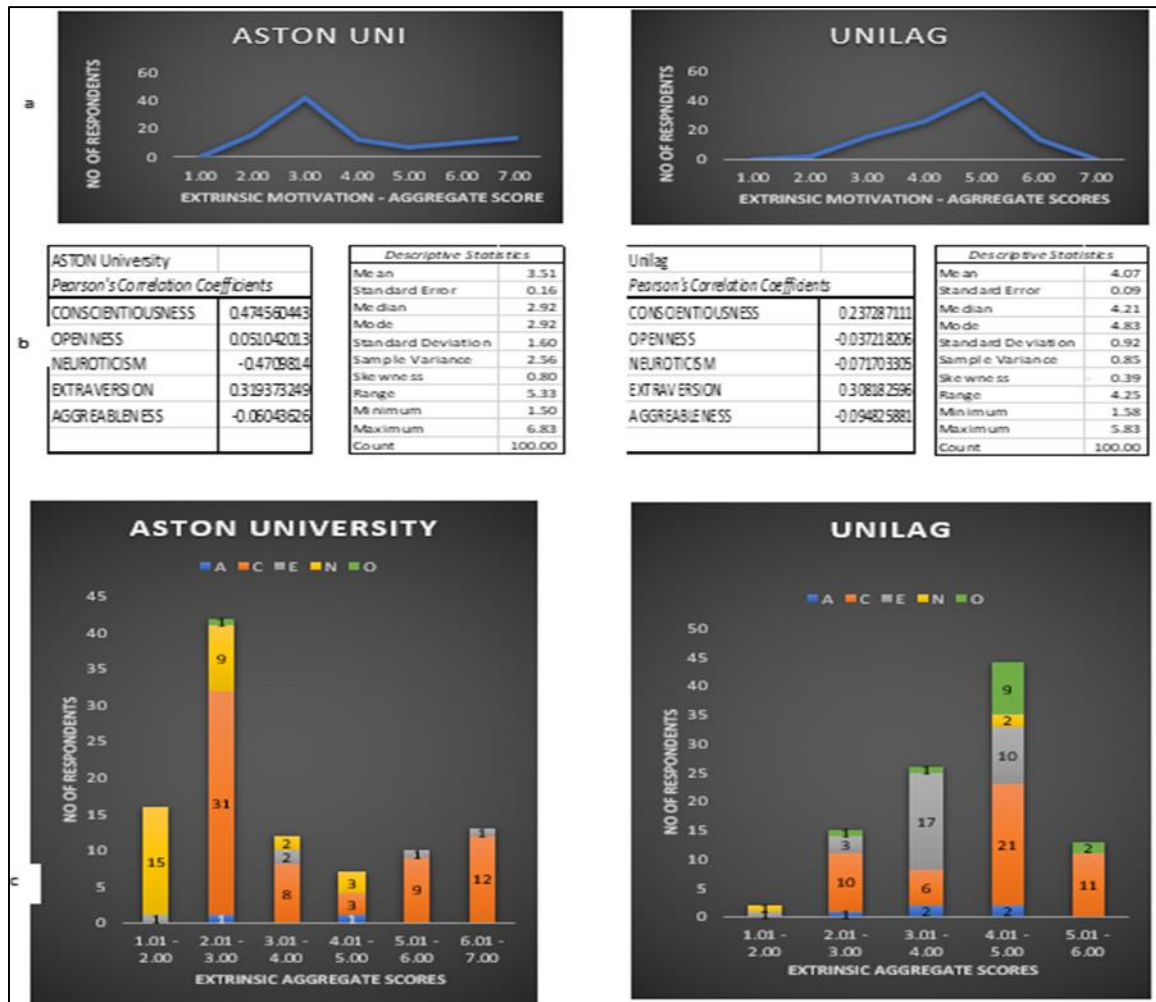
*4.5.1. Extrinsic Motivation*

Figure 11a shows the frequency distribution of the collated aggregate scores for the Extrinsic dimension of motivation for all participants across the two selected universities. The aggregate scores are based on the average scores of the feedback using 7-point Likert scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly).

Respondents from Unilag recorded higher extrinsic motivation scores, with mean of 4.07, in comparison with Aston University mean score of 3.51. While the Aston population had more respondents scoring between 2-5, Unilag had more respondents in the 5 -7 score bracket, so the mode for Unilag was significantly higher than the Aston cohort.

A review of the Pearson's correlation coefficient of extrinsic motivation with the Big Five personality traits indicates significant positive relationship with conscientiousness and extraversion across both population samples. It also revealed a strong negative correlation with neuroticism at Aston. However, neuroticism did not indicate any significant associations in Unilag. These outcomes remain consistent with prior results of exploratory factor analysis.

Figure 11c which shows the distribution of the personality types with the aggregate scores further illustrates this as it clearly depicts the population of high scorers in extrinsic motivation are primarily influenced by conscientiousness and extraversion. This is consistent with many of results of prior researchers highlighted in in section 2.4 of the literature review. However, the impact of extraversion was more significant in the Unilag in comparison with Aston. Similarly, Openness was also an observable trait at the Unilag population, but insignificant in its relationship with extrinsic motivation at the Aston population sample.



**Figure 12** Intrinsic Motivation – A holistic view

*4.5.2. Intrinsic Motivation*

Figure 12 above shows the frequency distribution of the collated aggregate scores for the Intrinsic dimension of motivation for all participants across the two selected universities. The aggregate scores are based on the average scores of the feedback using 7-point Likert scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly).

Analyses of the data indicates the Aston population had higher Intrinsic motivation scores with 45% of the population scoring between 4-7, as in comparison with 29% of the population for Unilag scoring within that bracket. Respondents from Aston recorded a mean score of 3.78 as against 3.66 in Unilag.

Correlation analyses revealed significant positive relationship between the conscientiousness (0.78) and openness (0.72) for the Aston cohort. However, for the Unilag cohort while conscientiousness was significant (0.59), the strength of relationship for openness to experience remained fairly moderate (0.27), with agreeableness showing stronger association (0.53). Of the 29 high scorers (4-7) at Unilag, 22 of them showed primary conscientiousness as the dominant trait. Interestingly, further analysis showed that half of this 22 exhibited secondary agreeableness.

A look at figure 12c similarly indicates that high scores in Intrinsic motivation is has been largely driven by conscientiousness (red hue) at both populations and to secondary extent by extraversion (grey hue) in the Unilag population. This result is very consistent with observed outcomes in previous clustering analysis carried out in 4.4. Of the 45 high scorers (4-7) at Aston, 43 exhibited primary conscientiousness. Further investigation revealed that of 40 of this 43, demonstrated secondary openness to experience, indicating that primary conscientiousness and secondary openness were most linked with intrinsic motivation at Aston university. These results converge with that of Kommarraju et al. (2009), highlighted in section 2.4 of the literature review, which argue that intrinsically motivated learners are likely to be conscientious and their openness to new experiences very high.



**Figure 13** Amotivation – A holistic view

*4.5.3. Amotivation*

Figure 12 above shows the frequency distribution of the collated aggregate scores for the Amotivation dimension of motivation for all participants across the two selected universities. The aggregate scores are based on the average scores of the feedback using 7-point Likert scale ranging from 1 (does not correspond at all) to 7 (corresponds exactly).

Analyses of the data indicates the Aston population had significantly higher amotivation scores with 28% of the population scoring between 5-7, as in comparison with 17% of the population for Unilag scoring within that bracket. Respondents from Aston recorded a mean score of 2.71 as against 2.30 in Unilag.

Correlation analyses revealed interesting pattern of relationships between the Big five traits and amotivation. Conscientiousness indicated the strongest relationship across both population samples, indicating a negative association with amotivation. Pearson's correlation coefficients of -0.83 and -0.75 for Aston and Unilag respectively, represent the strongest relationship among personality traits and any motivation dimension throughout this study. Similarly, neuroticism showed a strong positive relationship with amotivation in Aston but lacked statistical relevance at Unilag. However. Agreeableness just like Conscientiousness showed significant negative association with amotivation with the Unilag cohort.

A critical look at figure 12c which juxtaposes the respondent amotivation scores with their suppressed traits (indicated in lower caps) illustrates this further. Note that, unlike figure 11c and 10c which shows the distribution of motivation dimension scores (extrinsic and intrinsic) and the respondents dominant personality traits, this graph focuses on the supressed traits. At Aston, Majority of high amotivation scorers (6-7) are represented as low in conscientiousness; while at Unilag, the majority of high amotivation scorers (5-6) as well (6-7), are a mix of those showing low agreeableness and low conscientiousness, which remains very consistent with earlier clustering analysis.

Furthermore, the works of numerous scholars, highlighted in section 3.4 of the literature review reaffirms the negative relationship of conscientiousness and amotivation. Similarly, Clark and Scroth (2010) argue that students who lacked motivation tended to be agreeable and careless.

## 4.6. Correlation Analyses

**Table 4** Aston University Correlation Matrix

| Aston | Consci | Openness | Neuroticism | Extraver | Agreeabl | Extrinsic | Intrinsic | Amotivation |
|---|---|---|---|---|---|---|---|---|
| CONSCI | 1.00 | | | | | | | |
| OPENNESS | 0.72 | 1.00 | | | | | | |
| NEUROTICISM | -0.82 | -0.58 | 1.00 | | | | | |
| EXTRAVER | 0.47 | 0.36 | -0.40 | 1.00 | | | | |
| AGREEABLE | 0.23 | 0.16 | -0.18 | -0.09 | 1.00 | | | |
| EXTRINSIC | 0.47 | 0.05 | -0.47 | 0.32 | -0.06 | 1.00 | | |
| INTRINSIC | 0.78 | 0.72 | 0.66 | 0.21 | 0.26 | 0.02 | 1.00 | |
| AMOTIVATION | -0.84 | -0.05 | 0.83 | -0.31 | -0.29 | -0.52 | -0.72 | 1.00 |

Table 4 shows the correlation between personality traits (like conscientiousness, openness, and neuroticism) and motivational factors (extrinsic, intrinsic, and amotivation) at Aston University. Key findings include a strong positive correlation between conscientiousness and intrinsic motivation (0.78), and a strong negative correlation between neuroticism and conscientiousness (-0.82). Additionally, neuroticism is positively correlated with amotivation (0.83), indicating that higher neuroticism tends to be associated with higher levels of amotivation. The matrix effectively highlights how different traits relate to motivation.

Table 5 presents the correlation between personality traits and motivational factors for respondents at UNILAG. Noteworthy correlations include a strong positive relationship between conscientiousness and intrinsic motivation (0.59), and a strong negative correlation between conscientiousness and amotivation (-0.76). Unlike the Aston data, neuroticism shows weaker correlations with motivation, indicating different dynamics in this population. The matrix highlights how personality traits are linked to different motivational orientations among UNILAG students.

This section reviews the comprehensive correlation matrix of all variables analysed in this study, showing the respective Pearson's correlation coefficients. While the correlation analyses of the motivation dimensions and the Big five (shaded orange) has been discussed in the previous section, the matrix further provides the correlation insights among the individual personality traits.

**Table 5** Unilag Correlation Matrix

| Aston | Consci | Openness | Neuroticism | Extraver | Agreeabl | Extrinsic | Intrinsic | Amotivation |
|---|---|---|---|---|---|---|---|---|
| CONSCI | 1.00 | | | | | | | |
| OPENNESS | -0.23 | 0.01 | | | | | | |
| NEUROTICISM | -0.05 | -0.02 | 1.00 | | | | | |
| EXTRAVER | 0.59 | 0.25 | 0.06 | 1.00 | | | | |
| AGREEABLE | 0.24 | -0.07 | 0.01 | -0.16 | 1.00 | | | |
| EXTRINSIC | 0.59 | -0.04 | -0.07 | 0.31 | -0.09 | 1.00 | | |
| INTRINSIC | -0.76 | 0.27 | -0.21 | 0.09] | 0.54 | 0.24 | 1.00 | |
| AMOTIVATION | -0.84 | -0.06 | 0.05 | 0.20 | -0.77 | -0.30 | -0.50 | 1.00 |

At Aston, neuroticism indicated significant negative associations with conscientiousness, openness to experience and extraversion with coefficients of -0.82. -0.58 and -0.40 respectively. Similarly, strong positive associations were observable between conscientiousness and openness to experience, as well as conscientiousness and extraversion with coefficients of 0.72 and 0.47 respectively. However, at Unilag, it was conscientiousness and extraversion that showed strong positive relationships. These associations remain consistent with our exploratory factor analysis (refer to 4.3 understanding personality clusters), where OC (at Aston) and EC (Unilag) emerged the most dominant. The predominance of the yellow and orange hue bars of figure 4.3.2 further lends credence to negative associations of neuroticism and conscientiousness.

## 4.7. Multiple Regression Analyses

**Table 6** Predictive Power of Personality Traits on Motivational Factors: A Comparative Analysis between Aston University and UNILAG

| Factor | Predictor | ASTON | | | UNILAG | | |
|---|---|---|---|---|---|---|---|
| | | Beta | S.S | R2 | Beta | S.S | R2 |
| Extrinsic | conscientiousness | 0.94 | Y | | 0.47 | Y | |
| | Openness | 1.20 | Y | | 0.03 | N | |
| | Neuroticism | -0.27 | N | | 0.09 | N | |
| | Extraversion | 0.30 | N | | 0.78 | Y | |
| | Agreeableness | 0.72 | Y | 0.65 | 0.56 | Y | 0.62 |
| Intrinsic | Conscientiousness | 0.87 | Y | | 0.52 | Y | |
| | Openness | 0.79 | Y | | 0.58 | Y | |
| | Neuroticism | -0.12 | N | | -0.28 | N | |
| | Extraversion | -0.72 | Y | | 0.34 | N | |
| | Agreeable | 0.22 | N | 0.70 | 0.72 | Y | 0.51 |
| Amotivation | Conscientiousness | -1.32 | Y | | -0.88 | Y | |
| | Openness | 0.63 | Y | | -0.33 | Y | |
| | Neuroticism | 0.83 | Y | | -0.19 | N | |
| | Extraversion | 0.41 | N | | 0.55 | Y | |
| | Agreeableness | -0.64 | N | 0.81 | -1.13 | Y | 0.77 |
| S.S is a statistical significance based on p-value < 0.05 (95% confidence level). (Y- Yes; N- N0) | | | | | | | |

To clarify the results in a more systemic manner and provide statistical reassurance of associations and relationships that have been observed, a series of simultaneous regression analysis were conducted to examine the quantum of variance in academic motivation that could be explained by Big Five traits. Furthermore, it provided a dependable statistical framework to investigate the personality traits that are most influential in academic motivation, by identifying the key trait predictors of academic motivation: which is a key objective of the research.

Table 6 compares the predictive influence of personality traits on motivational factors (extrinsic, intrinsic, and amotivation) between respondents at Aston University and UNILAG. It shows that for both universities, conscientiousness and openness are significant predictors of intrinsic and extrinsic motivation, with agreeableness also playing a role in UNILAG. Neuroticism strongly predicts amotivation across both institutions. The R-squared values indicate that the models used explain a substantial portion of the variance in motivation types, with Aston University showing slightly higher explanatory power in some cases. Overall, the table underscores the consistent influence of certain personality traits on motivation across different educational contexts.

The regression analyses revealed important relationships between the Big Five personality traits and academic motivation, lending further credence to the results of prior correlation analyses and subsequent patterns of associations from exploratory factor analysis discussed earlier.

It showed that more than 75% of the variability in amotivation could be explained by the BigFive Traits. In Aston 81% of this variance was explained by Conscientiousness, Neuroticism and Openness to Experience, though with Unilag cohort, Agreeableness and Conscientiousness were the major predictors of amotivation. Agreeableness and Conscientiousness exhibited a negative relationship, indicating less conscientious and disagreeable individuals are more likely to be amotivated. For Intrinsic motivation, the regression model also proved significant, unveiling a linear relationship with 70% of the variance of intrinsic motivation attributable to Conscientiousness, Openness and Extraversion at Aston; while 51% of this variability was traced to Conscientiousness, Openness and Agreeableness at Unilag. Finally, for Extrinsic motivation the variability was largely driven by Conscientiousness and Openness at Aston, and by Conscientiousness, Extraversion and Agreeableness at Unilag.

Overall, the regression analysis revealed that Conscientiousness was most influential with significant relationship to all motivation variables. Conscientious individuals had high scores on both intrinsic and extrinsic motivation and showed the lower amotivation scores, across both populations. However, Agreeableness also proved to be a significant predictor at Unilag. Agreeable individuals showed high intrinsic motivation scores but lower extrinsic motivation, while disagreeable individuals showed high levels of amotivation.

## 5. Results and Discussions

The results from this study suggests that the individual differences play an integral role in the trajectory of academic motivation among students pursuing university degrees. As anticipated, those who differed in their reasons for attending university tended to have different personality traits, which was most noticeable when comparing those who lacked motivation (amotivation) with those who were highly motivated –intrinsically or extrinsically.

As previously highlighted in the literature review, the larger and richer literature on personality differences and academic motivation as well academic achievement consistently suggests that conscientiousness not only has a positive relationship with academic motivation and success (Costa and McCrae, 1992; Dollinger and Orf, 1991; Grozier, 1997; Paunonen and Ashton, 2001, Komarraju et al, 2009, Clark and Schroth, 2010), but is also considered the best predictor across a broad spectrum of academic achievement measures (Noftle and Robins, 2007; Kappe and Van Der Flier, 2012). Additionally, personality traits, especially conscientiousness, have been found to be highly connected to academic achievement (X Dong et al, 2022). Therefore, conscientiousness appears to be the most consistent and robust predictor of academic motivation.

Furthermore, besides conscientiousness, both openness to experience and agreeableness have been shown to be positively associated with academic performance (Farsides and Woodfield, 2003; Kamarrajau and Karau, 2005); while neuroticism has been associated with impaired academic performance (Premuzic and Furnham, 2003). Specifically, Komarraju and Karau (2005) found that conscientious students were more motivated by achievements while their more neurotic counterparts had higher avoidance scores. In a subsequent study, Komarraju et al. (2009) which relied on the use of the Academic Motivation Scale (Vallerand et al., 1992) they found that those who were intrinsically motivated demonstrated an inclination towards conscientiousness and openness to experience, those who were extrinsically motivated were conscientious, extroverted and neurotic; and those who lacked motivation were disagreeable and lacked conscientiousness.

Given this significance, this study hypothesized that relationships similar to what past researchers have published using their models of academic motivation will be encountered. Specifically, the following hypothesis were tested:

- Intrinsic motivation will be positively correlated to conscientiousness and openness.
- Extrinsic motivation will be positively correlated to conscientiousness and extraversion.
- Amotivation will be negatively correlated to conscientiousness and agreeableness.

The results not only provide strong support for the role of personality traits in academic motivation, but also add to the emerging body of research that emphasizes individual differences in student behaviour. This study reveals that conscientiousness is the most influential of all personality traits of the Big Five, exhibiting the strongest relationship to all variables. Conscientious individuals demonstrated higher scores on both intrinsic and extrinsic motivation, while showing the lowest amotivation. It reaffirms conscientiousness as central to all motivation, being the most reliable predictor of intrinsic and extrinsic motivation, with a negative association with amotivation (Heaven et al., 2002). This aligns with prior literature, which argues that conscientious students are disciplined and more likely finish their tasks and meet deadlines, apply themselves without continuous supervision and are least likely to be disengaged.

Besides conscientiousness, this study also demonstrated that Intrinsic motivation was also positively related openness to experience across board, suggesting that those high on openness tend to be more intellectually curious, intelligent, insightful, interested and consequently more likely to enjoy learning, indicating congruence with previous literature (Kommaraju and Kerau, 2009). However, for extrinsic motivation, subordinated associations indicated a positive relationship with extraversion in Unilag, suggesting that students with strong social needs may pursue university education as a means to an end. Notwithstanding, openness to experience remained the secondary determinant at Aston. This disparity in secondary predictors for motivation, is likely due to the ethnic homogeneity and widespread prevalence of extraversion in the black ethnic group (Krok-Schoen, et al, 2014). Though attention was not paid to collecting ethnic information in this study, it important to recognize that the Unilag student population is represented by black majority, reflective of the local community's demographic, while the Aston population is much more diverse and heterogenous, with a black minority. According to the University's Annual Student Equalities Report (2020), the largest student groups are Asian or Asian British at 44% and White at 32%, while groups of Blacks or Black British remain at 13%.

Amotivation showed the strongest negative relationship with conscientiousness, but secondary associations seemed to vary depending to the cohort being examined. Extraversion indicated a positive association, while agreeableness indicated a negative relationship with the Unilag population. However, it was neuroticism (not extraversion or agreeableness) that was the subordinate predictor (behind low conscientiousness) at Aston. This suggests that in the absence of conscientiousness, the social stimulation that energize extraverts, may be disadvantageous to academic motivation. Furthermore, given that disagreeableness items reflect low levels of cooperativeness and a high trust deficit and rebellion, the results suggest that disagreeableness students maybe more likely to display uncooperative and antisocial behaviour in the classroom characteristic of poor socialization to academic norms inherent in amotivation scale items. Neuroticism only proved significant as a predictor of amotivation in Aston, implying that the emotional instability characteristic of this trait, has a negative impact on academic motivation. However, neuroticism did not exhibit any statistical significance in Unilag. The results of the simple correlation analyses (tables 4.6.1 and 4.6.2) which indicate a strong positive correlation between amotivation and neuroticism at Aston (0.83), but insignificant at Unilag (0.05) may be a supporting indicator of this. Though it is important to interpret these results with caution, particularly as correlation does not imply causation (Nathans, Oswald and Nimon, 2012).

## 5.1. Addressing the Study Research Questions

### 5.1.1. RQ 1: How can personality types be effectively measured?

Personality assessment is a fundamental aspect of psychological research, enabling the measurement of individual differences in behaviour, cognition, and emotion. Various methods and tools have been developed to effectively measure personality types, providing valuable insights into human characteristics. This paper discusses the different approaches and techniques used in the measurement of personality types, emphasizing the importance of reliable and valid assessment methods in the effective measurement of personality types.

The effectiveness of personality measurement techniques is contingent on their validity and reliability. Validity refers to the accuracy of the assessment in measuring the intended constructs, while reliability pertains to the consistency of the results over time and across different conditions. It is essential for personality assessment methods to demonstrate high levels of validity and reliability to ensure the accuracy of the obtained measurements.

Personality assessment encompasses a range of methods, each with its unique advantages and considerations. These methods include self-report tests, direct observation, projective tests, interviews, and psychometric assessments. Self-report tests, such as questionnaires, allow individuals to provide information about their own personality traits. Direct observation involves the systematic monitoring of an individual's behaviour in various contexts. Projective tests, such as the Rorschach inkblot test, aim to reveal unconscious aspects of an individual's personality. Interviews and psychometric assessments are also commonly used to measure personality types.

This study focuses on the use of psychometric assessments which offer a scientific approach to measuring personality types. These assessments utilize standardized tools to evaluate various characteristics, such as conscientiousness, extraversion, agreeableness, emotional stability, and openness based on the Big Five. The Revised NEO Personality Inventory (NEO PI-R) is a widely used psychometric assessment tool that measures an individual on five dimensions of personality, commonly known as the Big Five personality traits. The NEO PI-R also reports on six subcategories of each Big Five personality trait, known as facets. The inventory provides detailed information on 30 distinct traits, offering a comprehensive assessment of an individual's personality. The NEO PI-R has demonstrated good internal consistency and test-retest reliability.

For the NEO-FFI-3, a shorter 60-item domain-only version of the NEO PI-R, which retains its reliability and validity and measures the same five dimensions of personality which was used in this study , the internal consistencies reported in the manual were N = .79, E = .79, O = .80, A = .75, C = .83. The test-retest reliability for over 6 years, as reported in the NEO PI-R manual, was the following: N = .83, E = .82, O = .83, A = .63, C = .79. These findings not only demonstrate good reliability of the domains but also their stability. Scores measured six years apart varied only marginally more than scores measured a few months apart.

In addition to construct validity and reliability, as well as the ease of administration, the NEO-FFI also offers other advantages in contrast to other personality instruments available such as MBTI and Ennegram. Crucial among this, is the fact the NEO FFI is based on the Big Five, a time-tested a trusted scientific model of personality. Furthermore, the Neo FFI measures personality traits based on a continuum using a 5 point Likert scale ranging from SA (strongly agree) to SD (strongly disagree). This approach of using a sliding scale rather than a forced choice format allows multiple traits to be analysed and assessed separately and with more nuance. This gives it the flexibility to cater for changes and observe how ones personality changes over time.

### 5.1.2. R.Q2: What traits are the best predictors of academic motivation?

Conscientiousness emerged as the most significant predictor of academic motivation, showing positive association with intrinsic and extrinsic motivation and a negative relationship with a lack of motivation for academic engagement suggesting that students who are disciplined, organised and goal oriented are most likely to be motivated.

Similarly, openness to experience and extraversion have been positively associated with academic motivation. Individuals who are open to new experiences and ideas demonstrate more intellectual curiosity which tends to enhance motivation, just as extraverted individuals who are sociable and energetic demonstrate greater inclination translate this to academic settings. However, while the majority of prior research indicate that relationship of extraversion is not as strong as openness to new experience (particularly with intrinsic motivation), this study demonstrates the possibility of an ethnic colouration, which may benefit from further research. This is because, relationship of extraversion with academic motivation was stronger with a predominantly black cohort.

Furthermore, this study also proves that where conscientiousness is lacking, the vivaciousness, social stimulation, energy and adventure characteristic of openness to experience and extraversion is more likely to be a cause of distraction and disengagement, resulting in amotivation. Amotivation itself has been strongly linked with low levels of conscientiousness and disagreeableness, which is in congruence with prior research and literature review.

### 5.2. Applying the Research Findings to the Real World

The implications of the relationship between personality traits and academic motivation have significant applications in academia and real life. Understanding these implications can inform educational practices, student support, and personal development.

Educational Practices: Educators can use insights from the relationship between personality traits and academic motivation to tailor their teaching methods and support strategies. For example, understanding that individuals with high levels of conscientiousness tend to be organized and goal-oriented can help educators design structured learning environments that resonate with these students. Similarly, recognizing that intrinsic motivations are positively

correlated with certain personality traits, such as conscientiousness, and openness to new experiences, and extraversion can guide the development of teaching approaches that foster students' internal drive to learn.

Student Support: Knowledge of the influence of personality traits on academic motivation can aid in the development of targeted student support programs. For instance, identifying students who may have lower levels of intrinsic motivation due to their personality traits can prompt the implementation of interventions aimed at enhancing their engagement and interest in learning. This could involve providing personalized guidance, mentorship, or resources that align with their individual characteristics and motivational drivers.

Personal Development: In real life, individuals can use this understanding to enhance their own academic motivation and achievement. For example, a student who recognizes that their personality traits are linked to specific motivational factors can leverage this knowledge to develop personalized study habits, goal-setting strategies, and self-motivation techniques that align with their inherent characteristics. This self-awareness can empower individuals to take ownership of their learning journey and make informed decisions about their academic and career paths.

## 6. Conclusions

This research underscores our understanding of the role of personality traits in influencing academic motivation. It reaffirms conscientiousness as central to all key variables of motivation, indicating that prudence, self-control, grit, and academic discipline play a significant role overall trajectory of academic motivation, which demonstrates convergence with the conclusions and results of earlier research.

The combination of different approaches including exploratory factor analysis with statistical techniques such as correlation and multiple regression reinforces construct validity and while providing deeper and more incisive insights, thus paving the way to highlight strategies for educators and educational institutions to adopt in enhancing motivation by taking personality influences into account.

Additionally, the use of two independent samples uncovers significant potential ethnic nuances and has set the stage for further research on these issues.

## Compliance with ethical standards

*Disclosure of conflict of interest*

No conflict of interest to be disclosed.

*Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

## References

[1]     Acar, S. and Runco, M.A. (2012) 'Psychoticism and creativity: A meta-analytic review.', Psychology of Aesthetics, Creativity, and the Arts, 6(4), p. 341.

[2]     Adams, N., Little, T.D. and Ryan, R.M. (2017) 'Self-determination theory', Development of self-determination through the life-course, pp. 47–54.

[3]     Alice Lalchhandami, F. (2016) 'Intelligence, Creativity and Self–concept as Predictors of Academic Performance amongst Mizo Children (6-8 years)'.

[4]     Argyle, M. and Little, B.R. (1972) 'Do personality traits apply to social behaviour?', Journal for the Theory of Social Behaviour [Preprint].

[5]     Ariani, D.W. (2013) 'Personality and learning motivation', European Journal of Business and Management, 5(10).

[6]     Åsvoll, H. (2014) 'Abduction, deduction and induction: can these concepts be used for an understanding of methodological processes in interpretative case studies?', International Journal of Qualitative Studies in Education, 27(3), pp. 289–307.

[7] Bandura, A. (2000) 'Self-efficacy: The foundation of agency', Control of human behavior, mental processes, and consciousness: Essays in honor of the 60th birthday of August Flammer, 16.

[8] Barrick, M.R. and Mount, M.K. (1991) 'The big five personality dimensions and job performance: a meta-analysis', Personnel psychology, 44(1), pp. 1–26.

[9] Beeton, S., Weiler, B. and Ham, S. (2005) 'CONTEXTUAL ANALYSIS FOR APPLYING PERSUASIVE COMMUNICATION THEORY TO MANAGING VISITOR BEHAVIOUR'.

[10] Bell, E., Bryman, A. and Harley, B. (2022) Business research methods. Oxford university press.

[11] Bernaus, M. and Gardner, R.C. (2008) 'Teacher motivation strategies, student perceptions, student motivation, and English achievement', The Modern Language Journal, 92(3), pp. 387–401.

[12] Borah, M. (2021) 'Motivation in learning', Journal of Critical Reviews, 8(2), pp. 550–552.

[13] Britannica, E. (2008) Britannica concise encyclopedia. Encyclopaedia Britannica, Inc.

[14] Bryman, A. (2016) Social research methods. Oxford university press.

[15] Caponetto, I., Earp, J. and Ott, M. (2014) 'Gamification and education: A literature review', in European Conference on Games Based Learning. Academic Conferences International Limited, p. 50.

[16] Chamorro-Premuzic, T. (2016) Personality and individual differences. John Wiley & Sons.

[17] Christie, R. and Lindauer, F. (1963) 'Personality structure', Annual review of psychology, 14(1), pp. 201–230.

[18] Clark, M.H. and Schroth, C.A. (2010) 'Examining relationships between academic motivation and personality among college students', Learning and individual differences, 20(1), pp. 19–24.

[19] Crysel, L.C., Crosier, B.S. and Webster, G.D. (2013) 'The Dark Triad and risk behavior', Personality and individual differences, 54(1), pp. 35–40.

[20] Deci, E.L., Koestner, R. and Ryan, R.M. (2001) 'Extrinsic rewards and intrinsic motivation in education: Reconsidered once again', Review of educational research, 71(1), pp. 1–27.

[21] Deci, E.L. and Ryan, R.M. (1985) 'The general causality orientations scale: Self-determination in personality', Journal of research in personality, 19(2), pp. 109–134.

[22] DiStefano, C., Zhu, M. and Mindrila, D. (2019) 'Understanding and using factor scores: Considerations for the applied researcher', Practical assessment, research, and evaluation, 14(1), p. 20.

[23] Edwards, A.L. (1957) 'The social desirability variable in personality assessment and research.'

[24] Erez, A. (1997) Core self-evaluations as a source of work-motivation and performance. Cornell University.

[25] Fabrigar, L.R. and Wegener, D.T. (2011) Exploratory factor analysis. Oxford University Press.

[26] Furnham, A., Richards, S.C. and Paulhus, D.L. (2013) 'The Dark Triad of personality: A 10 year review', Social and personality psychology compass, 7(3), pp. 199–216.

[27] Galang, A.J.R. (2021) 'The intrinsic-extrinsic distinction: A one-sided coin'.

[28] Gatzka, T. (2021) 'Aspects of openness as predictors of academic achievement', Personality and Individual Differences, 170, p. 110422.

[29] Goodman, S. et al. (2011) 'An investigation of the relationship between students' motivation and academic performance as mediated by effort', South African Journal of Psychology, 41(3), pp. 373–385.

[30] Goodwin, L.D. (1999) 'The role of factor analysis in the estimation of construct validity', Measurement in physical education and exercise science, 3(2), pp. 85–100.

[31] Graciani Hidajat, H. et al. (2020) 'Why I'm Bored in Learning? Exploration of Students' Academic Motivation.', International Journal of Instruction, 13(3), pp. 119–136.

[32] Hammar, R. (2023) 'Fallen Between the Cracks: Students' Motivation and Use of Learning Strategies in English 5: A comparison between an academic and a vocational program'.

[33] Hart, J.W. et al. (2007) 'The Big Five and achievement motivation: Exploring the relationship between personality and a two-factor model of motivation.', Individual Differences Research, 5(4).

[34] Hazrati-Viari, A., Rad, A.T. and Torabi, S.S. (2012) 'The effect of personality traits on academic performance: The mediating role of academic motivation', Procedia-Social and Behavioral Sciences, 32, pp. 367–371.

[35] Hiver, P., Al-Hoorie, A.H. and Mercer, S. (2020) Student engagement in the language classroom. Multilingual Matters.

[36] Izard, C.E. (2009) 'Emotion theory and research: Highlights, unanswered questions, and emerging issues', Annual review of psychology, 60, pp. 1–25.

[37] Jenkins, L.N. and Demaray, M.K. (2015) 'An investigation of relations among academic enablers and reading outcomes', Psychology in the Schools, 52(4), pp. 379–389.

[38] Judge, T.A. and Robbins, S.P. (2017) Essentials of organizational behavior. Pearson Education (us).

[39] Kock, F., Berbekova, A. and Assaf, A.G. (2021) 'Understanding and managing the threat of common method bias: Detection, prevention and control', Tourism Management, 86, p. 104330.

[40] Krok-Schoen, J.L. and Baker, T.A. (2014) 'Race differences in personality and affect between older white and black patients: An exploratory study', Journal of Racial and Ethnic Health Disparities, 1, pp. 283–290.

[41] Leentjens, A.F. and Levenson, J.L. (2013) 'Ethical issues concerning the recruitment of university students as research subjects', Journal of psychosomatic research, 75(4), pp. 394–398.

[42] Legault, L. (2020) 'Intrinsic and extrinsic motivation', Encyclopedia of personality and individual differences, pp. 2416–2419.

[43] Linnenbrink, E.A. and Pintrich, P.R. (2002) 'Motivation as an enabler for academic success', School psychology review, 31(3), pp. 313–327.

[44] Locke, E.A. and Latham, G.P. (2019) 'The development of goal setting theory: A half century retrospective.', Motivation Science, 5(2), p. 93.

[45] Marsh, H.W. et al. (2003) 'Evaluation of the Big-Two-Factor Theory of academic motivation orientations: An evaluation of jingle-jangle fallacies', Multivariate Behavioral Research, 38(2), pp. 189–224.

[46] McClelland, D.C. (1985) 'How motives, skills, and values determine what people do.', American psychologist, 40(7), p. 812.

[47] McCrae, R.R. (2009) 'The five-factor model of personality traits: Consensus and controversy', The Cambridge handbook of personality psychology, pp. 148–161.

[48] McCrae, R.R. and Allik, I. (2002) The five-factor model of personality across cultures. Springer Science & Business Media.

[49] McCrae, R.R. and Costa Jr, P.T. (2004) 'A contemplated revision of the NEO Five-Factor Inventory', Personality and individual differences, 36(3), pp. 587–596.

[50] McCrae, R.R., Costa, P.T. and Arenberg, D. (1980) 'Constancy of adult personality structure in males: Longitudinal, cross-sectional and times-of-measurement analyses', Journal of Gerontology, 35(6), pp. 877–883.

[51] McCrae, R.R. and John, O.P. (1992) 'An introduction to the five-factor model and its applications', Journal of personality, 60(2), pp. 175–215.

[52] McReynolds, P. et al. (1990) 'The search for basic dimensions of personality: A review and critique', Advances in Psychological Assessment: Volume 7, pp. 1–37.

[53] Mertova, P. and Webster, L. (2019) Using narrative inquiry as a research method: An introduction to critical event narrative analysis in research, teaching and professional practice. Routledge.

[54] Miles, M.B., Huberman, A.M. and Saldaña, J. (2020) Qualitative data analysis : a methods sourcebook. Fourth edition / Matthew B. Miles, A. Michael Huberman, Johnny Saldaña. SAGE. Available at: https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,url,shib,uid&db=cat00594a&AN=aston.b2177199&site=eds-live&authtype=ip,shib&custid=s9815128.

[55] Mischel, W. and Peake, P.K. (1982) 'Analyzing the construction of consistency in personality.', in. Nebraska symposium on motivation, University of Nebraska Press.

[56] Mohiyeddini, C., Bauer, S. and Semple, S. (2015) 'Neuroticism and stress: The role of displacement behavior', Anxiety, stress, & coping, 28(4), pp. 391–407.

[57] Nasheeda, A. et al. (2019) 'Transforming transcripts into stories: A multimethod approach to narrative analysis', International Journal of Qualitative Methods, 18, p. 1609406919856797.

[58] Nathans, L.L., Oswald, F.L. and Nimon, K. (2012) 'Interpreting multiple linear regression: a guidebook of variable importance.', Practical assessment, research & evaluation, 17(9), p. n9.

[59] Neher, A. (1991) 'Maslow's theory of motivation: A critique', Journal of humanistic psychology, 31(3), pp. 89–112.

[60] Novikova, I. (2013) 'Trait, trait theory', The encyclopedia of cross-cultural psychology, 3, pp. 1293–1295.

[61] Novikova, I.A. and Vorobyeva, A.A. (2019) 'The five-factor model: Contemporary personality theory', Cross-Cultural Psychology: Contemporary Themes and Perspectives, pp. 685–706.

[62] Podsakoff, P.M. et al. (2003) 'Common method biases in behavioral research: a critical review of the literature and recommended remedies.', Journal of applied psychology, 88(5), p. 879.

[63] Podsakoff, P.M. et al. (2023) 'Common Method Bias: It's Bad, It's Complex, It's Widespread, and It's Not Easy to Fix', Annual Review of Organizational Psychology and Organizational Behavior, 11.

[64] Reeve, J. (2016) 'Autonomy-supportive teaching: What it is, how to do it', in Building autonomous learners: Perspectives from research and practice using self-determination theory. Springer, pp. 129–152.

[65] Reiss, S. (2004) 'Multifaceted nature of intrinsic motivation: The theory of 16 basic desires', Review of general psychology, 8(3), pp. 179–193.

[66] Ridder, H.-G. (2014) 'Book Review: Qualitative data analysis. A methods sourcebook'.

[67] Ritter, S. et al. (2020) 'International legal and ethical issues of a future carrington event: existing frameworks, shortcomings, and recommendations', New Space, 8(1), pp. 23–30.

[68] Ryan, R.M. et al. (2019) 'The nature and the conditions of human autonomy and flourishing: Self-determination theory and basic psychological needs'.

[69] Ryan, R.M. and Deci, E.L. (2000) 'Intrinsic and extrinsic motivations: Classic definitions and new directions', Contemporary educational psychology, 25(1), pp. 54–67.

[70] Ryan, R.M. and Deci, E.L. (2017) Self-determination theory: Basic psychological needs in motivation, development, and wellness. Guilford publications.

[71] Saunders, M., Lewis, P. and Thornhill, A. (2016) 'Reserach Methods for Business Students Londres: Person Education Limited'.

[72] Smythe, W.E. and Murray, M.J. (2000) 'Owning the story: Ethical considerations in narrative research', Ethics & behavior, 10(4), pp. 311–336.

[73] Soto, C.J. and Jackson, J.J. (2013) 'Five-factor model of personality', J. Res. Personal, 42, pp. 1285–1302.

[74] Spitzer, D.R. and Keller, J.M. (1978) 'Developing an objective measure of academic motivation', Educational Technology, 18(6), pp. 26–30.

[75] Stoeber, J. et al. (2011) 'Passion and motivation for studying: predicting academic engagement and burnout in university students', Educational psychology, 31(4), pp. 513–528.

[76] Toates, F. (2002) 'Physiology, motivation and the organization of behaviour', The ethology of domestic animals: an introductory text'.(Ed. P Jensen) pp, pp. 31–50.

[77] Trautwein, U. et al. (2012) 'Probing for the multiplicative term in modern expectancy–value theory: a latent interaction modeling study.', Journal of educational psychology, 104(3), p. 763.

[78] Vallerand, R.J. et al. (1992) 'The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education', Educational and psychological measurement, 52(4), pp. 1003–1017.

[79] Wiggins, J.S. (1996) The five-factor model of personality: Theoretical perspectives. Guilford Press.

[80] Yin, R.K. (2018) Case study research and applications. Sage.

[81] Zou, K.H., Tuncali, K. and Silverman, S.G. (2003) 'Correlation and simple linear regression', Radiology, 227(3), pp. 617–628.