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An examination of academic envy behaviours among dentistry faculty students across various variables

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Abstract

Dental school students experience competition not only during the preparation process for university entrance but also throughout their academic education. As in every competitive environment, academic envy behaviours inevitably emerge in this context as well. This study examines the level of academic envy among dental school students in relation to academic achievement, year of study, gender, sibling status, romantic relationship status, and socioeconomic level. The study was conducted with 705 dental students. To analyze the data, the Mann–Whitney U test was employed for the variables of gender, sibling status, and romantic relationship status. At the same time, the PerANOVA technique was applied for socioeconomic level, year of study, and grade point average. The findings revealed that male students exhibited higher levels of academic envy compared to female students, and students without siblings reported higher levels of envy than those with siblings. In addition, fifth-year dental students demonstrated greater academic envy than students in other years. Students with low socioeconomic status also showed higher levels of academic envy compared to those with medium and high socioeconomic status. Furthermore, students with very high grade point averages were found to display higher levels of academic envy compared to other groups. However, no significant difference was observed in academic envy between students with and without a romantic relationship.

Keywords: Dental education, envy, jealousy, academic envy.

Introduction

Jealousy has been a universal emotion at the center of individual life, social relations, and cultural production since the earliest periods of human history. As an inseparable part of human nature, this emotion is present not only at the individual level but also in intercultural interactions, the establishment of social order, and various forms of art. From Ancient Greece to the present, jealousy has been one of the concepts most frequently addressed by philosophers and artists. For example, Aristotle defined jealousy as the discomfort felt toward things that one does not possess but are present in others, emphasizing its impact on social balance.

Art and literature have also treated jealousy as a universal theme. In different art forms such as theatre, novels, poetry, and music, jealousy is often depicted with its dramatic and destructive dimensions. One of the most striking examples in this context is William Shakespeare's classic

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work *Othello*. Through the character of Othello, jealousy is portrayed not merely as an internal emotion but as a powerful force shaping behaviour and social relationships. Shakespeare's description of jealousy as a "green-eyed monster" illustrates how this emotion can take over mental processes and, if left uncontrolled, lead to destructive consequences. Othello's murder of his wife Desdemona out of jealousy and his subsequent suicide dramatically demonstrate how dangerous jealousy can be at both individual and societal levels. This example is one reason why jealousy has become a major subject not only in literature but also in psychology. Indeed, this dramatic case has taken its place in psychopathology literature as the "Othello Syndrome," regarded as an important indicator of pathological jealousy (Todd & Dewhurst, 1955).

These historical and cultural examples reveal that jealousy is a universal component of human experience and can manifest in different ways depending on the context. Beyond literary and artistic portrayals, the fact that jealousy has also become a subject of scientific inquiry in psychology and the social sciences demonstrates its profound influence on individuals and societies.

Jealousy in psychoanalytic theory

In the psychology literature, jealousy has been systematically examined, particularly through the contributions of psychoanalytic theory. In Freud's works, jealousy is considered one of the fundamental emotions that inevitably emerge during human developmental processes. According to Freud, jealousy encompasses intense anxiety over the possible loss of a loved one, along with complex reactions such as anger, sadness, and self-criticism. As Pines (1998) notes, Freud conceptualized jealousy in four dimensions: (i) sadness over the loss of a loved one, (ii) anger arising from the realization that one cannot possess everything desired, (iii) envy toward successful rivals, and (iv) self-criticism resulting from losses. These dimensions suggest that jealousy is not merely an individual emotion but also a dynamic that shapes social relationships.

The psychoanalytic perspective highlights the unconscious processes related to jealousy and suggests that early experiences play a decisive role in the intensity of this emotion. Experiences of insecurity, inadequacy, and fear of loss in childhood may lead to more intense jealousy in adulthood. This approach reveals that jealousy is influenced not only by personal emotional experiences but also by social and cultural contexts. The psychoanalytic framing of jealousy in this way laid important groundwork for subsequent studies in social psychology and educational sciences. In particular, the "envy toward successful rivals" dimension provides a critical theoretical basis for understanding students' emotions toward their peers' achievements in educational settings.

Jealousy in modern psychology

Since the late 20th century, the concept of jealousy has been studied more systematically within modern psychology and social psychology. During this period, jealousy has been examined particularly in the context of emotional relationships, focusing on romantic jealousy, social comparison processes, and self-perception (Buunk, 1981; Guerrero & Eloy, 1992).

Parrott and Smith (1993) defined jealousy as the emotional state that arises when an individual recognizes the presence of superior qualities in another person that he or she does not possess. This definition demonstrates that jealousy can emerge not only in romantic relationships but also in various contexts such as achievement, status, and social prestige. Greenberg and Pyszczynski

(1985) argued that jealousy is rooted in factors such as love, low self-esteem, fear of loss, and insecurity. Pines (1998) emphasized that jealousy constitutes a multidimensional set of reactions to the potential endangerment or termination of a valued relationship. Similarly, DeSteno and Salovey (1996) characterized jealousy as an emotional state marked by negative feelings such as anger, unhappiness, and fear.

In modern social psychology, jealousy has also been examined within the framework of social comparison theory. Mead (1977) argued that jealousy stems from cultural or individual sources of insecurity and inadequacy. Mathes and Severa (1981) defined jealousy as a negative emotional state arising from the risk of losing an emotional relationship due to the presence of a rival. These approaches demonstrate that jealousy cannot be reduced solely to individual psychological processes but must also be understood as an emotion shaped within social contexts.

Academic jealousy

Educational and academic settings are environments in which individuals' achievements are continuously assessed and compared, making jealousy particularly salient. Freud's emphasis on the "envy toward successful rivals" dimension (Pines, 1998) is especially relevant in this context. Educational institutions operate as systems based on achievement and performance, where students are constantly compared to their peers through exam scores, project performances, and instructors' feedback. Such processes may intensify feelings of jealousy.

Schoeck (1969) broadened the concept of jealousy beyond romantic relationships, defining it as the strong emotion experienced toward anything desired by the individual but possessed by another. This perspective is particularly explanatory for educational contexts, as schools are performance-based systems where students often desire higher grades, prestigious scholarships, or better career opportunities. Thus, Schoeck's definition provides a crucial theoretical foundation for understanding students' jealousy toward academic achievement.

In today's educational settings, which are not only centers of knowledge acquisition but also of intense competition, jealousy functions not only as an individual emotional state but also as a factor shaping the quality of social relations. Koçak (2019) explained this phenomenon through the concept of "academic envy," defined as the emotional responses students develop toward peers who outperform them academically.

Academic envy is described as the set of negative emotions experienced by individuals in educational environments toward the academic achievements of peers or colleagues. These emotions often accompany feelings of inadequacy, competitiveness, and decreased motivation (Parrott & Smith, 1993). Academic envy can be observed not only among students but also among academics, through criteria such as career advancement, publication counts, citation rates, and promotions. However, it is particularly salient among students, influencing both academic performance and social relations.

Koçak (2019) defined academic envy as the negative emotions students feel toward peers who perform better than themselves in educational environments. In this regard, academic envy is triggered by the perception that others' achievements overshadow one's own success. Social comparison theory provides an important explanation: as students continually compare their performance with peers, feelings of inadequacy may intensify academic envy.

Consequences of academic envy

Academic envy affects students at both individual and social levels. On the individual level, it impacts self-worth and academic motivation; on the social level, it shapes classroom relationships, friendships, and the culture of collaboration. While academic envy may encourage some students to study harder, it may also reduce academic productivity due to the negative emotions it fosters.

Students experiencing academic envy often suffer from loss of motivation. Perceiving peers' success as a threat can cause them to underestimate their own potential and lose confidence in their ability to succeed (Van de Ven, 2017). This process may damage self-esteem and significantly reduce academic self-confidence. Academic envy also increases stress and may lead to burnout.

Socially, jealousy can lead to lack of cooperation, communication breakdowns, and the reinforcement of negative competition among students. Envious students may belittle, exclude, or devalue their more successful peers, fostering conflict rather than solidarity in the classroom.

Jealousy also directly affects academic performance. It reduces motivation for coursework and projects, negatively impacting academic achievement. It may also undermine academic integrity, as some students may disparage others' work or avoid collaboration. In more severe cases, academic envy may even result in sabotage attempts, threatening the healthy functioning of educational environments (Rentzsch, Schröder-Abé, & Schütz, 2015).

Jealousy in dentistry education

Health sciences inherently require high performance, discipline, and long-term intensive training. Along with medicine, pharmacy, and nursing, dentistry is one of the disciplines in which students are exposed to intense academic and professional competition. This environment makes students in health-related fields particularly prone to experiencing academic envy.

In Turkey, the university entrance process itself is one of the most significant examples of competition. The Higher Education Institutions Examination (YKS) is a nationwide exam in which millions of students participate, and placement is determined by achievement ranking. Dentistry faculties admit students from the highest achievement ranks, meaning that students must pass through intense competition even before entering university. This process increases the importance students attach to success and strengthens their tendency toward social comparison.

The structure of dentistry education also perpetuates competition. In Turkey, dentistry education is organized as a five-year undergraduate program. The first three years focus on basic medical sciences, biomedical courses, and introductory theoretical knowledge in dentistry. During this period, students attend intensive lectures, develop manual skills through laboratory work, and receive preclinical practical training. In the fourth and fifth years, clinical training predominates, with students directly involved in diagnosis, treatment planning, and patient care. Their clinical performance is regularly evaluated by faculty members, making achievements constantly visible and fostering both anxiety and competition. Studies have shown that exams, grading systems, and the fear of failure constitute major sources of stress for dentistry students (Dörtler et al., 2010; Uskun et al., 2005).

Clinical training is one of the areas where competition is most intense, as students are compared based on patient admission, procedural skills, and treatment success. These criteria determine

not only academic outcomes but also professional competencies. Thus, students frequently compare their own performance with that of peers, often triggering feelings of academic envy.

Post-graduation career opportunities and exams further intensify competition. Dentistry graduates in Turkey must take the Dentistry Specialization Examination (DUS) if they wish to pursue specialization. Due to limited quotas, this exam is highly competitive. For students aspiring to academic careers, requirements such as publication counts, citation rates, and research projects also foster comparisons. Additionally, opportunities for opening private clinics or pursuing education and work abroad contribute to further competition. Thus, rivalry extends beyond academic life into professional careers.

All these processes make competition in dentistry faculties highly visible and intense. This intense competition creates a fertile ground for the development of jealousy. Grade point averages, clinical successes, recognition by faculty members, and post-graduation opportunities lead students to constant comparisons. Therefore, examining the academic envy levels of dental students is crucial for understanding not only the psychological dimensions of their education but also the social dynamics affecting their professional competencies.

Research gap and purpose of the study

Most studies on jealousy have been conducted in psychology, focusing primarily on romantic relationships (DeSteno & Salovey, 1996; Parrott & Smith, 1993; Pines, 1998). The concept of academic envy, by contrast, has only recently gained attention and remains underexplored in the literature (Koçak, 2019). Notably, academic envy among students in health-related disciplines has not been sufficiently examined. Existing studies tend to focus on students in social sciences or engineering, with limited attention to the unique dynamics of envy in health education. Given that students in health fields are continuously assessed, compared, and exposed to intense competition, dentistry faculties constitute one of the most visible contexts for academic envy. However, large-sample studies directly investigating academic envy among dentistry students are scarce.

This study aims to fill this gap by examining academic envy among 705 dentistry students, focusing on variables such as gender, sibling status, romantic relationship status, socioeconomic level, year of study, and grade point average. The research contributes not only to understanding the individual and social dimensions of academic envy but also to illuminating the unique educational context of dentistry faculties.

Previous studies indicating that jealousy is more intensely experienced in health-related fields (Kim, 2008; Luthar et al., 2020; Massé & Gagné, 2002) further underscore the need for such an investigation. The findings of this study are expected to inform efforts to foster a culture of collaboration and solidarity in dentistry education, design interventions to enhance students' emotional intelligence, and mitigate the negative effects of academic envy.

Research Questions

Based on this framework, the study seeks to answer the following research questions:

1. Do dentistry students' academic envy levels differ significantly according to gender?
2. Do dentistry students' academic envy levels differ significantly depending on whether they have siblings?

3. Do dentistry students' academic envy levels differ significantly depending on whether they are in a romantic relationship?
4. Do dentistry students' academic envy levels differ significantly according to socioeconomic status?
5. Do dentistry students' academic envy levels differ significantly according to year of study?
6. Do dentistry students' academic envy levels differ significantly according to grade point average?

Method

Design

The purpose of this study was to determine the level of academic envy among dentistry students. As it describes the existing situation without any intervention, the research possesses the characteristics of a descriptive study.

Participants and procedure

The accessible sampling method was employed in the study, and a total of 705 students enrolled in the faculty of dentistry were included. The demographic characteristics of the participants are presented in Table 1.

Table 1 Demographic characteristics of the participants

Variable	Categories	n	f
Gender	Female	405	55.5
	Male	300	44.5
Sibling status	Yes	391	59.6
	No	314	40.4
Romantic relationship	Yes	420	25.8
	No	285	44.0
Socioeconomic status	Low	182	30.2
	Middle	310	14.9
	High	213	17.6
Year of study	1	105	26.0
	2	124	21.7
	3	183	19.9
	4	153	27.1
	5	140	23.8
	≤59	191	27.4
Grade point average	60–64	168	21.3
	65–69	193	14.6
	70–79	150	55.5
	80–100	103	44.5

As shown in Table 1, the distributions of participants are presented according to gender, year of study, socioeconomic status, and other variables included in the research. Socioeconomic status was classified as low, middle, and high based on the participants' average monthly expenditures.

Measures

As the data collection instrument, the *Academic Envy Scale* developed by Koçak (2019) was administered, along with questions about participants' personal information. The 19-item scale consists of three subdimensions: envy, self-direction, and maturity. The scale was scored on a five-point Likert-type format, ranging from *Always* = 5 to *Never* = 1. Total scores were obtained by

summing across items.

During its development, the Cronbach's alpha internal consistency coefficient for the overall scale was reported as 0.78. Subdimension reliability coefficients were: Envy = 0.840, Self-direction = 0.840, and Maturity = 0.817. The test-retest reliability for the overall scale was 0.89, indicating stability.

Data analysis

To determine whether the students' academic envy scores showed normal distribution and homogeneity of variance according to the independent variables, the Kolmogorov–Smirnov test and Levene's test of homogeneity of variances were applied. Based on the results of these tests, the appropriate statistical technique for answering the research questions was selected. The results of the normality and variance homogeneity tests are presented in Table 2.

Table 2 Results of normality and homogeneity of variances tests for academic envy scale scores

Variable	Group	Kolmogorov–Smirnov D	p	df	Levene F	p
Gender	Female	0.046	0.038	703	2.969	0.085*
	Male	0.098	0.000			
Sibling status	Yes	0.053	0.011	703	15.599	0.000
	No	0.074	0.000			
Romantic relationship	Yes	0.059	0.001	703	0.952	0.330*
	No	0.076	0.000			
Year of study	1	0.157	0.054*	701	8.017	0.000
	2	0.101	0.042			
	3	0.074	0.654*			
	4	0.170	0.005			
	5	0.168	0.007			
Socioeconomic status	High	0.122	0.000	702	9.099	0.000
	Middle	0.046	0.200*			
	Low	0.182	0.001			
GPA	≤59	0.167	0.000	700	2.924	0.020
	60–64	0.107	0.000			
	65–69	0.115	0.000			
	70–79	0.170	0.000			
	80–100	0.154	0.000			

Note. *p > .05

As shown in Table 2, the results of the normality and homogeneity of variances tests indicated that academic envy scores did not exhibit normal distribution across the variables of gender, sibling status, and romantic relationship. The assumption of homogeneity of variance was met for gender and romantic relationship, but not for sibling status. Accordingly, the Mann–Whitney U test was employed to determine whether significant differences existed in academic envy scores by gender, sibling status, and romantic relationship status.

For the variables of year of study, socioeconomic status, and grade point average, the assumption of homogeneity of variance was not met. Moreover, the normality assumption was not met for any level of GPA, and only partially met for socioeconomic status and year of study. Consequently, comparisons based on year of study, socioeconomic status, and GPA were analyzed using the nonparametric alternative to variance analysis, the *perANOVA* technique.

All statistical analyses were conducted using the R software (R Core Team, 2016). The “nortest”

package (Gavrilov & Pusev, 2015) was employed for normality testing using the `lillie.test()` function, while the assumption of homogeneity of variances was examined with the `leveneTest()` function from the “car” package (Fox & Weisberg, 2019). The codes used in the analysis are provided in Appendix 1.

Findings

Under this heading, the findings regarding whether the total scores obtained from the Academic Envy Scale significantly differed according to the variables of gender, sibling status, romantic relationship, year of study, socioeconomic status, and grade point average of the dentistry students are presented.

Table 3 Test results for the comparison of academic envy levels by gender

Gender	n	Mean Rank	Sum of Ranks	U	p
Female	405	334,27	135380,00	53165,00	0,005*
Male	300	378,28	113485,00		

Note. * $p > .05$

It was found that the Academic Envy Scale scores significantly differed by gender. Accordingly, male students were observed to have higher levels of academic envy compared to female students ($p < .05$).

Table 4 Test results for the comparison of academic envy levels by sibling status

Sibling Status	n	Mean Rank	Sum of Ranks	U	p
Yes	391	336,61	141377,50	52967,00	0,045*
No	314	377,15	107488,50		

Note. * $p > .05$

It was found that the Academic Envy Scale scores significantly differed according to sibling status ($p < .05$). Students without siblings were observed to have higher levels of academic envy compared to those with siblings.

Table 5 Test results for the comparison of academic envy levels by romantic relationship status

Romantic Relationship	n	Mean Rank	Sum of Ranks	U	p
Yes	420	341,88	133675,50	57039,50	0,109
No	285	366,85	115189,50		

Note. * $p > .05$

It was found that the Academic Envy Scale scores did not significantly differ according to romantic relationship status ($p > .05$).

Table 6 Test results for the comparison of academic envy levels by socioeconomic status

Source of Variance	Sum of Squares	Mean Square	df	p
Between groups	4693,151	2346,576	2	0,000
Within groups	60564,772	86,275	702	

*Note. $p < .05$

Academic envy levels were found to differ significantly according to socioeconomic status ($p < .05$). Based on Holm’s post-hoc comparisons, students with low socioeconomic status were observed to have higher levels of academic envy than those with medium and high socioeconomic status.

Table 7 Test results for the comparison of academic envy levels by year of study

Source of Variance	Sum of Squares	Mean Square	df	p
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Between groups	2689,629	896,543	3	0,000
Within groups	62568,295	89,256	701	

*Note. $p < .05$

Academic envy levels were found to differ significantly according to year of study ($p < .05$). Based on Holm's post-hoc comparisons, it was concluded that fifth-year students had significantly higher levels of academic envy compared to students in other years.

Table 8 Test results for the comparison of academic envy levels by students' grade point average

Source of Variance	Sum of Squares	Mean Square	df	p
Between groups	5707,337	1426,834	4	0,000
Within groups	59550,923	85,072	700	

*Note. $p < .05$

Academic envy levels were found to differ significantly according to grade point average ($p < .05$). Based on Holm's post-hoc comparisons, students with a GPA of 3.50 and above were observed to have significantly higher levels of academic envy compared to other students.

Discussion

The present study aimed to examine the levels of academic envy among dentistry students in relation to several demographic and academic variables. The findings revealed that gender, sibling status, socioeconomic level, year of study, and grade point average were significant factors, while romantic relationship status was not associated with differences in academic envy.

The results showed that male students experienced higher levels of academic envy than female students. Although the literature provides limited insights into academic envy specifically, studies of jealousy in interpersonal and romantic contexts have yielded inconsistent results with respect to gender. Some studies reported women to be more jealous (Buunk, 1981; Pines & Aronson, 1983), others found men to be more jealous (de Zoysa, Kumar, & Amarasuriya, 2021; Ramachandran & Jalal, 2017; Bryson, 1991; Carson & Cupach, 2000), while still others indicated no significant gender differences (Shettel-Neuber, Bryson, & Young, 1978). These inconsistencies suggest that gender may operate differently across contexts. The present findings, consistent with Redelmeier, Etchells, and Najeeb (2023) as well as de Zoysa et al. (2021), suggest that in academic settings, men may be more prone to envy, possibly reflecting differences in competitive orientation or achievement-related expectations.

Students without siblings were found to report higher levels of academic envy compared to those with siblings. Previous research has highlighted the presence of jealousy in sibling relationships (Cruz-Vargas, Sánchez-Aragón, & Escobar-Mota, 2024; Kamil, Narjis, & Sope, 2024; Kieffer, 2020; Kobrick, 2020; Qian, Li, Qu, An, & Guo, 2024; Wesselinoff, 2023). However, individuals who grow up with siblings may also develop greater tendencies toward sharing, cooperation, and mutual support (Göksal, 2022; Cirelli et al., 2020; Zucker et al., 2022). In contrast, only children have been found to display lower levels of prosocial behaviours such as sharing and helping (Kupfer et al., 2022; Valentova, 2020). Taken together, these findings suggest that the cooperative and prosocial tendencies fostered through sibling relationships may act as a buffer against envy, thereby lowering academic envy levels among students with siblings. Future studies may further investigate the associations between academic envy and prosocial traits such as cooperation and academic support.

The findings indicated no significant differences in academic envy according to whether students were in a romantic relationship. This suggests that jealousy in the academic domain should be conceptualized as distinct from jealousy in romantic contexts. Academic envy, as operationalized in this study, concerns the academic achievements of peers rather than romantic circumstances. Thus, individuals' romantic lives appear unrelated to their experience of academic envy, underscoring the importance of delineating academic envy as a construct independent from romantic jealousy.

Students with low socioeconomic status reported significantly higher levels of academic envy than those with medium or high socioeconomic status. From a theoretical standpoint, envy has been described as the desire to possess what one lacks (Buunk, 1981). Students from lower socioeconomic backgrounds may therefore experience stronger desires for acquisition, not only in material terms but also in academic domains. This finding aligns with Koçak's (2019) conceptualization of academic envy as a broader desire to obtain what one does not possess. Thus, socioeconomic disadvantage may amplify tendencies toward academic envy by strengthening the underlying motivation to "have" and "attain."

Academic envy levels were significantly higher among fifth-year dentistry students compared to those in earlier years. This result may be interpreted in light of research on workplace jealousy, which shows that aspirations for promotion and advancement can foster jealousy among colleagues (Andiappan & Dufour, 2020; Bani-Melhem et al., 2023). In dentistry education, the increasing clinical responsibilities and proximity to professional practice in the final year may intensify competition and, consequently, academic envy. Supporting this interpretation, Ünlü et al. (2025) found that preclinical dentistry students scored higher on psychological resilience than clinical students, suggesting that the cumulative workload and responsibilities of later years may erode resilience and contribute to heightened envy.

Finally, students with very high GPAs (80 and above) were found to report higher levels of academic envy compared to their peers with lower GPAs. One possible explanation is that highly successful students may be less willing to share their achievements, preferring to "remain at the top," which in turn triggers envious attitudes and behaviours. This suggests a complex relationship between academic achievement and envy, in which success does not necessarily diminish envy but may instead intensify it.

Conclusion

Overall, the findings highlight the multifaceted nature of academic envy and its associations with demographic, social, and academic factors. Male students, those without siblings, students from lower socioeconomic backgrounds, fifth-year students, and those with very high GPAs emerged as groups more vulnerable to academic envy. These findings contribute to the limited literature on academic envy and underscore the importance of addressing envy in competitive academic environments such as dentistry faculties. Future research may extend this line of inquiry by exploring the personality and contextual factors that mediate or moderate academic envy, and by designing interventions aimed at fostering collaboration and reducing the negative effects of envy in academic settings.

Limitations and future directions

This study was conducted with 705 dentistry students using a quantitative research design. While

the concept of academic envy has been discussed in the literature for nearly three decades, the variables associated with it have not yet been fully established. Accordingly, the findings of this study should be interpreted with caution, as they provide preliminary evidence in a context where comparable studies remain scarce.

A primary limitation of this study lies in its exclusive focus on undergraduate dentistry students. Future research could be extended to include dentists in specialization training programs. Such an expansion may provide valuable insights into envy-related behaviours that occur not only among students but also across departments and teams that are expected to collaborate in professional practice.

Another limitation concerns the research design. This study employed a purely quantitative approach, which restricted the ability to explore the underlying reasons for academic envy in depth. Future studies could employ qualitative designs to investigate the potential causes of academic envy more comprehensively, allowing for a richer understanding of its psychological and social underpinnings. In addition, mixed-methods research may offer further value by combining quantitative data with qualitative insights, enabling the triangulation of findings and providing a more holistic understanding of academic envy.

Statement of researchers

Researchers' contribution rate statement

The first author obtained ethical approval. The second author carried out data collection, and the first author conducted statistical analyses. All remaining stages of the study, including conceptualization, interpretation of findings, and manuscript preparation, were performed jointly by both authors.

Conflict statement

The authors declare no conflict of interest.

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