International Journal Educational Psychology
Volume 14, Issue 2, 24th June 2025, Pages 94-117
Online First Published: 8th April, 2025

http://dx.doi.org/10.17583/ijep.15094

# Personality Shadows: Dark Triad Traits and Academic Major Choices Among Greek University - Students

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## Abstract

This study examined the link between academic majors and Dark Triad personality traits in 2,387 Greek university students. Utilizing Bifactor Exploratory Structural Equation Modeling, we identified a general dark factor (D-factor) and three specific traits. Latent Profile Analysis revealed four personality clusters: self-centric personalities, ambitious manipulators, tactful manipulators, and omni-dark personalities. Self-centric personalities exhibited low D-factor levels but high narcissism, typically choosing majors like Humanities, Law, and Social Sciences that spotlight personal success. Tactful manipulators, with moderate Machiavellianism and narcissism but low psychopathy, opted for majors in Humanities, Law, Social Sciences, Economics, and Information Sciences, suitable for roles demanding influence and leadership. Ambitious manipulators displayed high Machiavellianism and narcissism with lower psychopathy, favoring competitive fields like Maths, Natural/Technological Sciences, and Health/Life Sciences, which offer opportunities for personal advancement and leadership. Omni-dark personalities scored high across all Dark Triad traits, gravitating towards majors linked with power and competitive hierarchies. The study also found a higher prevalence of omni-dark personalities among males, suggesting potential biological, social, and cultural influences. These insights inform potential interventions to support students in their educational and developmental paths.

## Keywords

Dark Triad traits, academic major choices, university students

**To cite this article:** Kokkinos, C. M., Voulgaridou, I, & Tsouloupas, C. N. (2025). Personality Shadows: Dark Triad Traits and Academic Major Choices Among Greek University Students. *International Journal Educational Psychology, 14*(2). pp. 94-117. http://dx.doi.org/10.17583/ijep.15094

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International Journal Educational Psychology
Volumen 14, Número 2, 24 de junio, 2025, Páginas 94-117
Publicado en Online First: 8 de abril de 2025

http://dx.doi.org/10.17583/ijep.15094

# Sombras de Personalidad: Rasgos del Triángulo Oscuro y Elección de Carreras Universitarias Entre Estudiantes Griegos

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## Resumen

Este estudio investigó la relación entre las áreas de estudio universitario y los rasgos de personalidad de la Tríada Oscura en 2,387 estudiantes universitarios griegos. Se utilizó el Modelado de Ecuaciones Estructurales Exploratorio Bifactorial, identificamos un factor oscuro general (D-factor) y tres rasgos específicos. Un Análisis de Perfiles Latentes reveló cuatro grupos de personalidad: egocéntricos, manipuladores ambiciosos, manipuladores diplomáticos y personalidades completamente oscuras. Las personalidades egocéntricas mostraron bajo D-factor pero alto narcisismo, eligiendo carreras como Humanidades, Derecho y Ciencias Sociales, que enfatizan el éxito personal. Los manipuladores diplomáticos, con maquiavelismo y narcisismo moderados pero baja psicopatía, optaron por Humanidades, Derecho, Ciencias Sociales, Economía y ciencias de la comunicación, adecuados para roles de liderazgo. Los manipuladores ambiciosos, con alto maquiavelismo y narcisismo y menor psicopatía, prefirieron Matemáticas, Ciencias Naturales/Tecnológicas y de la Salud/Vida, que ofrecen oportunidades de avance. Las personalidades completamente oscuras puntuaron alto en los tres rasgos de la Tríada Oscura, inclinándose por carreras ligadas al poder y jerarquías competitivas. Además, su prevalencia fue mayor en hombres, sugiriendo influencias biológicas, sociales y culturales. Estos hallazgos pueden guiar intervenciones para apoyar el desarrollo educativo y personal de los estudiantes.

## Palabras clave

Rasgos del Triángulo Oscuro, elección de carreras universitarias, estudiantes universitarios

**Cómo citar este artículo:** Kokkinos, C. M., Voulgaridou, I, y Tsouloupas, C. N. (2025). Sombras de Personalidad: Rasgos del Triángulo Oscuro y Elección de Carreras Universitarias Entre Estudiantes Griegos. *International Journal Educational Psychology, 14*(2) pp. 94-117. http://dx.doi.org/10.17583/ijep.15094

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Personality is a well-established predictor of academic and vocational decisions, with prior research highlighting its significant influence on the choice of academic majors (Gottfredson & Richards, 1999). While cognitive abilities and personal interests also play crucial roles, the inclusion of more nuanced personality traits offers deeper insight into these decisions. The examination of personality traits in the context of academic major selection has primarily focused on the Five Factor Model (FFM), which captures broad dimensions of personality (Kokkinos et al., 2024). However, these traits, while useful, may not fully account for more socially aversive characteristics that could drive academic choices. Traits within the Dark Triad (D3)—Narcissism, Machiavellianism, and Psychopathy— offer a unique perspective as they center on social aversiveness and manipulative tendencies. Narcissism involves an inflated sense of self-importance, a need for admiration, and a lack of empathy, leading individuals to pursue majors that offer personal recognition. Machiavellianism is characterized by manipulation, self-interest, and the pursuit of power, drawing individuals toward competitive fields where strategic behavior is rewarded. Psychopathy, marked by impulsivity, callousness, and a lack of remorse, may influence academic choices in fields that value risk-taking and assertiveness.

Recent developments in personality psychology have led to the formulation of the Dark Core theory, which seeks to address some of the shortcomings identified in the Dark Triad framework. This theory posits a single underlying factor that encompasses various dark traits, offering a more integrated perspective of how socially aversive characteristics, such as deceitfulness, arrogance, and lack of empathy, manifest across different domains (Moshagen et al., 2018). Empirical studies like those by O'Boyle et al. (2015), who found stronger correlations between the traits of the Triad, and Furnham et al. (2013), who described the shared core of the triad as essentially callous-manipulation, highlight the robustness and interrelatedness of these traits. Furthermore, the debate continues with proposals such as the Dark Tetrad, which includes Sadism alongside the traditional Dark Triad traits, and research suggesting a broader spectrum of dark characteristics like amoralism and sensational interests (Paulhus & Jones, 2015; Buckels et al., 2013). These traits are fundamentally different from the FFM in that they reflect malevolent behaviors like deceitfulness, arrogance, and lack of empathy, which could shape specific academic choices in distinctive ways.

University decisions are often influenced by high school academic paths (Cannon et al., 2020). While previous research has established a link between low Agreeableness in the FFM and certain academic fields- such as business and law- (Vedel, 2016; Vedel & Thomsen, 2017), it is essential to recognize the ongoing debate within the literature. Some scholars argue that low Agreeableness may encapsulate many of the behaviors and tendencies associated with dark personality traits, suggesting that the D3 traits may not represent entirely distinct constructs but rather extensions of low Agreeableness (Lynam & Widiger, 2001). From this perspective, D3 traits might be seen as a more extreme manifestation of antagonistic and socially aversive behaviors already captured by low Agreeableness (Elegido, 2009).

However, an alternative view contends that while low Agreeableness reflects traits such as competitiveness, skepticism, and tough-mindedness (Costa & McCrae, 1992), the D3 traits encompass a broader range of malevolent behaviors, including glibness, deceit, manipulation, and lack of empathy (Paulhus & Williams, 2002). These traits focus not just on interpersonal antagonism but also on strategic, self-serving behaviors aimed at gaining power, control, and

personal advantage—qualities that are less central to the definition of low Agreeableness. As such, D3 traits may uniquely influence decision-making processes, particularly in competitive, hierarchical, or self-serving academic environments. This study seeks to expand the understanding of how personality traits, particularly the D3, influence academic major choices. The research aims to examine the structure of D3 traits within a university student population and determine whether a bifactor model can adequately represent these traits. It also investigates whether D3 traits offer stronger or additional predictive power for academic major choices compared to the Five Factor Model traits. Furthermore, it aims to identify distinct personality profiles through Latent Profile Analysis (LPA) and examine how these profiles relate to students' academic major choices

## Dark Triad Traits and Academic Majors

The D3, encompassing traits such as lack of empathy, deception, and manipulation, exerts a significant influence on various life domains, including interpersonal relationships, environmental interactions, and potentially academic major selections. The D3 consists of Narcissism, characterized by an inflated sense of self-importance, a need for admiration, and a lack of empathy; Machiavellianism, defined by manipulative, strategic behavior focused on self-interest and achieving power; and Psychopathy, marked by impulsivity, callousness, and a lack of remorse. Each trait has distinct features but shares a common foundation of social aversiveness and malevolence.

The common dark factor, or D-factor, reflects the core characteristics shared by all three traits, such as the tendency to engage in unethical behavior for personal gain, disregard for others, and a focus on self-serving goals. The overarching D-factor has been shown to predict negative outcomes, including unethical decision-making and interpersonal conflict (Moshagen et al., 2018), and provides a comprehensive framework for understanding how these traits may collectively influence academic and career choices. In recent developments, the discourse around Dark Triad traits has broadened to include the Dark Tetrad, introducing Sadism as a fourth trait (Buckels et al., 2013). This extension reflects the ongoing debate and dynamic nature of dark personality research, where not only new traits like sadism are considered but also dimensions, such as amoralism and sensational interests, further enriching our understanding of the dark personality spectrum (Paulhus & Jones, 2015). These expansions highlight the field's response to the need for a more comprehensive framework that captures a broader array of antisocial or malevolent behaviors.

Empirical studies, such as those by O'Boyle et al. (2015), have found stronger correlations between the traits of the triad, suggesting a more interconnected structure than previously thought. Meanwhile, Furnham et al. (2013) identified a shared core of callous-manipulation within the triad, challenging the notion that these traits operate entirely independently. The conceptual evolution continued with the introduction of the Dark Core (D-factor) by Moshagen et al. (2018), aimed at consolidating various dark traits into a single, unified framework. Initially encompassing nine thematic dimensions, this bifactor model was later streamlined to five due to conceptual redundancies and empirical challenges, as noted by Bader et al. (2021). Further research in different cultural contexts, such as in Portugal, has shown varying levels of

support for the bifactor model (Pechorro et al., 2024), with some studies finding that a unidimensional approach provided a better fit for the data (Jonason et al., 2022). Additionally, significant research into callous-unemotional traits has revitalized the approach to studying psychopathy. Moving from a categorical taxonomy to a more nuanced, multidimensional approach, the triarchic model of psychopathy (meanness, disinhibition, boldness) offers a continuum that extends from normal personality variations to extreme psychopathic traits (Patrick et al., 2009). This model underscores the complex and graduated nature of these traits in the general population.

As this debate illustrates, the distinction and integration of the D3, Dark Tetrad, and Dark Core are critical for advancing our understanding of how these personality frameworks influence various life outcomes, including academic and career decisions. It is crucial for educational institutions and researchers to recognize these distinctions and commonalities when developing targeted interventions or conducting further research. Prior research has indicated that business students often exhibit D3-associated traits (Elegido, 2009). However, empirical investigations exploring the associations between D3 traits and academic major choices remain limited. This study aims to elucidate potential correlations between the academic majors of Greek university students and D3 traits through the application of LPA.

Latent Profile Analysis is employed to uncover unobserved subgroups characterized by unique configurations of traits, thereby accommodating non-linear relationships and interaction effects (Ferguson & Hull, 2018). This methodology provides nuanced insights and enhances predictive accuracy, surpassing traditional mean-level analyses. Previous research on the D3 has primarily concentrated on creating profiles based on simple quantitative measures (e.g., high, moderate, or low levels of traits), which limits the exploration of the multidimensional nature of these traits (McLarnon & Tarraf, 2021). To address these limitations, we incorporate advanced factor analysis techniques, including structural equation modeling (SEM) and specifically bifactor exploratory SEM (B-ESEM), to establish a comprehensive multidimensional measurement model of D3 traits. The B-ESEM approach facilitates a more refined understanding by examining both general and specific factors. Factor scores derived from B-ESEM are subsequently utilized in our person-centered analyses via LPA. This integrated approach allows for the identification of D3 profiles with significant shape and configurational distinctions, transcending mere trait level differences (McLarnon & Tarraf, 2021).

Despite the limited scope of research on the relationship between D3 traits and academic major selection, several noteworthy patterns have emerged. Danish students majoring in economics and business have been observed to score highest in Machiavellianism and significantly higher in Narcissism compared to their counterparts in political science and psychology (Vedel & Thomsen, 2017). Similarly, Köse and Ekren (2020) documented elevated levels of Machiavellianism and Psychopathy among students in economics/business and engineering, suggesting these disciplines may attract individuals with pronounced Psychopathy traits. Business students also demonstrated higher scores in various psychopathic facets compared to psychology majors (Litten et al., 2018). Furthermore, Wilson and McCarthy (2011) found that business/trade majors scored notably higher on Psychopathy than those in science and arts. Gruda et al. (2023) revealed a significant correlation between Machiavellian

tendencies and academic major choice, with economics majors displaying the highest Machiavellianism scores among 50 majors across 11 countries.

For the present study, we adopted a four-category classification (Humanities/Law/Social Sciences, Economics/Information Sciences, Maths/Natural/Technological, and Health/Life Sciences), similarly employed in previous research (Kokkinos et al., 2024), to capture the nuanced disciplinary distinctions observed in our sample, while recognizing that alternative grouping schemes exist. The rationale for this classification is grounded in both empirical evidence and practical considerations. The decision was informed by a review of literature indicating that such groupings provide a meaningful differentiation of academic disciplines, but also align well with the similarities in subject matter, typical career paths, and core competencies within these groups. For example, Humanities, Law, and Social Sciences are grouped together due to their shared focus on critical thinking, argumentative skills, and societal issues, which often overlap in their educational objectives and outcomes. Similarly, Economics and Information Sciences share a quantitative and analytical framework, making them suitable to be categorized together, especially in the context of their application in business and technology settings. Maths/Natural/Technological and Health/Life Sciences are grouped based on their rigorous scientific and technical curriculum, which requires a strong foundation in empirical research and practical applications. The choice of four groups over three, five, or more was strategically made to balance comprehensiveness with manageability. Grouping into fewer than four categories would have oversimplified the distinctions between fields that have significant differences in personality alignment, while more than four groups could fragment the categories too much, potentially diluting the statistical power and clarity of analysis due to smaller sample sizes in each group. while maintaining manageable sample sizes for statistical analyses. Furthermore, this categorization reflects common practices in educational psychology research, where broad fields of study are grouped based on inherent similarities to ensure that comparative analyses remain robust and meaningful (Kokkinos et al., 2024; Kokkinos & Voulgaridou, 2024). By maintaining manageable sample sizes, it is ensured that the statistical analyses are both reliable and valid, providing clear, actionable insights into how personality traits influence academic major selection.

The prevalence of D3 traits across different academic majors may be influenced by a combination of factors. First, individuals with higher D3 traits might be predisposed to select majors that align with their inherent predispositions, which include not only leadership aspirations but also a preference for environments that emphasize competition, power, and control. While leadership roles can be found across all academic disciplines, D3 traits may specifically drive individuals toward fields where strategic manipulation, hierarchical dynamics, and status-seeking behaviors are more pronounced, such as in economics and business.

Second, specific academic disciplines may cultivate or amplify D3 traits due to their competitive, strategic, and power-oriented environments. For instance, students who are drawn to economics or business may find that these fields encourage traits such as Machiavellianism and Psychopathy, which can be advantageous in certain competitive or high-stakes professional settings. Evidence indicates that students exhibiting D3 traits are drawn to majors associated with power and status, such as economics and business (Vedel & Thomsen, 2017). These fields

may inadvertently promote darker traits, potentially neglecting moral and ethical considerations (Elegido, 2009).

Understanding the interplay between D3 traits and academic major selection is essential for comprehending the broader dynamics within university programs. This study contributes to the existing literature by offering a more sophisticated analysis through the use of LPA and B-ESEM, thus providing a deeper understanding of how these traits influence academic choices.

## Gender Differences

In examining the role of D3 traits in academic major choices, it is essential to consider the influence of gender. Previous research suggests that these traits manifest differently across genders. For instance, studies have demonstrated that males often score higher on traits such as Narcissism and Machiavellianism (Fiske et al., 2010; Kimmel, 2018). These differences may be driven by a combination of biological, psychological, and social factors, including societal expectations and socialization processes that encourage competitiveness, assertiveness, and self-promotion more in males than in females.

Gender differences in D3 traits could have implications for academic major selection, particularly given the established gender disparities in various academic fields. For example, males are often overrepresented in fields such as engineering, business, and economics—areas that are associated with traits like strategic manipulation, competitiveness, and status-seeking, which align with higher levels of D3 traits. Conversely, females are more frequently found in disciplines like education, nursing, and psychology, which are typically associated with empathy, cooperation, and interpersonal care—traits less aligned with the D3. Thus, the intersection of gender and D3 traits may help explain some of the observed gender differences in academic major choices. Males with higher levels of D3 traits may gravitate towards majors that emphasize power, competition, and hierarchical structures, such as business and economics, while females with lower levels of these traits may be more likely to pursue fields focused on nurturing and social relationships.

Our analysis seeks to delineate the interaction between gender and D3 traits in shaping academic paths. By investigating this interaction, we aim to offer new insights into how these traits influence academic choices and to potentially provide tailored educational guidance based on gender-specific trait manifestations. By understanding how gender interacts with D3 traits in the context of academic major selection, this study contributes to the broader discourse on personality and educational outcomes. It highlights the importance of considering gender-specific dynamics in academic guidance and career counseling, ensuring that educational interventions are more effectively tailored to individual needs.

## The Present Study

The primary aim of this study is to investigate the relationship between D3 personality traits—Narcissism, Machiavellianism, and Psychopathy—and academic major choices among Greek university students. By employing LPA and B-ESEM, the study seeks to uncover distinct D3

profiles and assess their predictive power regarding students' academic major selection. The use of B-ESEM will facilitate the establishment of a comprehensive multidimensional measurement model of the D3 traits, capturing both general and specific factors, while LPA will reveal unique trait configurations based on D3 trait scores and to explore their relevance for academic major selection. Additionally, the study examines gender differences in D3 traits and their implications for academic paths, aiming to provide insights for tailored educational guidance and interventions within the Greek higher education context.

It is important to note that the cultural context of Greek higher education differs in significant ways from other Western educational settings, such as those in the U.S. or Northern Europe. These differences are relevant when considering how D3 traits may influence academic major choices. For example, Greek students tend to exhibit higher levels of Conscientiousness compared to students in Northern Europe, which may reflect cultural emphases on duty, tradition, and the economic challenges that necessitate careful planning (Hofmann et al., 2023). Such cultural values may influence the expression of personality traits, including those in the D3, in ways that are distinct from other regions. In terms of D3 traits, previous cross-cultural research suggests that Greek students might display lower levels of Machiavellianism compared to students from Eastern European countries, where competitive, power-oriented behaviors are more culturally accepted (Hofmann et al., 2023). This variation in cultural norms and values is critical for understanding how D3 traits may influence academic major choices within the Greek context. For instance, academic fields in Greece that emphasize tradition, stability, and social responsibility—such as law or public administration—may be less attractive to individuals with higher levels of Machiavellianism, whereas more competitive fields like business and economics might still appeal to those with heightened D3 traits, despite the lower overall levels of such traits in the population.

Furthermore, gender differences in D3 traits, as moderated by cultural expectations in Greece, may also play a unique role in academic major selection. Traditional gender roles in Mediterranean cultures, including Greece, often emphasize more conservative and distinct gender expectations compared to Northern European or American cultures. These cultural dynamics may shape how males and females express D3 traits and how these traits influence their academic choices. For example, males with higher levels of Machiavellianism or Narcissism may be drawn to competitive fields like business, where power and status are prioritized, while females may face different societal expectations that could moderate the influence of these traits on their academic decisions.

Therefore, the study is guided by the following research questions:

a) How are the dimensions of D3 traits structured within this sample, and can a bifactor model adequately represent the data (B-ESEM), distinguishing between common and unique trait-specific variances?

b) Do the measures of D3 traits exhibit measurement invariance across different demographic groups, specifically between genders and across various academic majors?

c) Are there significant differences in the levels of D3 traits between genders and among different academic majors, and what are the distinct personality profiles based on D3 trait scores?

d) How do D3 personality profiles differ in demographic and academic characteristics, and how well do they predict students' choices of academic majors?

By addressing these questions, this study aims to provide a nuanced understanding of how D3 traits influence academic major choices within the Greek higher education system. The findings are expected to contribute to the development of tailored educational guidance and interventions that take into account both personality traits and cultural context, thereby enhancing the effectiveness of educational strategies and supporting students in making informed academic decisions.

## Method

### Participants

A sample of 2,387 Greek public university students, predominantly females (1,432), aged 18 to 60 (M = 22.17; SD = 5.56), majoring in Humanities/Law/Social Sciences, Maths/Natural/Technological Sciences, Economics/Information Sciences and Health/Life Sciences was used. Table 1 outlines the detailed participant information, including the distribution of gender across different academic majors and presents the mean age and standard deviation (SD) for the study participants.

**Table 1**
*Participant Demographics by Academic Major*

| Academic Major | Gender Distribution | Mean Age | Age SD |
|---|---|---|---|
| Humanities/Law/Social Sciences | Male: 361, Female: 758 | 22.52 | 6.29 |
| Maths/Natural/Technological Sciences | Male: 310, Female: 365 | 22.39 | 5.46 |
| Economics/Information Sciences | Male: 127, Female: 121 | 21.30 | 3.81 |
| Health/Life Sciences | Male: 153, Female: 171 | 21.21 | 3.89 |

### Procedure

Participants were recruited through social media posts and snowball sampling method, where initial participants were encouraged to share the questionnaire link with peers. The recruitment posts indicated that the study aimed to examine personality traits and their relation to academic major choices. Participation was voluntary and anonymous, and no financial or other tangible incentives were provided for participation. Instead, participants were informed that their involvement would contribute to advancing research on personality and academic decision-making, and they were assured of the confidentiality and anonymity of their responses. Informed consent was obtained from all participants before they began the survey, which clearly explained the study's purpose. The study was approved by the institution's Ethics Committee. Survey distribution used Lime Survey (limesurvey.org) online tool, which allowed participants to complete the questionnaire at their convenience. No specific inclusion or

exclusion criteria were applied other than being enrolled in a Greek public university and being within the age range of 18 to 60. The minimum sample size of 200 was determined based on Monte Carlo simulations for Confirmatory Factor Analysis, considering the structure complexity and ordinal data nature (Moshagen & Musch, 2014).

## Measures

### *The Dark Triad Personality Traits*

The Short Dark Triad Scale (SD3), a 27-item instrument developed by Jones and Paulhus (2014), was utilized to assess participants' D3 personality traits, namely Machiavellianism (e.g., "Most people can be manipulated"), Narcissism (e.g., "Many group activities tend to be dull without me"), and Psychopathy (e.g., "It's true that I can be mean to others"). Responses were gathered using a 5-point Likert scale with 1 representing "strongly disagree" and 5 "strongly agree". The scale has been used with Greek university students and demonstrated adequate psychometric properties (Kokkinos & Antoniadou, 2024). In the current sample, the Cronbach's alphas were acceptable: .68 for Machiavellianism, .65 for Narcissism, and .71 for Psychopathy.

## Statistical Analyses

Statistics were conducted using IBM SPSS 26 and Mplus 8.6 (Muthén & Muthén, 2017). The fit of five models was evaluated using Structural Equation Modeling with robust diagonally-weighted least squares (DWLS) based on recent studies on the SD3 scale's factor structure (e.g., Persson et al., 2019). Analysis ranged from single-factor CFA to three-factor bifactor ESEM. Bifactor ESEM was used to examine the underlying factor structure of the Dark Triad traits, addressing our first research question on the trait dimensionality in an academic setting. Reliability was analyzed using the Bifactor Indices Calculator R package (Dueber, 2018), calculating omega (ω, ωh, ωhs), alpha (α), and explained variance (ECV).

Configural and latent means invariance models were compared using $\Delta\chi 2$, ΔCFI, and ΔRMSEA to assess the consistency D3 trait measurement across genders and academic majors, addressing our second research question on trait comparability. Model fit was evaluated considering variations in CFI and RMSEA, using Chen's (2007) cutoff criteria adjusted for sample size; changes less than .010 in CFI and .015 in RMSEA supported measurement invariance. Latent means differences between genders and majors were explored to address our third research question on trait disparities, examining significant variations in D3 traits.

Latent Profile Analysis was utilized to identify student profiles based on D3 traits, addressing our third research question concerning the prevalence of personality profiles in academic settings. LPA, a probabilistic method, assigns individuals to latent classes based on their scores and calculates class membership probabilities (Muthén & Muthén, 2017). To determine the optimal model, we considered various fit indicators such as Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-size adjusted BIC (SABIC), following guidelines by Ferguson and Hull (2018). The model selection favored the lowest

AIC, BIC, and SABIC values. A non-significant LMR test (p>.05) suggested a model with fewer classes. Good classification was indicated by average posterior probabilities and entropy values above .80. Missing data, comprising only 0.9% of responses, were handled using Full Information Maximum Likelihood (FIML) to minimize biases and ensure accurate estimates.

Logistic regression was used to calculate odds ratios (ORs) and 95% confidence intervals (CIs) regarding gender differences and differences in terms of academic major groups between the clusters, to address our fourth research question. The subjects classified in the omni-dark personalities cluster (Cluster 4) was used as the reference group. Logistic regression was employed to predict the likelihood of students choosing a specific major based on their Dark Triad profiles, addressing our fourth research question on the predictive power of personality traits for academic decisions.

## Results

Table 2 provides a detailed breakdown of D3 traits by academic major and gender, showing mean scores, SD, and Cronbach's Alpha reliabilities for each trait.

**Table 2**

*Distribution of Dark Triad Traits by Academic Major and Gender: Means, Standard Deviations, and Cronbach's Alpha Reliabilities*

| Academic Major | Gender | M-Mean | M-SD | M-alpha | N-Mean | N-SD | N-alpha | P-Mean | P-SD | P-alpha | M Cohen's d | N Cohen's d | P Cohen's d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Humanities/Law/Social Sciences | Male | 2.90 | 0.65 | .72 | 2.94 | 0.56 | .66 | 2.21 | 0.60 | .75 | 0.137 | 0.103 | 0.257 |
| Humanities/Law/Social Sciences | Female | 2.81 | 0.66 | .71 | 2.88 | 0.60 | .64 | 2.06 | 0.57 | .66 | | | |
| Maths/Natural/Technological Sciences | Male | 2.98 | 0.67 | .73 | 2.93 | 0.62 | .68 | 2.29 | 0.65 | .75 | 0.047 | 0.050 | 0.112 |
| Maths/Natural/Technological Sciences | Female | 2.95 | 0.60 | .63 | 2.90 | 0.59 | .64 | 2.22 | 0.60 | .66 | | | |
| Economics/Information Sciences | Male | 3.07 | 0.66 | .70 | 3.06 | 0.55 | .63 | 2.36 | 0.68 | .74 | 0.111 | 0.194 | 0.193 |
| Economics/Information Sciences | Female | 3.00 | 0.61 | .62 | 2.95 | 0.58 | .62 | 2.24 | 0.57 | .66 | | | |

| Academic Major | Gender | M-Mean | M-SD | M-alpha | N-Mean | N-SD | N-alpha | P-Mean | P-SD | P-alpha | M Cohen's d | N Cohen's d | P Cohen's d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Health/Life Sciences | Male | 2.81 | 0.62 | .68 | 2.94 | 0.58 | .67 | 2.14 | 0.60 | .70 | -0.016 | 0.178 | 0.089 |
| Health/Life Sciences | Female | 2.82 | 0.63 | .66 | 2.83 | 0.64 | .58 | 2.09 | 0.54 | .55 | | | |

Table 3 details model fit indices for five models. Correlated three-factor CFA showed poor fit, consistent with prior research (Persson et al., 2019). Bifactor ESEM (Model E) exhibited the best fit with CFI=.94, TLI=.92, RMSEA=.047 [.045–.050]. The general factor showed high reliability (ω=.90), with specific factors for Psychopathy, Machiavellianism, and Narcissism also demonstrating strong reliability (ω values of .90, .90, and .89, respectively) and Cronbach's alpha values of .86, .87, and .83. Further analysis revealed the general factor accounted for 51.6% of the common variance (ECV = .51), indicating a strong general dark factor. The specific factors of Psychopathy, Machiavellianism, and Narcissism had ECV values of .16, .14, and .19, respectively. Reliability estimates show that most reliable variance in total scores is due to the general factor (ωh=.68), but substantial common variance is distinct for each specific factor (ωhs values of .36, .39, and .37), suggesting that they significantly reflect unique traits beyond the general factor.

**Table 3**

*Goodness-of-Fit Statistics of the Alternative Measurement Models of the SD3-G*

| | DWLS $\chi^2$ | *Df* | CFI | TLI | RMSEA (90%CI) | $\Delta\chi^2$ | ΔCFI | ΔTLI | ΔRMSEA |
|---|---|---|---|---|---|---|---|---|---|
| Model A | 4404.86 | 344 | .772 | .753 | .082 [.080 – .084] | - | - | - | - |
| Model B | 3401.37 | 341 | .834 | .821 | .073 [.071 – .075] | - | - | - | - |
| Model C | 2523.12 | 305 | .876 | .852 | .064 [.062 – .067] | - | - | - | - |
| Model D | 1605.70 | 291 | .942 | .923 | .051 [.049 – .053] | - | - | - | - |
| Model E | 1376.46 | 262 | .953 | .934 | .048 [.046 – .051] | - | - | - | - |
| *Academic major* | | | | | | | | | |

| | DWLS $\chi^2$ | *Df* | CFI | TLI | RMSEA (90%CI) | $\Delta\chi^2$ | ΔCFI | ΔTLI | ΔRMSEA |
|---|---|---|---|---|---|---|---|---|---|
| Configural | 1379.37 | 484 | .951 | .936 | .036 [.033 – .040] | - | - | - | - |
| Weak | 1483.54 | 587 | .945 | .928 | .049 [.047 – .052] | 104.17 | –.006 | –.008 | +.013 |
| Strong | 1580.12 | 668 | .938 | .924 | .051 [.049 – .054] | 96.58 | –.007 | –.004 | +.002 |
| Strict | 1598.47 | 747 | .936 | .921 | .052 [.049 – .054] | 18.35 | –.002 | –.003 | +.001 |
| Latent Variance–Covariance | 1607.69 | 849 | .938 | .923 | .041 [.039 – .044] | 9.22 | +.002 | .002 | -.011 |
| Latent Means | 1624.56 | 854 | .927 | .915 | .048 [.046 – .051] | 16.87 | –.011 | –.008 | +.007 |

*Note.* $\Delta\chi^2$ tests reflect comparison to directly preceding model (i.e., Model C vs. Model B) with Mplus' DIFFTEST procedure. All $\chi^2$ and $\Delta\chi^2$ are significant at $p < .001$. All alternative nested model comparisons (i.e., Model C vs. Model A) are significant at $p < .001$ as well. Model A = single-factor CFA, Model B = correlated three factor CFA, Model C = orthogonal three-factor bifactor model, Model D = orthogonal three-factor ESEM, Model E = Bifactor ESEM. Target rotation was utilized for the ESEM and bifactor ESEM models (Morin et al., 2016).

An examination of the factor loadings in the Bifactor ESEM model indicates that the global factor is well-defined by most of the items, with loadings, |λ|, ranging from .15 to .66, M=.41. Additionally, the specific factors retain their own meaningful specificity apart from that explained by the global factor, with main loadings $\lambda_{Psychopathy}$=.23–.48, M=.39, $\lambda_{Machiavellianism}$=.24–.53, M=.36 and $\lambda_{Narcissism}$=.32–.72, M=.47. The cross-loadings were comparatively weak and generally lower than the main loadings, |λ|=.03–.39, M=.18, further indicating well-defined specific factors.

Latent factor means comparisons were run to examine gender differences on the D3 using the critical ratio (CR) value for assessing significant differences, with a CR above 1.96 indicating statistical significance (Byrne, 2013). A positive CR indicates the comparison group (females) has a higher latent mean than the reference group (males), and vice versa for a negative CR. The results revealed no gender differences as the absolute value of CR was less than 1.96 and the significance probability p was greater than 0.05.

## Latent Profile Analysis

Table 4 details the fit indices for LPA and various latent profile structures, evaluating models with one to five clusters. The four-profile model emerged as optimal, showing significant p-values for BLRT, non-significant for LMR in the five-profile solution, high entropy, and the lowest indices (AIC, AWE, BIC, SABIC, CAIC). This model produced distinct, meaningful

profiles, as additional profiles did not offer added value and only yielded quantitatively similar profiles. The four-profile model demonstrated high classification accuracy (entropy=0.80) and average posterior probabilities of class membership ranging from 0.81 to 0.93.

**Table 4**

*Fit Indices for the Latent Profile Analyses Models*

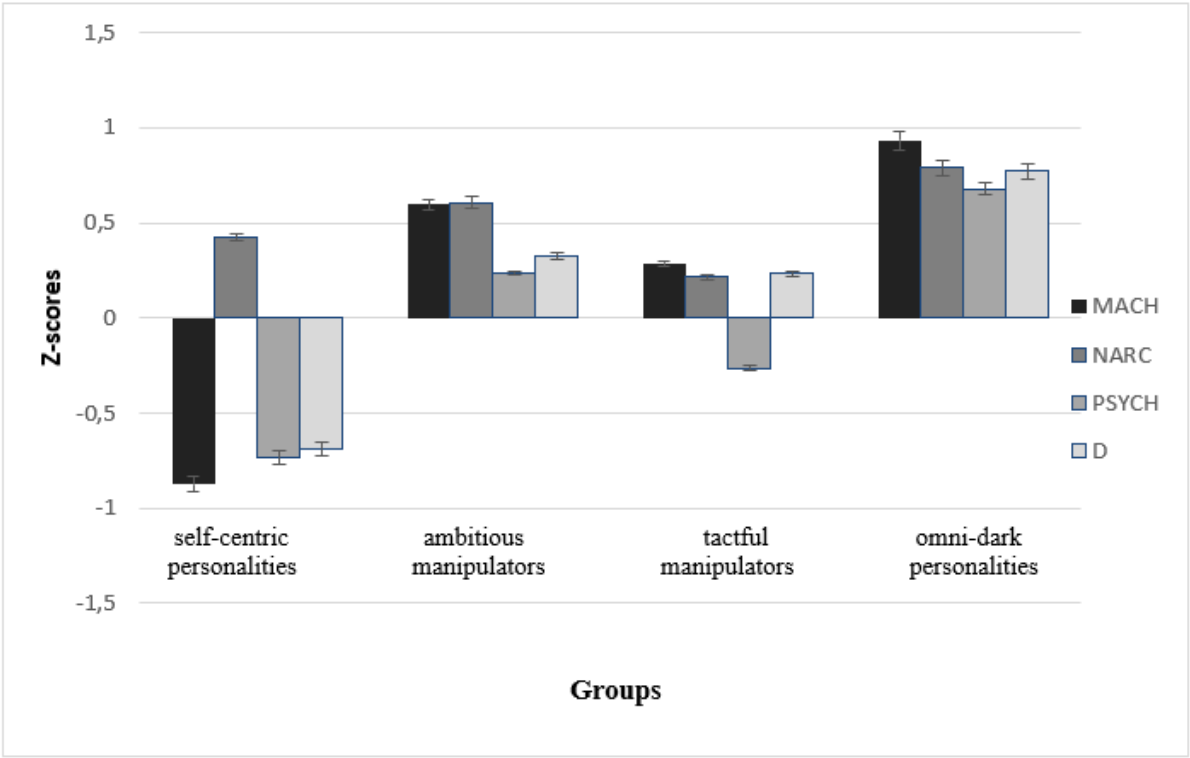
| | Number of parameters | Log-likelihood | AIC | AWE | BIC | SABIC | CAIC | Entropy | LMR | BLRT |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 profile | 8 | -8102.10 | 16220.19 | 16243.24 | 16266.41 | 16241 | 16239.24 | 0.784 | | |
| 2 profiles | 13 | -6733.48 | 13492.96 | 13530.40 | 13568.07 | 13526.76 | 13523.90 | 0.813 | <.01 | <.001 |
| 3 profiles | 18 | -6098.79 | 12233.58 | 12285.42 | 12337.58 | 12280.39 | 12276.42 | 0.824 | 0.021 | <.001 |
| 4 profiles | 23 | -5820.41 | 11686.82 | 11753.06 | 11819.71 | 11746.63 | 11741.56 | 0.806 | 0.054 | <.001 |
| 5 profiles | 28 | -5990.94 | 11837.87 | 12118.52 | 11899.65 | 11810.69 | 12104.52 | 0.791 | 0.061 | <.001 |

*Note*: AIC, Akaike Information Criterion; AWE, Approximate Weight of Evidence; BIC, Bayesian Information criterion; SABIC, sample size adjusted BIC; CAIC, Constant AIC; LMR, p value associated with the adjusted Lo-Mendell-Rubin likelihood ratio test set at <.05; BLRT, p value associated with the bootstrap likelihood ratio test.

Sample distribution across the four clusters was well balanced, avoiding abnormally small groups: Cluster 1 (11.1%), Cluster 2 (39.8%), Cluster 3 (38.4%), and Cluster 4 (10.5%). Cluster descriptions in Figure 1 include: Cluster 1, "self-centric personalities" with low general Dark Triad (D factor), but high narcissism; Cluster 2, "ambitious manipulators" with high Machiavellianism and narcissism but lower psychopathy and D factor; Cluster 3, "tactful manipulators" with moderate D factor, Machiavellianism, and narcissism, but low psychopathy; and Cluster 4, "omni-dark personalities" with high scores in all D3 factors.

**Figure 1**

*Latent Profile Analysis of Dark Triad Personality Traits*




*Note.* MACH = Machiavellianism, NARC = Narcissism, PSYCH = Psychopathy, D= General D factor.

## Profile Differences in Gender and Academic Major

Post-LPA, chi-square analysis was used to explore the association between gender and the identified clusters. Males had a significantly higher likelihood (OR=28.589, 95% CI=11.827–48.569) of being in Cluster 4 (omni-dark personalities) compared to Cluster 1 (self-centric personalities). Chi-square analysis indicated gender-based differences in D3 profiles, showing females to be more prevalently represented in all clusters, except for the omni-dark personalities. Crosstabulation details between gender and profiles are described in the Table 5.

**Table 5**

*Crosstabulation between Gender and D3 Clusters (%)*[a]

| | **Groups** | | | | **Total** |
|---|---|---|---|---|---|
| | **Cluster 1 Self-centric personalities** | **Cluster 2 Ambitious manipulators** | **Cluster 3 Tactful manipulators** | **Cluster 4 Omni-dark personalities** | |
| Females | 158 (11) | 579 (40.4) | 576 (40.2) | 119 (8.3) | 1432 |
| Males | 106 (11.1) | 372 (39) | 342 (35.8) | 135 (14.1) | 955 |
| Total | 264 | 951 | 918 | 254 | 2387 |

[a]($\chi^2$ (3, N= 2387) =21.49, p=.000)

Post-LPA, chi-square analysis was conducted to examine the association between academic majors and the identified clusters, detailed in the Table 6. Although the analysis revealed no significant overall differences, it highlighted that "ambitious manipulators" were more prevalent in Maths/Natural/Technological and Health/Life Sciences majors. In contrast, "tactful manipulators" tended to choose Humanities/Law/Social Sciences and Economics/Information Sciences majors.

**Table 6**

*Crosstabulation between Academic Major Groups and D3 Clusters (%)*[a]

| | **Groups** | | | | |
|---|---|---|---|---|---|
| | **Cluster 1 Self-centric personalities** | **Cluster 2 Ambitious manipulators** | **Cluster 3 Tactful manipulators** | **Cluster 4 Omni-dark personalities** | **Total** |
| Humanities/Law/Social Sciences | 146 (13) | 412 (36.8) | 459 (41) | 102 (9.2) | 1119 |
| Maths/Natural/Technological Sciences | 60 (8.9) | 286 (42.4) | 238 (35.3) | 91 (13.5) | 675 |
| Economics/Information Sciences | 36 (11.1) | 122 (37.7) | 142 (43.8) | 24 (7.4) | 324 |
| Health/Life Sciences | 21 (8.5) | 122 (49.2) | 71 (28.6) | 34 (13.7) | 248 |
| Total | 263 | 942 | 910 | 251 | 2366 |

[a]($\chi^2$ (12, N= 2366) =43.48, p=.000)

## Discussion

This study examined the relationships between academic major choices and D3 traits in Greek university students. Furthermore, LPA was employed to identify clusters of students based on their scores on D3 traits. Many studies have examined whether 'normal' personality characteristics, and academic major choices (Kokkinos et al., 2024; Vedel & Thomsen, 2017) are associated. While some studies have examined the D3 in various contexts, such as workplace behavior or interpersonal relationships (LeBreton et al., 2018), its relationship with academic major choices has yet to be investigated. Therefore, this study provided evidence to fill this gap in the literature by investigating how D3 traits manifest in the context of academic major selection among Greek university students.

Based on the first and second research questions the Short Dark Triad Scale's factor structure and measurement invariance across genders and academic majors was examined by fitting five alternative models. The findings suggest the presence of a general dark factor and three distinctive factors. Recent Bifactor ESEM research has confirmed this finding (McLarnon & Tarraf, 2021). The general dark factor is "the general tendency to maximize one's individual utility—disregarding, accepting, or malevolently provoking disutility for others—, accompanied by beliefs that serve as justifications" (Moshagen et al., 2018, p. 657).

In this study, this D-factor is specific to the traditional Dark Triad traits of Narcissism, Machiavellianism, and Psychopathy. Unlike broader interpretations that include additional traits such as Sadism, Moral Disengagement, and Spitefulness (Moshagen et al., 2018), the application of the D-factor in the present study remains confined to the original triadic configuration. This focused approach aligns with this study's objective to investigate how these well-defined D3 traits interact and manifest in academic settings, rather than exploring a wider spectrum of dark personality traits.

The identification of this overarching factor is crucial as it underscores the commonality of dark traits while also recognizing their distinct manifestations in academic settings. These findings are pivotal for developing targeted interventions and counseling strategies in educational institutions, as they suggest that students who score highly on the D-factor may require tailored guidance to align their academic and career paths with their personality profiles. Moreover, the ongoing evolution of dark personality research, including debates around the Dark Tetrad and broader constructs like amoralism and sensational interests (Paulhus & Jones, 2015), continues to influence how these traits are understood and studied. Empirical findings such as those by O'Boyle et al. (2015) and Furnham et al. (2013) underscore the interconnected and nuanced nature of these traits, revealing a robust but complex pattern of correlations and a shared core of callous manipulation that demands further investigation. The introduction of the Dark Core (D-factor) by Moshagen et al. (2018) aimed to address these complexities by proposing a unified factor that encapsulates the essence of dark personality traits. However, the adjustment of its thematic dimensions by Bader et al. (2021) and the inconsistent findings from international studies illustrate the ongoing challenges in developing a universally accepted model. The present study contributes to this dynamic field by confirming the structured complexity of dark traits through B-ESEM and highlighting their practical implications for academic major selections. As research into the multifaceted nature of the D3 construct continues, future studies should explore specific pathways through which these traits influence educational outcomes. Understanding these dynamics can help educators and administrators in designing more effective academic programs that consider the psychological profiles of their students, ultimately enhancing educational success and personal development.

LPA was employed to uncover hidden patterns within the D3 traits, addressing the third research question. The analysis resulted in the identification of four distinct clusters of individuals, namely self-centric personalities, ambitious manipulators, tactful manipulators, and omni-dark personalities. Self-centric personalities had low levels of D factor, alongside low Machiavellianism and Psychopathy, but in combination with relatively strong Narcissism; ambitious manipulators showed strongly elevated levels of Machiavellianism and Narcissism, and lower Psychopathy and D factor; tactful manipulators had moderately strong levels of D factor and Machiavellianism, and Narcissism, but low Psychopathy, and omni-dark personalities scored high in all D3 traits.

The emerged profiles replicated well-established patterns observed in previous research on the D3 personality traits (Jones & Paulhus, 2014). Self-centric personalities, characterized by low general D factor scores and high Narcissism, resemble profiles associated with vulnerable Narcissism, where individuals exhibit a strong need for admiration but lack the antagonism typical of grandiose Narcissism (Miller et al., 2018). These individuals tend to seek recognition

and success in academic majors that align with their need for admiration, such as Humanities or Law, where personal visibility and status are more likely to be achieved.

Ambitious manipulators, with elevated Machiavellianism and Narcissism but lower Psychopathy and general D factor, align with profiles indicative of socially adept manipulators who employ strategic tactics to achieve personal goals while maintaining a veneer of social charm (Jonason et al., 2012). These individuals are drawn to fields such as Maths/Natural/Technological and Health/Life Sciences, where personal achievement, competition, and strategic thinking are valued. Ambitious manipulators thrive in competitive environments where they can outmaneuver others, making these fields appealing. Tactful manipulators, demonstrating moderate levels of general D factor, Machiavellianism, and Narcissism, correspond to profiles characterized by adaptive manipulation strategies aimed at navigating social interactions and achieving desired outcomes (Wiltshire et al., 2014). This group was more likely to select majors in Humanities/Law/Social Sciences and Economics/Information Sciences, where interpersonal skills, persuasion, and strategic thinking play important roles. In these fields, tactful manipulators can effectively leverage their abilities to influence and control outcomes while maintaining social harmony.

Finally, omni-dark personalities, scoring high across all D3 traits, represent individuals exhibiting a pervasive pattern of malevolent traits, reminiscent of profiles associated with pathological Narcissism and antisocial behavior (Miller et al., 2018). This cluster tends to gravitate toward fields that emphasize power, status, and dominance, potentially reflecting their attraction to environments where their callous, manipulative tendencies can be exploited.

Based on the fourth research question the study evaluated whether personality profiles predict students' choices of academic majors. In reflecting upon the classification of academic majors into four groups, it is evident that this approach allowed for nuanced insights into the relationship between Dark Triad traits and academic choices. The decision to categorize majors was not only theoretically grounded (e.g., Kokkinos et al., 2024), but also validated by these findings, which indicated distinct personality profiles within these grouped disciplines. For example, 'ambitious manipulators' were predominantly found in competitive fields such as Economics and Information Sciences. This alignment with the strategic and power-oriented nature of these majors not only supports the initial grouping rationale, but also highlights the utility of our methodological approach in linking personality traits to specific academic environments. More specifically, students majoring in Humanities/Law/Social Sciences were more likely classified in the cluster of tactful manipulators. Indeed, tactful manipulators are inclined towards selecting social academic majors due to their strong interpersonal skills and ability to navigate social situations adeptly. These majors provide opportunities for individuals to develop persuasive abilities and adaptability to diverse social contexts, aligning with the manipulative tendencies of tactful individuals. Moreover, social majors offer avenues for individuals to assert influence through leadership roles and community engagement, complementing their desire for power and influence. Tactful manipulators are known for their adaptive manipulation strategies, which allow them to influence others while maintaining social harmony and avoiding detection. In fields such as law or social work, where negotiation and persuasion are essential, individuals with these traits may excel in achieving their goals while maintaining positive relationships (Jonason et al., 2012). Additionally, these majors

allow tactful manipulators to deepen their understanding of human behavior and societal dynamics, enhancing their ability to manipulate social situations effectively (Hyde et al., 2020).

Students majoring in Economics/Information Sciences were also more likely to be categorized as tactful manipulators. Economics and Information Sciences students ranked highly among tactful manipulators indicate a match between the characteristics of these academic disciplines and the interpersonal skills, manipulation strategies, and motivations common to this personality cluster. Specifically, the analytical and strategic skills required in these fields corresponds with the moderate Machiavellianism and Narcissism traits of tactful manipulators (Wiltshire et al., 2014), which enable them to navigate complex systems and influence outcomes strategically. Moreover, Economics/Information Sciences majors offer opportunities for individuals to assert influence and control over financial or informational resources, appealing to the desire for power and influence, an attribute of tactful manipulators (Miller et al., 2018). Lastly, the dynamic nature of these fields requires individuals to adapt quickly to changing environments and market conditions, a skill at which tactful manipulators excel, allowing them to thrive in environments where agility and flexibility are valued (Jones & Paulhus, 2014).

Students majoring in Maths/Natural/Technological and Health/Life Sciences were more likely to be classified as ambitious manipulators. These majors often attract individuals who are highly motivated and driven to succeed. Ambitious manipulators, characterized by strongly elevated levels of Machiavellianism and Narcissism, may be drawn to these fields as they offer opportunities for personal achievement and advancement (Miller et al., 2018). Both Maths/Natural/Technological and Health/Life Sciences are known for their competitive environments, where individuals are often driven by a desire to excel and outperform their peers. Ambitious manipulators thrive in such settings, using their strategic thinking and goal-oriented nature to pursue success and recognition (Jonason et al., 2012).

In terms of gender, results showed that males were more likely to be classified in omni-dark personalities, possibly due to a combination of biological, social, and cultural factors. Biological influences, such as hormonal differences, may contribute to behaviors associated with dominance and aggression, traits often found within the D3 (Garcia et al., 2015). Socialization processes and adherence to traditional gender norms encourage assertiveness and competitiveness in males from a young age, aligning with characteristics of dark personality traits (Eagly & Wood, 2013). Cultural expectations that valorize masculine ideals of strength and power may contribute to the higher prevalence of dark personality traits among men (Hofstede, 2011). This is further evidenced by findings from Kokkinos, et al. (2023), which reveal that Greek male university students scored higher on Hofstede's personal cultural value orientations of social inequality and masculinity. These intersecting factors suggest that societal norms surrounding masculinity and social inequality may not only reinforce traditional power dynamics but also exacerbate negative personality traits linked to those ideals. Furthermore, societal perceptions and biases, such as assertiveness or risk-taking, may lead to certain dark behaviors being more accepted or admired in males compared to females (Jones & Paulhus, 2014).

## Implications, Limitations, and Future Directions

The findings of the present study enhance our understanding of the association between academic majors and D3 personality traits providing valuable theoretical and practical insights. The results corroborate the intricate interplay between personality and academic choices documented globally, while also highlighting unique cultural influences within Greek universities. By applying advanced methodologies, our research provides a deeper understanding of personality configurations and their impact on educational paths, prompting a reevaluation of existing evidence regarding the association between personality and academic major choice, and suggesting new directions for both academic policies and future research.

This study's insights are crucial for developing tailored educational interventions that consider personality traits as a fundamental factor in academic guidance and counseling. This knowledge can guide awareness programs for students to align their personalities with academic and social interactions. Additionally, organizations can utilize this understanding for effective management and ethical relationships. To further support these interventions, educational institutions are encouraged to integrate personality assessments into their student orientation and advising processes. This integration would ensure that academic advisors and career counselors are well-equipped with the necessary tools to guide students in selecting majors and career paths that align with their individual personality profiles. Additionally, policymakers should consider developing policies that promote the application of these assessments, ensuring their ethical use and effectiveness across all educational settings. Workshops and seminars designed to help students leverage their personality traits for academic and professional success should be routinely implemented. These programs should focus on explaining the impact of various personality traits on learning styles and career choices, providing students with practical strategies to capitalize on their strengths and mitigate potential weaknesses. Career counselors should also offer tailored career counseling sessions that begin with a personality assessment to provide a personalized advisory experience based on each student's unique characteristics. Furthermore, educational policy developers should allocate specific funding for the creation and sustained support of these programs, ensuring that they are evidence-based and tailored to meet the diverse needs of the student population. By standardizing the use of personality assessments and supporting educational interventions with policy and funding, institutions can enhance student engagement, reduce dropout rates, and improve educational and career outcomes.

However, certain limitations must be acknowledged, such as the reliance on self-report measures that may introduce response biases and shared method variance. Future research should aim to enhance validity by incorporating objective assessments and diverse data collection methods. The cross-sectional design also necessitates future longitudinal studies, as personality alone cannot fully explain academic choices. Furthermore, while our study benefits from a large sample size of 2,387 Greek university students, the distribution of students across academic disciplines was uneven, with an overrepresentation of majors in Humanities, Law, and Social Sciences compared to other fields. In response to this imbalance, we are considering several approaches to improve sample diversity in future research. Collaborating with other universities could allow access to a more diverse and balanced sample pool that includes a proportional representation of all major groups. Additionally, employing stratified sampling

techniques in subsequent studies would ensure that each major category is adequately represented, thus enhancing the robustness and applicability of our results.

Despite these limitations, the study's strengths include a large sample size of Greek university students across diverse academic disciplines and the use of LPA to examine students' D3 profiles. Overall, the study reveals an association between Greek university students' academic majors and Dark Triad personality traits, revealing four distinct student clusters. It suggests that students majoring in Humanities, Law, and Social Sciences are likely to exhibit 'tactful manipulator' traits, characterized by moderate Machiavellianism and Narcissism. Conversely, those majoring in Maths, Natural Sciences, and Health Sciences tend to display 'ambitious manipulator' characteristics. These findings offer valuable insights into how academic environments may cater to or cultivate certain personality traits, and they provide a basis for developing programs that not only guide students in their academic choices but also foster environments that enhance their educational and interpersonal success.

**References**


Bader, M., Hartung, J., Hilbig, B. E., Zettler, I., Moshagen, M., & Wilhelm, O. (2021). Themes of the dark core of personality. *Psychological Assessment*, *33*(6), 511-525.

Buckels, E. E., Jones, D. N., & Paulhus, D. L. (2013). Behavioral confirmation of everyday sadism. *Psychological Science*, *24*, 2201-2209.

Byrne, B.M. (2013). *Structural Equation Modeling with Mplus: Basic Concepts, Applications and Programming*. Routledge.

Cannon, M., Vedel, A., & Jonason, P. K. (2020). The dark and not so humble: School-type effects on the Dark Triad traits and intellectual humility. *Personality and Individual Differences*, *163*.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14,* 464–504.

Costa, P. T. J., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI): Professional manual.* Psychological Assessment Resources.

Dueber, D. (2018). *Bifactor Indices Calculator: Bifactor Indices Calculator* (Version 0.2.0). https://cran.r-project.org/package=BifactorIndicesCalculator

Eagly, A. H., & Wood, W. (2013). The nature–nurture debates: 25 years of challenges in understanding the psychology of gender. *Perspectives on Psychological Science*, *8*(3), 340-357.

Elegido, J. M. (2009). Business education and erosion of character. *African Journal of Business Ethics, 4*, 16–24.

Ferguson, S. L., & Hull, D. M. (2018). Personality profiles: Using latent profile analysis to model personality typologies. *Personality and Individual Differences*, *122*, 177-183.

Fiske, S. T., Gilbert, D. T., & Lindzey, G. (Eds.). (2010). *Handbook of Social Psychology, Volume 2* (Vol. 2). John Wiley & Sons.

Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The Dark Triad of personality: A 10 year review. *Social and Personality Psychology Compass*, *7*(3), 199-216.

Garcia, D., Adrianson, L., Archer, T., & Rosenberg, P. (2015). The dark side of the affective profiles:differences and similarities in psychopathy, Machiavellianism, and Narcissism. *Sage Open*, *5*(4).

Gottfredson, L. S., & Richards, J. M., Jr. (1999). The meaning and measurement of environments in Holland's theory. *Journal of Vocational Behavior*, *55*(1), 57–73.

Gruda, D., McCleskey, J., & Khoury, I. (2023). Cause we are living in a Machiavellian world, and I am a Machiavellian major: Machiavellianism and academic major choice. *Personality and Individual Differences*, *205*, 112096.

Hofmann, R., Rozgonjuk, D., Soto, C. J., Ostendorf, F., & Mõttus, R. (2023). There are a million ways to be a woman and a million ways to be a man: Gender differences across personality nuances and nations [Preprint]. PsyArXiv.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online Readings in Psychology and Culture*, *2*(1).

Hyde, J., Grieve, R., Norris, K., & Kemp, N. (2020). The dark side of emotional intelligence: the role of gender and the Dark Triad in emotional manipulation at work. *Australian Journal of Psychology*, *72*(4), 307-317.

Jonason, P. K., Slomski, S., & Partyka, J. (2012). The Dark Triad at work: How toxic employees get their way. *Personality and Individual Differences*, *52*(3), 449-453.

Jonason, P. K., Tosi, M., Silva, S., Antunes, R., & Brito-Costa, S. (2022). An initial comparison of the psychometric properties of the Dark Triad Dirty Dozen in Spanish and Portuguese. *Psychological Test Adaptation and Development*, *3*(1), 125-133.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3). *Assessment*, *21*(1), 28–41.

Kimmel, M. S. (2018). *Privilege: A reader*. Routledge.

Kokkinos, C. M., & Antoniadou, N. (2024). Understanding Academic Dishonesty in University Settings: The Interplay of Dark Triad Traits and Moral Disengagement. *The Journal of Genetic Psychology*, *185 (5)*, 309-322.

Kokkinos, C. M., Antoniadou, N., & Voulgaridou, I. (2024). Majors unleashed: unravelling students' personality profiles across academic disciplines. *Current Psychology*, 1-11. Advance Online Publication.

Kokkinos, C.M., Tsouloupas, C.N. & Voulgaridou, I. (2023). General Mental Health and Subjective Well-Being Among University Students: The Moderating Role of Personal Cultural Orientations. *Human Arenas,* 6, 776–793. https://doi.org/10.1007/s42087-021-00253-8

Kokkinos, C. M., & Voulgaridou, I. (2024). Emotional intelligence across the personality spectrum: A study of university students' personality profiles. *Personality and Individual Differences*, *222*, 112574.

Köse, A. G., & Ekren, B. (2020). An investigation of the differences in the dark triad and the big five personality traits across majors. *Kalem Eğitim ve İnsan Bilimleri Dergisi*, *10*(2), 465-484.

Litten, V., Roberts, L. D., Ladyshewsky, R. K., Castell, E., & Kane, R. (2018). The influence of academic discipline on empathy and psychopathic personality traits in undergraduate students. *Personality and Individual Differences*, *123*, 145–150.

LeBreton, J. M., Shiverdecker, L. K., & Grimaldi, E. M. (2018). The dark triad and workplace behavior. *Annual Review of Organizational Psychology and Organizational Behavior*, *5*, 387-414.

Lynam, D. R., & Widiger, T. A. (2001). Using the five-factor model to represent the DSM-IV personality disorders: An expert consensus approach. *Journal of Abnormal Psychology*, *110*, 401-412.

McLarnon, M. J., & Tarraf, R. C. (2021). Getting to the core: How "(dis) honest" is the core of the Dark Triad? *Personality and Individual Differences*, *171*, Article 110545.

Miller, J. D., Lynam, D. R., Siedor, L., Crowe, M., & Campbell, W. K. (2018). Consensual lay profiles of narcissism and their connection to the Five-Factor Narcissism Inventory. *Psychological Assessment*, *30*(1), 10-18.

Moshagen, M., Hilbig, B. E., & Zettler, I. (2018). The dark core of personality. *Psychological Review*. *125*(5), 656–688.

Moshagen, M., & Musch, J. (2014). Sample size requirements of the robust weighted least squares estimator for confirmatory factor analysis with ordinal data. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, *10*, 60 –70.

Muthén, B., & Muthén, L. (2017). Mplus. In *Handbook of item response theory* (pp. 507-518). Chapman and Hall/CRC.

O'Boyle, E. H., Forsyth, D. R., Banks, G. C., Story, P. A., & White, C. D. (2015). A meta-analytic test of redundancy and relative importance of the dark triad and five-factor model of personality. *Journal of Personality*, *83*(6), 644-664.

Patrick, C. J., Fowles, D. C., & Krueger, R. F. (2009). Triarchic conceptualization of psychopathy: Developmental origins of disinhibition, boldness, and meanness. *Development and Psychopathology*, *21*(3), 913-938.

Paulhus, D. L., & Jones, D. N. (2015). Measures of dark personalities. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of Personality and Social Psychological Constructs* (pp. 562-594). Academic Press. ISBN 9780123869159.

Paulhus, D. L., & Williams, K. M. (2002). The dark triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, *36*, 556-563.

Pechorro, P., Rodrigues, R., Bonfá-Araujo, B., DeLisi, M., & Simões, M. R. (2024). Measuring the dark core of personality in Portugal: A psychometric examination of D. *Deviant Behavior*, *45*(12), 1729-1742.

Persson, B. N., Kajonius, P. J., & Garcia, D. (2019). Revisiting the structure of the Short Dark Triad. *Assessment*, *26*(1), 3-16.

Smits, I. A., Timmerman, M. E., Barelds, D. P., & Meijer, R. R. (2014). The Dutch symptom checklist-90-revised. *European Journal of Psychological Assessment*, *31*, 236–271.

Vedel, A. (2016). Big Five personality group differences across academic majors: A systematic review. *Personality & Individual Differences, 92,* 1–10.

Vedel, A., & Thomsen, D. K. (2017). The Dark Triad across academic majors. *Personality and Individual Differences, 116,* 86-91.

Wilson, M. S., & McCarthy, K. (2011). Greed is good? Student disciplinary choice and self-reported psychopathy. *Personality and Individual Differences, 51*, 873-876.

Wiltshire, J., Bourdage, J. S., & Lee, K. (2014). Honesty-humility and perceptions of organizational politics in predicting workplace outcomes. *Journal of Business and Psychology*, *29*, 235-251