



Sociodemographic, Academic, and Psychosocial Characterization of Students in Distance Technological Programs: A Multitemporal Descriptive Analysis (2022–2024)

Caracterización sociodemográfica, académica y psicosocial de estudiantes en programas tecnológicos a distancia: análisis descriptivo multitemporal (2022–2024)

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ABSTRACT

The characterization of students in distance technological programs is an essential tool for understanding educational dynamics and designing strategies aimed at promoting retention and academic success. However, research on the specific traits of these students is limited in this modality, so it is necessary to collect empirical information to guide institutional policies and propose effective retention strategies for a population historically excluded from the higher education system. Objective: To characterize, in a descriptive and multitemporal way, the sociodemographic, academic and psychosocial conditions of UPTC-FESAD students, to identify trends, patterns of change and possible risk factors that affect their permanence and academic success. This study was conducted at the Faculty of Distance Studies (FESAD) of the Pedagogical and Technological University of Colombia (UPTC), using a descriptive design with a quantitative approach. Structured surveys were administered during the 2022-I, 2023-I, 2023-II, and 2024-I academic periods to collect sociodemographic, academic, and psychosocial information from the student population. The findings reveal a predominantly female profile (79.1%), along with a progressive increase in students over 30 years of age and a decline in younger cohorts. Likewise, the majority of students come from public educational institutions (82.9%), and two-thirds are entering higher education for the first time. Additionally, 58% combine study with employment, while 66.1% report earning below the legal minimum wage, highlighting significant vulnerability conditions. This profile presents critical challenges related to balancing academic, work, and family roles, addressing the feminization of enrollment, implementing academic leveling programs, and strengthening university welfare services as a strategy to prevent dropout. The program is positioned as a space for inclusion and educational democratization, but it requires real and viable institutional adjustments that ensure equity, flexibility, and comprehensive support in order to effectively address the needs of a diverse, complex student population with multiple responsibilities.

RESUMEN

La caracterización de los estudiantes en programas tecnológicos a distancia constituye una herramienta esencial para comprender las dinámicas educativas y diseñar estrategias orientadas a favorecer la permanencia y el éxito académico. El presente estudio se desarrolló en la Facultad de Estudios a Distancia (FESAD) de la Universidad Pedagógica y Tecnológica de Colombia (UPTC), bajo un diseño descriptivo y un enfoque cuantitativo. Se aplicaron encuestas estructuradas en los periodos 2022-I, 2023-I, 2023-II y

2024-I, con el propósito de recopilar información sociodemográfica, académica y psicosocial de la población estudiantil. Los hallazgos muestran un perfil predominantemente femenino (79,1%), acompañado de un aumento progresivo de estudiantes mayores de 30 años y una disminución de los más jóvenes. Asimismo, la mayoría procede de instituciones educativas públicas (82,9%) y dos tercios ingresan por primera vez a la educación superior. De forma complementaria, el 58% combina estudio y trabajo, mientras que el 66,1% reporta ingresos inferiores a un salario mínimo, lo que evidencia condiciones de marcada vulnerabilidad. Este perfil plantea retos significativos relacionados con la conciliación de roles académicos, laborales y familiares, la atención a la feminización de la matrícula, la implementación de programas de nivelación académica y el fortalecimiento de los servicios de bienestar universitario como estrategia para prevenir la deserción. El programa se configura como un espacio de inclusión y democratización educativa, pero requiere ajustes institucionales que garanticen equidad, flexibilidad y acompañamiento integral, con el fin de responder eficazmente a las necesidades de una población estudiantil diversa, compleja y con múltiples responsabilidades.

PALABRAS CLAVE | KEYWORDS

Distance Education, Student Profiling, Sociodemographic Factors, Academic Retention.

Educación distancia, caracterización estudiantil, factores sociodemográficos, permanencia académica.

1. Introduction

Student characterization constitutes an essential component for understanding the dynamics of educational processes and guiding pedagogical decision-making based on the diversity of the academic population (Acosta-Corporan et al., 2022; Granados-López et al., 2024). In the current context of the knowledge society, where innovation and the plurality of sociocultural experiences shape increasingly complex learning environments, it becomes indispensable to identify who the students are, what their prior trajectories have been, and what specific needs they present (Ahonen et al., 2018; Ampartzaki et al., 2024). This knowledge fosters flexible curricular design and the implementation of adaptive strategies capable of responding to hybrid and changing scenarios, in which the boundaries between face-to-face and virtual modalities are progressively blurred (Ahonen et al., 2018; Ampartzaki et al., 2024; De la Barrera et al., 2023).

The scientific literature has emphasized the relevance of this approach. Azevedo (2015) argues that academic persistence and success largely depend on the correspondence between the individual characteristics of the student and the conditions provided by their educational environment. Complementarily, Gutiérrez-Castillo et al. (2023) underline that understanding sociodemographic, academic, and psychosocial factors is essential for designing inclusive strategies that promote equity, enhance meaningful learning, and reduce dropout rates. In this sense, student characterization transcends demographic description to become a strategic tool for academic planning and management.

Within this framework, a systematic analysis of the student profile at the Universidad Pedagógica y Tecnológica de Colombia (UPTC), Facultad de Estudios a Distancia (FESAD), is presented, based on information collected through surveys applied in the academic periods 2022-I, 2023-I, 2023-II, and 2024-I. The study addresses three central dimensions: sociodemographic aspects, academic background, and psychosocial conditions, whose integration allows for a comprehensive view of the student population. This approach contributes to understanding the heterogeneity of the group, composed of individuals from different regions, educational trajectories, and diverse motivations, which demands differentiated strategies of support and teaching.

The relevance of this exercise is intensified in the field of distance education, characterized by marked student diversity and additional challenges in the post-pandemic scenario. Previous research highlights the need to constantly monitor the factors that influence learning, in order to reduce socioeconomic and digital gaps, improve persistence, and optimize academic outcomes (Ampartzaki et al., 2024; Friedman & Robbins, 2022; Gutiérrez-Castillo et al., 2023). In this regard, the objective of the present study is to characterize, in a descriptive and multitemporal manner, the sociodemographic, academic, and psychosocial conditions of UPTC–FESAD students, with the aim of identifying trends, patterns of change, and potential risk factors that affect their persistence and academic success.

2. Methodology

The study was framed within a quantitative, descriptive, and cross-sectional design, aimed at characterizing UPTC–FESAD students (Hernandez-Sampieri, 2018). The research covered four consecutive time points 2022-I, 2023-I, 2023-II, and 2024-I allowing for the examination of variations and trends over time. The population consisted of all students enrolled in the program during each period, applying a census sampling by availability. Participation was voluntary, mediated by informed consent, and in accordance with the ethical principles of educational research.

Data collection was carried out through a structured 20-item questionnaire, administered digitally via Google Forms. The instrument included closed-ended, multiple-choice questions and five-point Likert-scale items (1 = Strongly disagree; 5 = Strongly agree). The items were organized into three blocks: (i) sociodemographic, addressing gender, age, marital status, and geographic origin; (ii) academic background, considering the type of educational institution of origin, prior experience in higher education, and study modality; and (iii) psychosocial factors, related to employment status, family composition, income level, and health system affiliation. This structure ensured coherence between the research objectives and the information collected (Matas, 2018).

Data analysis was performed at two complementary levels. First, descriptive procedures were applied to estimate frequency distributions, percentages, and measures of central tendency. Subsequently, comparisons across periods were conducted using homogeneity tests (χ^2) and linear trend analyses in proportions, with a significance level of 5%. Based on these results, monitoring indicators were constructed such as program

feminization, age composition, socioeconomic conditions, and work burden facilitating the identification of patterns and the interpretation of changes observed in the student population.

The content validity of the questionnaire was determined through expert judgment, while the reliability of the Likert-type items was estimated using Cronbach's alpha coefficient (Ahonen et al., 2018). The database was cleaned to ensure consistency, eliminating incomplete records and verifying duplicates. Among the study's limitations are the non-probabilistic nature of the sample, potential self-selection bias of participants, and the self-reported nature of the data. Nevertheless, the findings provide a robust and relevant approximation for guiding curricular planning, academic support, and institutional management in distance higher education programs (Azevedo, 2015; Gutiérrez-Castillo et al., 2023; Zhao & Zheng, 2014).

3. Results

3.1. Sociodemographic Analysis

3.1.1. Gender Distribution

The analysis of gender distribution revealed a clear female predominance in the program, with an overall average participation of 79.1% across the four periods analyzed. In terms of evolution, a progressive increase in female enrollment was observed, rising from 76.2% in 2022-I to 81.2% in 2024-I, consolidating a stable upward trend. Conversely, male participation decreased over the same interval, from 23.8% to 18.8%, indicating a gradual reduction in male representation within the program. It is noteworthy that no students were recorded under the "Other" category in any of the periods. This trend highlights the sustained majority presence of women in the program's enrollment throughout the entire observation period, as detailed in Table 1.

Period	Female (%)	Male (%)
2022-I	76.2	23.8
2023-I	78.6	21.4
2023-II	80.4	19.6
2024-I	81.2	18.8

3.1.2. Age Distribution

The age distribution showed that the program has a diverse population in terms of age, ranging from students who have recently graduated from secondary education to adults with more consolidated trajectories. On average, students over 30 years old were the most representative group, accounting for 31.4% of the total. The second most important group corresponded to the 21–25 age range, with 26.3%, followed by the 26–30 age group with stable values around 19–22%. The participation of younger students (17–20 years old) showed a significant downward trend, decreasing from 32.7% in 2022-I to 15.6% in 2024-I. Conversely, enrollment of students over 30 years old increased in the same period from 25.0% to 37.5%, reflecting a growing incorporation of the adult population into the program. These patterns are systematized in Table 2.

Age Range	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)
17-20 years	32.7	25.1	17.4	15.6
21-25 years	23.1	27.9	26.1	28.1
26-30 years	19.2	18.6	21.7	18.8
Over 30	25	28.4	34.8	37.5

3.1.3. Marital Status

Regarding marital status, the group of single students was the majority across all periods, with an average of 69.1%. However, this group showed a slight decrease over time, falling from 71.2% in 2022-I to 65.6% in 2024-I. In contrast, married students recorded a steady increase, rising from 9.6% in 2022-I to 15.6% in 2024-I, which represents a sustained growth of six percentage points. The category of common-law union remained relatively stable, with an average of 17.7%, while the "Other" category appeared only in 2024-I, representing 3.1% of enrollment. In aggregate terms, approximately three out of ten students reported having formal family commitments (marriage or common-law union), which constitutes a relevant segment within the total cohort. Complete values are presented in Table 3.

Table 3: Trends in the Marital Status Composition of Students.

Marital Status	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)
Single	71.2	69.8	69.6	65.6
Married	9.6	11.6	13.0	15.6
Common-law Union	19.2	18.6	17.4	15.6
Other	0	0	0	3.1

3.1.4. Geographic Origin

The analysis of geographic origin reflected a primarily regional scope of the program. On average, 78.9% of the students came from the department of Boyacá, of which 30.1% resided in the capital city, Tunja, and 48.8% in other municipalities of the same department. The remaining 21.1% corresponded to students from other departments of the country. The proportion of students from Tunja showed a steady increase across the four periods, rising from 23.1% in 2022-I to 34.4% in 2024-I, while students from municipalities other than the capital remained within a range close to 47–54%. Students from other departments maintained a relatively constant participation rate of around 20%. These data, presented in Table 4, indicate that although enrollment is primarily regional, there is also a stable presence of external students, which broadens the program's territorial coverage.

Table 4: Geographic Origin of the Student Population: Regional and National Scope.

Origin	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Tunja (Boyacá)	23.1	32.6	30.4	34.4	30.1
Other municipalities of Boyacá	53.8	46.5	47.8	46.9	48.8
Other departments	23.1	20.9	21.7	18.8	21.1

3.2. Academic Background

3.2.1. Academic Background

Regarding secondary education, it was found that the vast majority of students (82.9%) came from public educational institutions, while 17.1% completed their studies in private institutions. This proportion remained practically unchanged over the four academic periods, with only minor variations that did not alter the predominance of the public sector in the students' prior educational trajectory. Table 5 presents the detailed distribution.

Table 5: Academic Background of Students by Type of Institution.

Type of Institution	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Public	80.8	83.7	82.6	84.4	82.9
Private	19.2	16.3	17.4	15.6	17.1

3.2.2. Previous Educational Experience

The analysis of prior higher education experience showed that, on average, 64.5% of the students were enrolled in a higher education program for the first time, making this the largest group. Meanwhile, 13.9% reported having previously started another program without completing it, while 16.8% indicated having completed a prior academic program. Finally, 4.8% stated that they were simultaneously enrolled in another degree program. These results reveal a diversity of academic trajectories within the student population, where first-time entrants coexist with others who have prior educational experiences. The full values are presented in Table 6.

Table 6: Academic Background and Students' Previous Experience.

Previous Experience	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
First time enrolled	61.5	67.4	69.6	59.4	64.5
Started another program but did not finish	15.4	11.6	13.0	15.6	13.9
Completed another program	19.2	16.3	13.0	18.8	16.8
Currently enrolled in another program	3.8	4.7	4.3	6.3	4.8

3.2.3. Mode of Study

With regard to the selected mode of study, the analysis revealed a clear preference for the daytime modality, which reached an average of 78.2% across the four periods, with values ranging from 73.1% in 2022-I to 82.6% in 2023-II. The weekend and validation modalities registered very similar percentages, with average values of 9.7% each. Finally, the evening modality showed the lowest percentages, averaging 2.3%, and was absent in some periods (Table 7).

Mode	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Daytime	73.1	79.1	82.6	78.1	78.2
Weekend	11.5	9.3	8.7	9.4	9.7
Validation	11.5	9.3	8.7	9.4	9.7
Evening	3.8	2.3	0.0	3.1	2.3

3.3. Psychosocial Aspects

3.3.1. Employment Status

The analysis of employment status indicated that, on average, 48.2% of the students were employed, 9.6% worked independently, and 42.3% were unemployed. A gradual increase was observed in the proportion of students with employment or independent activity, rising from 53.9% in 2022-I to 62.5% in 2024-I. This trend is detailed in Table 8.

Employment Status	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Employed	46.2	48.8	47.8	50.0	48.2
Unemployed	46.2	41.9	43.5	37.5	42.3
Self-employed	7.7	9.3	8.7	12.5	9.6

3.3.2. Family Structure

Regarding family structure, 48.6% of the students lived with their parents, 29.0% lived with a partner and children, and 22.5% lived alone. A decrease was identified in the proportion of students living with their parents, from 53.8% in 2022-I to 43.8% in 2024-I, while those living with a partner and children showed an increase during the same period, from 23.1% to 34.4%. The proportion of those living alone remained relatively stable, with values close to 22% across all periods (Table 9).

Family Nucleus	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Family (Single living with parents)	53.8	48.8	47.8	43.8	48.6
Family (Partner/children)	23.1	27.9	30.4	34.4	29.0
Alone	23.1	23.3	21.7	21.9	22.5

3.3.3. Income Level

The results regarding income level showed that 66.1% of the students reported receiving an earning of less than one Minimum Monthly Legal Wage (MMLW), while 33.9% indicated earnings between 1 and 2 MMLW. In none of the four periods were students recorded with incomes above 2 MMLW. The proportion of students in the 1–2 MMLW range showed a slight increase, from 30.8% in 2022-I to 37.5% in 2024-I. Table 10 details this distribution.

Income Level	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Less than 1 minimum wage (MMLW)	69.2	67.4	65.2	62.5	66.1
Between 1 and 2 minimum wages (MMLW)	30.8	32.6	34.8	37.5	33.9
More than 2 minimum wages (MMLW)	0.0	0.0	0.0	0.0	0.0

3.3.4. Health System

Regarding the health system, 52.4% of the students belonged to the subsidized system, while 44.2% were affiliated with the contributory system. A total of 3.4% reported not being affiliated with the health system. Between 2022-I and 2024-I, an increase was observed in the proportion of students enrolled in the contributory system, rising from 42.3% to 46.9%, while enrollment in the subsidized system decreased from 53.8% to 50.0%. The proportion without affiliation remained constant, although low, ranging between 2.3% and 4.3% depending on the period (Table 11).

Table 11: Conditions of Student Health System Affiliation.

Health System Regime	2022-I (%)	2023-I (%)	2023-II (%)	2024-I (%)	Average (%)
Contributory	42.3	44.2	43.5	46.9	44.2
Subsidized	53.8	53.5	52.2	50.0	52.4
None	3.8	2.3	4.3	3.1	3.4

4. Discussion

A comprehensive analysis of the program's student population reveals a heterogeneous and complex profile that requires special attention to ensure persistence and academic success (Borge et al., 2020; Kautzmann & Jaques, 2019; Tuckman, 1965). One of the most noteworthy findings is the marked feminization of enrollment, which constitutes a structural and sustained feature over time. Although this female predominance is common in programs associated with health sciences, it highlights involves the need to reflect on the pedagogical and social implications of having a majority of women in the learning process (Estevez et al., 2016; Järvelä, 2015). It is not only a matter of recognizing a statistical trend, but of creating gender-sensitive learning environments that address the conditions, expectations, and challenges faced by female students, fostering their professional development within an equitable context (Malmberg et al., 2019; Molinillo et al., 2018).

The age composition also reveals a significant shift in the entry profile, characterized by an increase in the proportion of students over 30 years of age, while the presence of younger students aged 17–20 has declined. This transition suggests that the program has become an attractive alternative for adults seeking to complement their training or redirect their career paths, contributing a diversity of experiences and expectations to the academic environment. However, this adult profile poses methodological challenges, as it requires differentiated pedagogical strategies oriented toward knowledge applicability and flexibility in learning organization (Aprianto & Zaini, 2019; Friedman & Robbins, 2022; Zheng & Huang, 2016). The decline in younger students, on the other hand, underscores the need to strengthen vocational guidance mechanisms and to position distance education as a viable and high-quality option for recent high school graduates.

In terms of social structure, changes in marital status and family composition confirm the importance of considering personal responsibilities in academic performance. Although the majority of students remain single, there is a steady increase in those who are married or cohabiting, as well as those living with a partner and children. These family realities introduce additional pressures and demand institutional policies that promote the reconciliation of study, work, and family (Al-Rawahi & Al-Mekhlafi, 2015; Castles et al., 2018). Furthermore, more than half of the students combine their studies with employment or independent work. While this may enrich learning by linking it directly to professional experiences, it also represents a heavy workload that can lead to stress, reduced performance, and dropout risk (Acosta-Corporan et al., 2022; Barenthien et al., 2020).

Socioeconomic conditions reveal deep vulnerabilities that cannot be overlooked. Two-thirds of the students report incomes below the minimum legal monthly wage, and more than half are affiliated with the subsidized health system. This context of precariousness limits the chances of persistence and academic success, especially considering that a small percentage of students lack health insurance altogether, placing them in a situation of extreme vulnerability (Alvarez-Munoz & Perez-Montoro, 2015; Prins et al., 2016). This situation requires a clear institutional response in terms of scholarships, living allowances, and welfare programs to alleviate financial burdens and guarantee minimum conditions of equity in access and persistence (Buendía-Arias et al., 2018; Cupare Castro & Resplendor Barreto, 2023; Mármol Castillo et al., 2022).

The program also demonstrates a significant territorial impact, attracting the vast majority of its students from Boyacá, particularly from municipalities outside the capital. This highlights the democratizing role of distance education in historically marginalized regions, where the lack of access to in-person institutions

has limited educational opportunities (Borge et al., 2020; Prendes Espinosa, 2018; Tolosa & Zerpa, 2009). However, this regional scope also poses challenges related to connectivity, access to digital resources, and the adaptation of pedagogical strategies to diverse sociocultural contexts. Ensuring equity in study conditions for students from rural or peripheral areas must be a priority to prevent territorial gaps from turning into academic inequalities (Baker et al., 2012; Bolivar Osorio, 2019; Panadero & Alonso-Tapia, 2014).

From an academic perspective, it is especially relevant that a significant proportion of students are pursuing higher education for the first time. This condition, common among first-generation university students, entails additional challenges in adapting to academic life, developing self-directed learning skills, and handling the dynamics of university contexts (Barros Bastidas & Turpo Gebera, 2020; Perines, 2020). The predominance of graduates from public institutions reinforces the importance of this finding, as many of these students face gaps in critical areas such as reading comprehension, academic writing, basic mathematics, and scientific thinking. Consequently, it is essential to design induction and leveling programs that address both specific content and transversal skills, to reduce entry gaps and foster equitable academic performance (Schmidt et al., 2011; Viñals Blanco & Cuenca Amigo, 2016).

The combination of all these factors gender, age, marital status, family responsibilities, employment status, socioeconomic conditions, geographical origin, and prior academic trajectories shapes a diverse, complex, and challenging student profile (Aprianto & Zaini, 2019). This profile not only requires a flexible educational offer but also robust institutional policies on student welfare, academic support, and psychosocial guidance. Expanding support services, implementing early warning systems to identify students at risk, and strengthening articulation with the region's productive sector are necessary actions to effectively address this reality (Al-Rawahi & Al-Mekhlafi, 2015; Ávalos Dávila & Sevillano García, 2018).

In summary, the program has proven to be a space for educational inclusion that opens opportunities for women, adults, rural populations, and low-income groups. However, the success of this mission will depend on the institution's ability to recognize the particularities of the student profile and design differentiated strategies to meet their needs. The challenge is to build a flexible, inclusive, and sustainable educational model that ensures not only access but also persistence and timely graduation, guaranteeing that distance education fulfills its promise of democratizing knowledge and contributing to social and regional development (Banderas Martínez et al., 2018; Martín-Núñez et al., 2022; Montes & Mendoza, 2018).

5. Conclusions

The analysis carried out shows that the student population of distance technology programs faces conditions of marked socioeconomic vulnerability, which calls for the strengthening of institutional and state support programs. Scholarships, food subsidies, transportation assistance, and other similar mechanisms are a priority to ensure student retention and timely graduation, especially considering that two-thirds report incomes below the current legal monthly minimum wage.

Likewise, the need was identified to promote strategies that facilitate the reconciliation of study, work, and family. Since more than half of the students combine work and academic responsibilities, and nearly one-third report formal family obligations, it is essential to offer flexible study modalities, adjustable schedules, and pedagogical methodologies complemented by virtual education, in order to respond to the students' time availability and diverse contexts.

Another key finding highlights the importance of implementing academic leveling programs that respond to the diversity of entry profiles, as the majority come from public educational institutions and nearly two-thirds have no prior higher education experience. Such programs should address basic competencies in communication, mathematics, scientific thinking, and autonomous learning, so that students have the necessary tools to successfully meet the program's demands.

Therefore, the complex psychosocial profile identified requires the expansion and diversification of university welfare services, including psychological support, vocational guidance, academic advising, and specific attention to students with children. This should be complemented by the creation of early warning systems to detect dropout risks and the strengthening of ties with the regional labor sector, facilitating internships, practicums, and employment opportunities compatible with the program. Continuous monitoring of the student profile will allow institutional strategies to be adjusted, consolidating an inclusive, equitable, and student-centered program.

6. Recommendations

It is necessary to combine qualitative research methodology to discover the subjective dynamics and meaning behind quantitative information, which will allow the institution to have a clear idea of what students have experienced and the reasons that cause situations of vulnerability. At the same time, it is necessary to implement longitudinal cohort research, which is key to drawing the academic trajectory over time and to be able to adequately identify the critical moments of risk and protective factors that effectively ensure permanence.

The dynamic field information, acquired from these methods, serves as input into technological innovation for retention management. Specifically, the manufacture of predictive dropout models using AI and machine learning methods can be a strategic objective to identify risk patterns on an individual basis and generate automatic alerts, so that the institution evolves towards proactive management of student retention.

Finally, it is also necessary to widely socialize these findings with decision-makers, the productive sector and the media to generate strategic alliances that materialize the proposed solutions.

Funding

This research was funded by Universidad Pedagógica y Tecnológica de Colombia UPTC, Special Account for Research Funds.

Acknowledgments

The authors express their gratitude to the reviewers who conducted the analysis and constructive criticism of the submitted article.

Conflict of Interest

The authors declare no conflict of interest.

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