

Academic burnout and sociodemographic variables in working university engineering students

Burnout académico y variables sociodemográficas en estudiantes universitarios de ingeniería que trabajan

  Alexis Manuel Gutierrez Ticona¹

  María Mercedes Valdivia Cotrina¹

  Walter Lizandro Arias Gallegos²

  Carlos Renzo Rivera Calcina²

¹ Universidad Tecnológica del Perú, Arequipa, Perú

² Universidad Católica San Pablo, Arequipa, Perú

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Autor de correspondencia: Walter Lizandro Arias Gallegos

Abstract

The objective of the present study was to determine the association between academic burnout and sociodemographic variables in 156 engineering students who work and study at a private university. The Maslach Burnout Inventory (general version) and a sociodemographic sheet were used in the research. The results revealed that 80% of the students exhibit a moderate level of academic burnout. When analyzing emotional exhaustion and academic effectiveness, significant differences were observed, with women presenting more emotional exhaustion; On the other hand, men present more academic efficiency. Likewise, it could be seen that there are significant differences between total burnout and work hours. Significant differences were also found in the dimension of academic effectiveness depending on economic income.

Keywords: Academic burnout, university students, sociodemographic variables, work, emotional exhaustion.

Resumen

El objetivo del presente estudio fue determinar la asociación entre el burnout académico y las variables sociodemográficas en 156 estudiantes de ingeniería que laboran y estudian en una universidad privada. En la investigación se empleó el Inventario de Burnout de Maslach (versión general) y una ficha sociodemográfica. Los resultados revelaron que el 80 % de los estudiantes exhiben un nivel moderado de burnout académico. Al analizar el agotamiento emocional y la eficacia académica, se observaron diferencias significativas siendo las mujeres las que presentan más agotamiento emocional; en cambio, los hombres presentan más eficacia académica. Asimismo, se pudo apreciar que hay diferencias significativas entre el burnout total y las horas de trabajo. También se encontraron diferencias significativas en la dimensión de eficacia académica en función de los ingresos económicos.

Palabras clave: Burnout académico, estudiantes universitarios, variables sociodemográficas, trabajo, agotamiento emocional.

INTRODUCTION

Academic burnout is defined as a reaction to chronic stress in educational settings that negatively affects students' mental well-being (Caballero et al., 2015). This syndrome manifests itself through three pathognomonic symptoms: emotional exhaustion, depersonalization, and personal fulfillment. Originally, the burnout syndrome was studied in organizational contexts, describing it as a condition in which individuals working in human service professions (HSP) experienced emotional exhaustion due to chronic stress resulting from interaction with the beneficiaries of their work, which ultimately affected their job performance and their physical and mental health. Hence, burnout syndrome has been extensively researched in healthcare personnel (Osorio-Guzmán et al., 2021), school and university teachers, and military or police personnel (Arias, & Gutiérrez, 2018).

Likewise, beginning in the 1990s, based on available evidence, the exclusive impact of the syndrome on PSH and its etiological anchoring to exchange theories began to be questioned, expanding to new and different professions unrelated to caring for people and to other contexts beyond the workplace, such as family and academic settings. In this sense, the study of academic burnout focuses on the educational context, and although there are factors similar to those of occupational burnout, the specific causes differ. While occupational burnout can be caused by intense professional demands, academic burnout arises from academic demands such as excessive workloads, scarce resources, competition, and imbalance in personal life.

On the other hand, the Maslach three-dimensional model is a widely accepted theory on burnout in general, which explains the syndrome based on three dimensions: emotional exhaustion, depersonalization, and low personal accomplishment. The first is characterized by emotional fatigue and lack of energy to perform normal tasks, presenting both psychological and physical symptoms. The depersonalization dimension occurs when the individual has a negative response to aspects of work or study, accompanied by negative feelings. Olivares (2017) indicates that this generates negative attitudes and social isolation, which reduces effort and energy in their work, affecting their

performance. Low personal fulfillment refers to negative self-perception or self-assessment of one's own competencies, accompanied by a feeling of incompetence. In educational contexts, this dimension is known as academic inefficacy.

Various factors are associated with academic burnout. Academic factors include work overload, lack of support, and high expectations, which vary from student to student. Caballero et al. (2010) mention external factors such as inadequate feedback from teachers, poor administrative conditions, and course overload. Environmental and social factors include lack of peer support, lack of available academic spaces, and lack of social support from the student's environment (Estrada et al., 2021). The intrapersonal factors include individual characteristics such as personality traits, social and cognitive skills, motivation, and personal satisfaction, which influence the manifestations of burnout in different ways. Sociodemographic factors include data referring to characteristics of a population, such as gender, age, marital status, employment status, and socioeconomic status.

Thus, the academic burnout has been linked to specific sociodemographic characteristics. Estrada et al. (2021) and Amor et al. (2020) indicate that burnout levels increase significantly as university students progress in their studies, with unfavorable increases for health observed in each of the dimensions. This phenomenon could be attributed to the increase in academic demands in the final stages of study, where the required tasks demand greater effort. In addition, in relation to the gender of university students, it is often reported that women present moderate and high levels of the syndrome more frequently (Mota et al., 2022). In this regard, Seperak et al. (2021) and Villamar et al. (2019) explain that women strive harder to excel, which stresses them out and makes them more vulnerable to anxiety and depression, unlike men, who tend to show an attitude of indifference toward academic activities.

In addition, the fact that university students also work has a significant influence on increased levels of burnout. Estrada et al. (2021) and Osorio et al. (2020) point out that students who work while studying experience greater emotional and physical exhaustion than those who only study. Furthermore, working more hours per

week seems to have an impact on the onset of the syndrome, probably due to the accumulated emotional fatigue in students.

In this regard, the consequences of academic burnout encompass several vital areas of students' lives. Emotionally, students may experience feelings of failure, hopelessness, pessimism, irritability, and academic decline (Castro et al., 2011). Cognitive consequences include feelings of emptiness and mental fatigue, changes in self-concept, and loss of creativity. Behaviorally, Martínez (2010) mentions a loss of proactive actions, substance abuse, harmful habits, and irresponsibility in academic activities. Socially, burnout can lead to the loss of close relationships and interpersonal conflicts, as well as dissatisfaction with one's partner and home life (Rosales, & Rosales, 2013). Finally, the physical consequences of burnout include cardiovascular disorders, headaches, muscle pain, respiratory and gastrointestinal problems, and changes in body weight (Caballero et al., 2010). For all these reasons, academic burnout has various negative consequences for students, but these are more intense and harmful in students who have jobs as well (Agust et al., 2001; Estrada et al., 2021).

Despite this, the burnout syndrome has been studied more in the workplace than in the academic environment, since, from its inception, it has been recognized by researchers and professionals as an organizational psychosocial issue. However, given the above, it is crucial to also analyze it in the academic environment (Dominguez-Lara et al., 2021; Fernández-Arata et al., 2020). While there is extensive research focused on prevention proposals aimed at workers, prevention measures applicable to the academic environment are not widely known. This is particularly concerning, given that students often need to find effective ways to cope with burnout to avoid negative mental and physical effects. For this reason, it is essential to develop and promote prevention measures to address this form of burnout, ensuring that students can maintain their overall well-being as they progress in their academic training.

In Peru, there is little research on burnout in academia. However, Seperak et al. (2021) found that more than 40% of Peruvian university students reported worrying levels of academic burnout, with women being the most affected. Another study that took a sample of education

students reported that 52.5% of the sample showed moderate levels of academic burnout. Likewise, those most affected were female students between the ages of 16 and 20 who were in their first semesters of study and who were working (Estrada et al., 2021). On the other hand, Dominguez-Lara et al. (2021) analyzed the psychometric properties of the Emotional Exhaustion Scale, which assesses one of the dimensions of academic burnout, reporting a unidimensional structure with adequate levels of reliability.

Through analysis of the literature, it has been observed that burnout is a growing problem, making it important to investigate the various sociodemographic variables associated with its onset. In this regard, given that studies considering these variables are scarce in Peru, this research will provide valuable information on this topic in a regional context.

METHOD

Research design

The research design used was non-experimental comparative according to Pérez et al. (2020), or associative according to Ato et al. (2013).

Sample

A total of 156 university students from the Faculty of Engineering of a private university in the city of Arequipa, located in southern Peru, participated in the study. In addition to studying, these students also work. In terms of gender, 42.3% were women and 57.7% were men, with an average age of 23. The sampling was non-probabilistic by quotas (Hernández et al., 2014). In terms of their field of study, 15.4% are studying Civil Engineering, 27.6% Industrial Engineering, 9% Mechatronics Engineering, 3.8% Mechanical Engineering, 11.5% Mining Engineering, 27.6% Industrial and Mining Safety Engineering, and 5.1% Systems and Computer Engineering. With regard to their working hours, 57.7% work between 4 and 7 hours a day, 30.8% between 8 and 9 hours, and 11.5% between 10 and 12 hours. Likewise, 22.4% earn less than 500 soles per month, 44.2% between 500 and 1000 soles, and 33.3% more than 1000 soles per month.

Instruments

A questionnaire on sociodemographic variables was used, designed ad hoc to collect data on each student, such as gender, age, degree program, number of hours worked, and income. The Maslach Burnout Inventory - Student Version (MBI-URPSS) was used to assess academic burnout syndrome. This instrument was adapted by Correa et al. (2019), who validated it in Peruvian university students. The test consists of 15 items on a Likert-type response scale with seven alternatives: "Never" = 1, "Almost never" = 2, "Sometimes" = 3, "Regularly" = 4, "Often" = 5, "Almost always" = 6, and "Always" = 7. The 15 items are distributed into three scales, each measuring the dimensions of academic burnout syndrome: five correspond to Emotional Exhaustion, four to Cynicism, and the last six to Academic Efficacy. With regard to the validity of the instrument, the internal structure of the test was verified using confirmatory factor analysis, which yielded adequate goodness-of-fit indices: $\chi^2 = 165.616$; $df = 86$; $p < .001$; $\chi^2/df = 1.926$; CFI = .912; TLI = .892; RMSEA = .077; SRMR = .075. Likewise, reliability was evaluated using the internal consistency method through McDonald's omega coefficient, and the three dimensions: emotional exhaustion ($\omega = .820$), academic efficacy ($\omega = .845$) and cynicism ($\omega = .737$) presented adequate reliability.

Procedures

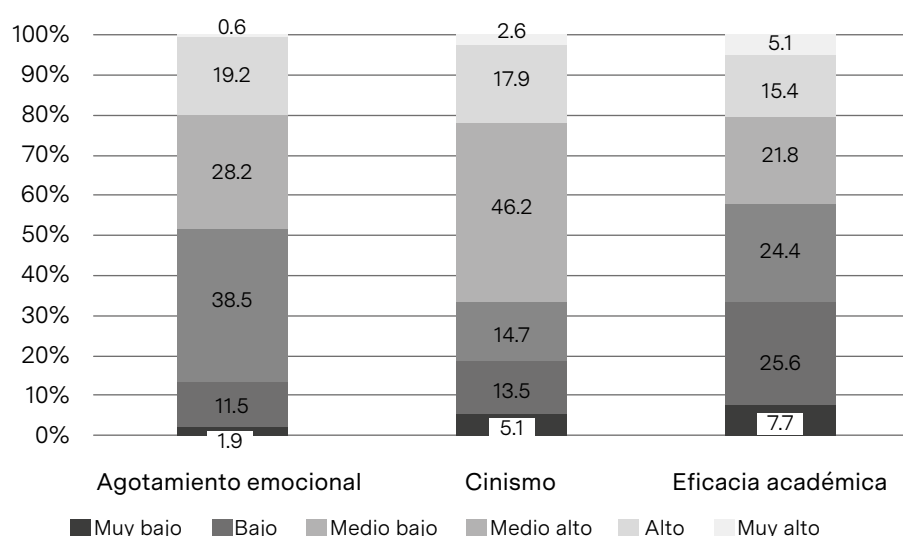
Previously, the corresponding permissions were obtained from the university where the sample originated in order to carry out the data collection. In order to perform a non-probabilistic sampling, teachers from various courses were contacted to request their support in this data collection process. The application of the instrument took approximately 20 minutes of face-to-face classes for this procedure. The data was collected between October and December 2023. This research was approved by the Ethics Committee of the Technological University of Peru with the code 165-2023-CEI-UTP.

Data analysis

To process the research data, JASP version 0.95 (JASP Team, 2025) was used. The data were previously coded in a Microsoft Excel® database. Once this was done, a descriptive analysis of the data was performed using frequencies and percentages, and then normality was assessed using the Shapiro-Wilk test. Subsequently, parametric statistical tests such as analysis of variance (ANOVA) or nonparametric tests such as Mann-Whitney U and Kruskal-Wallis H were used to make the respective comparisons of academic burnout syndrome based on sociodemographic data. Additionally, the chi-square test was used to relate sociodemographic variables to the presence of burnout in those evaluated.

RESULTS

Regarding the presence of academic burnout, only 11.5% of university students presented the problem. In terms of the dimensions of academic burnout, Figure 2 shows that, in emotional exhaustion, 38.5% experience a medium-low level, 28.2% a high level, and 19.2% a very high level. In relation with the cynicism dimension, the results reveal that 46.2% present a medium-high level, 17.9% a high level, and 2.6% a very high level. Likewise, with regard to academic efficacy, it was found that 7.7% present a very low level, 25.6% a low level, and 24.4% a medium-low level.

Figure 1*Dimensions of the academic burnout*

No normality was found in any of the dimensions of academic burnout according to gender ($p < .05$), so comparisons were made using the Mann-Whitney U test. Table 1 shows that women experience significantly more emotional exhaustion than men, with a small effect size ($U = 3753$; $p = .005$; $r_{rb} = -.264$). Men, on the other hand, show significantly more academic efficacy than women, with a small effect size

($U = 2393.5$; $p = .039$; $r_{rb} = .194$). In contrast, no statistically significant differences were found in the dimension of cynicism based on the gender of those evaluated ($U = 2882.5$; $p = .754$).

In addition, no statistically significant relationship was found between gender and the presence of academic burnout ($\chi^2 = 0.038$; $p = .845$).

Table 1*Comparative analysis of the academic burnout syndrome based on gender*

	Gender	N	Average range	U	p-value	r_{rb}
Emotional exhaustion	Female	66	90.36	3753	.005	-.264
	Male	90	69.80			
Cynicism	Female	66	77.17	2882.5	.754	-
	Male	90	79.47			
Academic efficacy	Female	66	69.77	2393.5	.039	.194
	Male	90	84.91			

Normality was only found in the dimension of academic burnout related to emotional exhaustion based on the professional career ($p > .05$). For this reason, this comparison was made using ANOVA; furthermore, the variable showed homogeneity of variances according to Levene's test ($p = .490$).

Table 2 shows that no significant differences were found in the dimensions of academic

burnout based on the professional career that the respondents were pursuing: emotional exhaustion ($F(6,149) = 0.230$; $p = .966$), cynicism ($H = 8.594$; $p = .198$), and academic efficacy ($H = 5.273$; $p = .509$).

Additionally, no statistically significant relationship was found between the professional career and the presence of academic burnout ($\chi^2 = 0.919$; $p = .988$).

Table 2*Comparative analysis of academic burnout based on professional career*

ANOVA				
	Career	N	Mean	SD
Emotional exhaustion	Civil Eng.	24	10.67	4.082
	Industrial Eng.	43	11.07	5.170
	Mechatronics Eng.	14	10.43	3.694
	Mechanical Eng.	6	9.17	2.041
	Mining Eng.	18	11.33	4.563
	Safety Eng.	43	10.84	4.587
	Systems Eng.	8	11.38	4.779
Kruskal-Wallis				
	Carrera	N	Mean range	
Cynicism	Civil Eng.	24	65.35	
	Industrial Eng.	43	69.09	
	Mechatronics Eng.	14	85.07	
	Mechanical Eng.	6	84.83	
	Mining Eng.	18	80.72	
	Safety Eng.	43	86.20	
	Systems Eng.	8	105.88	
Academic efficacy	Civil Eng.	24	75.56	
	Industrial Eng.	43	85.81	
	Mechatronics Eng.	14	79.57	
	Mechanical Eng.	6	88.00	
	Mining Eng.	18	88.19	
	Safety Eng.	43	71.02	
	Systems Eng.	8	57.38	

No normality was found in any of the dimensions of academic burnout in relation to working hours ($p < .05$), so the comparisons were made using the Kruskal Wallis H test. With regard to the variable of working hours, Table 3 shows that no significant differences were found between the dimensions of academic burnout syndrome: emotional exhaustion ($H = 5.492$; $p = .064$), cynicism ($H = 0.918$; $p = .632$), and academic efficacy ($H = 3.523$; $p = .172$).

On the other hand, a statistically significant relationship was found between working hours and the presence of academic burnout ($\chi^2 = 11.969$; $p = .003$). Thus, there is a higher prevalence of burnout among those who work 10 to 12 hours (33.3%) or 8 to 9 hours (14.6%) compared to those who work 4 to 7 hours (5.6%).

Table 3*Comparative analysis of academic burnout levels based on working hours*

	Working hours	N	Mean range	H	p-value
Emotional exhaustion	4-7 hours	90	73.87	5.492	.064
	8-9 hours	48	78.71		
	10-12 hours	18	101.11		
Cynicism	4-7 hours	90	76.61	0.918	.632
	8-9 hours	48	78.57		
	10-12 hours	18	87.75		
Academic efficacy	4-7 hours	90	72.83	3.523	.172
	8-9 hours	48	87.61		
	10-12 hours	18	82.53		

Normality was only found in the dimension of academic burnout related to emotional exhaustion according to professional career ($p > .05$), so this comparison was made using ANOVA; furthermore, the variable showed homogeneity of variances according to Levene's test ($p = .320$).

Table 4 shows the comparative analysis of academic burnout on the basis of income, where statistically significant differences can be seen in the academic efficacy dimension, with a minimum effect size ($H = 7.010$; $p = .030$; $\epsilon^2 = .045$). Dunn's multiple comparison test showed

that those who earn more than 1,000 soles have significantly more effectiveness than those who earn less than 500 soles ($z = -2.331$; $p = .020$; $rrb = .292$) and between 500 and 1000 soles ($z = -2.219$; $p = .026$; $rrb = .237$), in both cases with a small effect size. On the other hand, no significant differences were found in the dimensions of emotional exhaustion ($F(2,153) = 2.722$; $p = .069$) and cynicism ($H = 5.501$; $p = .064$).

Likewise, no statistically significant relationship was found between income and the presence of academic burnout ($\chi^2 = 0.342$; $p = .843$).

Table 4*Comparative analysis of academic burnout based on income*

ANOVA				
	Monthly income	N	Media	DE
Emotional exhaustion	Less than 500	35	12.23	5.128
	500-1000	69	10.84	3.999
	More than 1000	52	9.96	4.520

Kruskal-Wallis				
	Monthly income	N	Rango promedio	H
Cynicism	Less than 500	35	87.86	5.501
	500-1000	69	82.49	
	More than 1000	52	66.90	
Academic efficacy	Less than 500	35	68.80	7.010
	500-1000	69	73.41	
	More than 1000	52	91.79	

DISCUSSION

The objective of this study was to determine the association between academic burnout syndrome and the sociodemographic characteristics of a sample of students from a private university, with 156 participants from engineering programs. This issue is addressed because, as evidenced in the literature review, it has adverse consequences on students' physical and psychological health, as well as on their academic performance. For this reason, it is essential to comprehend and understand how sociodemographic characteristics influence the onset and severity of burnout.

The data collected reveals, first of all, that a large number of students show certain levels of burnout, with up to 80% of the sample showing a moderate level of the syndrome. These results exceed the percentages reported in previous studies with samples from Peru, which indicate that 40% (Seperak et al., 2021) or 52.5% (Estrada et al., 2021) of university students experience moderate levels of academic burnout. In this regard, the first study evaluated students studying psychology, engineering, law, and business administration in various regions of Peru, of whom 74% came from Arequipa and 19% had paid jobs; while the second study took a sample of Peruvian students studying education, of whom 48% worked. It is possible that these differences in the sociodemographic characteristics of the sample may explain the differences obtained in this study, since only students who work, live in Arequipa, and are studying engineering were evaluated. This would reveal that working and studying at the same time significantly increases the levels of burnout syndrome in university students,

as has been reported in other studies, given that they are exposed not only to the demands of university, but also to those of the work environment, which includes stress due to workload, often accompanied by fatigue (Arias, & Gutiérrez, 2018; Castro Bastidas et al., 2011).

Comparatively speaking, there are significant differences in academic burnout depending on sociodemographic variables among working university students, as has also been reported in other studies (Agust et al., 2001; Mota et al., 2022). However, although the existence or absence of burnout may be closely related to employment status, people who do not work may also experience this syndrome, although with differences in its three dimensions, since academic burnout is triggered by academic stress (Arias, & Rivera, 2024; Pepe-Nakamura et al., 2014; Tirado-Amador et al., 2023). With regard to gender, we found that emotional exhaustion and academic efficacy were higher among women and men, respectively, suggesting that women tend to be more negatively affected by the syndrome than their male counterparts, as reported in previous studies (Agust et al., 2001; Núñez, 2017; Seperak et al., 2021; Villamar et al., 2019). These results coincide with those of Espinoza et al. (2020), Merchán-Galvis et al. (2018), and Rodríguez et al. (2019), which show that academic burnout is more prevalent among female university students, most of whom have moderate levels of the syndrome due to their studies and extra-curricular activities at home.

Regarding professional careers, Seperak et al. (2021) explain that in order to obtain more accurate information, it is necessary to take this variable into account, as it is associated with diffe-

rences in the levels at which academic burnout occurs. Similarly, Puertas et al. (2020) confirm that the prevalence of the academic burnout syndrome differs depending on the university degree program that students are enrolled in (medicine, dentistry, and veterinary medicine), which could be due to various factors such as excessive workload, degree program requirements, competition, and professional expectations. However, this study shows that there is no significant association between academic burnout and the university career of students in the Faculty of Engineering, which suggests that other factors may influence its manifestations. This suggests that, at least within the specific context in which the research was conducted, other aspects may be playing a more important role in determining the levels of each of the dimensions, or that engineering careers have common elements due to the characteristics of these disciplines or the institutional culture of the university from which the sample originates.

On the other hand, in the comparative analysis of academic burnout based on working hours, it was observed that participants who work between 10 and 12 hours, i.e., those who have longer daily working hours, show higher levels of the syndrome. This result is similar to that of Arias and Gutiérrez (2018) and Merchán-Galvis et al. (2018), who found that as the number of working hours increases, so does the likelihood of experiencing academic burnout. The results suggest that the time participants devote to work can constitute a threatening condition associated with the onset of academic burnout, since the overload of work responsibilities, together with the demands of the university academic context, can contribute to increased emotional exhaustion and, consequently, lead to higher levels of burnout. The findings highlight the need and importance of finding a balance between studies and work that favors student performance in both contexts.

Finally, the comparative analysis of academic burnout based on income suggests that there is a significant association, more specifically in academic efficacy, such that those with lower incomes also have lower scores in this dimension. It could therefore be said that students' feelings of academic efficacy are negatively associated with their income. In fact, this problem is attributed to various factors, such as the pressure to maintain a certain standard of living, concerns

about personal expenses, and, finally, the need to maintain a balance between academic and work responsibilities. Despite all this, it is extremely important to contextualize the above with findings from the research by Figueroa et al. (2023), who point out that the level of burnout is closely related to aspects that arise in the work context, such as working hours, recognition within the workplace, and salary in relation to economic needs. They also mention that if these factors are not managed correctly, dissatisfaction can arise, which can be reflected in various areas.

Based on the aforementioned, it is suggested that future research expand the sample size, incorporating both working and non-working university students, in order to achieve a more accurate generalization of the results and to be able to make a comprehensive comparison between both groups. It would also be relevant to include other variables such as marital status, length of service, and academic performance, among others, in order to gain a more complete understanding of this issue. In addition, it would be beneficial to consider academic variables in the study in order to obtain more information about the factors that may be contributing to student stress. In this regard, it is crucial to bear in mind that the prediction of variables provides a theoretical basis for reducing burnout levels and alleviating its consequences. Therefore, it is necessary to strengthen coping and social support strategies, which have a buffering effect on burnout syndrome; these aspects should be investigated in future studies (Castillo et al., 2018)

With regard to the results, there is a need for further research and analysis of various factors that may be triggering academic burnout, with the aim of developing academic counseling programs and services that effectively address this issue and promote student well-being. This line of research may lead to the implementation of specific interventions designed to manage stress and improve the quality of life of university students. In addition, it will provide additional data on sociodemographic factors that can be used in future research seeking to further explore the issue of burnout in education. Likewise, the results of the study provide information for designing prevention or intervention plans, which will be useful in providing support to specific groups in need.

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Author roles:

AMGT: Conceptualization, Data curation, Formal analysis, Writing - revision and editing.

MMVC: Conceptualization, Formal Analysis, Writing - revision and editing.

WLAG: Supervision, Methodology, Writing - review and editing.

CRRC: Formal analysis, writing - revision and editing.

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