

Research Article

Towards a strategic assessment of brain sciences in Latin America: current status, strengths and structural needs

Luis Aguilar^a, Juan E. Belforte^{b,c}, Newton Canteras^d, Fernando P. Cardenas^e,
 María Carreira^f, Zulma Dueñas^g, Juan F. Montiel^h, María Pertusaⁱ,
 Alberto Javier Ramos^j, Laura V. Sánchez-Vincitore^k, Roberto Rodríguez-Labrada^l,
 Daniel E. Olazábal^{m,1}, Luisa Rocha^{n,1}

^a Facultad de Ciencias de la Salud, Universidad Continental, Av. Alfredo Mendiola 5210, Lima, Peru

^b Grupo de Neurociencia de Sistemas, Departamento de Ciencias Fisiológicas, Facultad de Ciencias Médicas, Universidad de Buenos Aires, 2155 Paraguay st, 7 floor, Ciudad Autónoma de Buenos Aires 1121, Argentina

^c Instituto de Fisiología y Biofísica Bernardo Houssay (IFIBIO-Houssay), UBA-CONICET. 2155 Paraguay st, 7 Floor, Ciudad Autónoma de Buenos Aires 1121, Argentina

^d Departamento de Anatomía, Instituto de Ciências Biomédicas, Universidade de São Paulo, SP, Brazil

^e Laboratorio de Neurociencia y Comportamiento, Universidad de los Andes. Cra 1 #18A-12, Aguas 111711, Bogotá, Colombia

^f Institute of Scientific Research and High Technology Services of Panama, Republic of Panama

^g Grupo de Neurobiología, Fisiología y Comportamiento, Departamento de Ciencias Fisiológicas, Facultad de Medicina, Universidad Nacional de Colombia. Carrera 30 No. 45-03, Edificio 471, Bogotá, DC, Colombia

^h Laboratorio de Neurociencias Integradas, Centro de Investigación Biomédica, Facultad de Medicina, Universidad Diego Portales. Ejército Libertador 141, CP 8370007 Santiago, Chile

ⁱ Departamento de Biología, Facultad de Química y Biología, Universidad de Santiago de Chile, Santiago, Chile

^j IBCN UBA-CONICET, Facultad de Medicina, Universidad de Buenos Aires, Calle Paraguay 2155 3er piso (1121), Ciudad de Buenos Aires, Argentina

^k Instituto de Neurociencia Aplicada, Universidad Iberoamericana (UNIBE), Calle Majoma N. 13, Los Ríos, Santo Domingo, the Dominican Republic

^l Centro de Neurociencias de Cuba, Cuba

^m Unidad Académica Fisiología, Facultad de Medicina, Universidad de la República Uruguay, Gral. Flores 2125, Montevideo 11800, Uruguay

ⁿ Pharmacobiology Department, Center for Research and Advanced Studies of the National Polytechnic Institute, Calz. Tenorios 235. Col. Granjas Coapa, Mexico City 14330, Mexico

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ABSTRACT

Latin America and the Caribbean have a long-standing tradition in brain research characterized by unique regional features. However, the region faces significant hurdles in maintaining pace with the rapid global advances in Brain Sciences observed over the last few decades. The Latin America Brain Initiative (LATBrain) was established to integrate regional efforts and catalyze the interdisciplinary development of Brain Sciences. To support this mission, LATBrain conducted the first survey to assess the perceptions of researchers, students, and professionals regarding opportunities and systemic barriers in the field across Latin America and the Caribbean.

Respondents identified notable strengths, including high academic achievement, creativity, and a robust capacity for collaboration. Conversely, critical concerns centered on the need for sustained funding, access to state-of-the-art technology, and specialized interdisciplinary training. Public interest was perceived to be primarily aligned with applied societal issues, such as neurodegenerative disorders and mental health. Furthermore, the survey highlighted how insufficient funding compromises infrastructure sustainability and the retention of promissory and top-tier researchers.

Our findings underscore a critical need to refocus training to be more socially relevant and academically interdisciplinary. LATBrain is actively collaborating with partners across Latin America and the Caribbean to overcome these limitations by strengthening scientific integration and interdisciplinarity, promoting resource

E-mail addresses: laguilar@continental.edu.pe (L. Aguilar), jbelforte@fmed.uba.ar (J.E. Belforte), newton@icb.usp.br (N. Canteras), lucarden@uniandes.edu.co (F.P. Cardenas), mariabcarreirafranceschi@gmail.com (M. Carreira), zduenasg@unal.edu.co (Z. Dueñas), juan.montiel@udp.cl (J.F. Montiel), maria.pertusa@usach.cl (M. Pertusa), jramos@fmed.uba.ar (A.J. Ramos), l.sanchez1@prof.unibe.edu.do (L.V. Sánchez-Vincitore), robertrl1981@gmail.com (R. Rodríguez-Labrada), dolazabal@fmed.edu.uy (D.E. Olazábal), lrocha@cinvestav.mx (L. Rocha).

¹ Both authors contributed equally to this work and should be considered as corresponding authors.

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sharing, and advocating for the socio-economic importance of brain research. This strategic plan seeks to solidify the region's position as a global leader in brain research.

Introduction

Global investment in brain research has accelerated significantly in recent years, primarily through the establishment of large-scale Brain Initiatives in the developed world, such as the USA Brain Initiative, the Human Brain Project in Europe, the Chinese Brain Project, and the South Korean Brain Initiative. These initiatives primarily aim to deepen our understanding of brain function and develop new technologies to unravel the neural codes underlying thought and action. The search for understanding of brain structure and connectivity at the cellular and molecular levels has led to the development of research tools and the availability of open-source brain activity data. Thus, advances in mapping brain structure and connectivity have revolutionized the field, fostering improvements in the treatment of neurological and mental disorders while driving broader socio-economic shifts.

The global burden of nervous system disorders is profound, with multiple brain-related conditions, including addictions, violence, and sensory-motor disorders, severely affecting quality of life. These disorders cause significant productivity losses and impose a heavy financial burden on national healthcare systems (Huang et al., 2023; Moitra et al., 2023). For example, neurological disorders are a significant health concern both globally and in Latin America. Approximately 3.4 billion individuals worldwide (43.1% of the global population) are living with neurological conditions, making these disorders the leading cause of illness and disability (Steinmetz et al., 2021). Between 1990 and 2021, the number of disability-adjusted life-years (DALYs) increased by 18.2% (Steinmetz et al., 2021). Besides, since 1990, the absolute number of individuals worldwide living with or dying from neurological conditions has increased (WHO-PAHO news, 2024).

In Latin America, the study and treatment of brain diseases have deep historical roots dating back to pre-Hispanic times in Mexico and Peru. During the colonial period, when many Latin American countries remained Spanish colonies or had just achieved their independence, the study of the brain was linked to neurosurgery (Gómez-González & Briceño-Iragorry, 2007). While early academic associations emerged in the 20th century, scientific productivity has grown continuously, and many countries have established robust scientific communities (Galvez-Contreras et al., 2022).

The region now also faces a significant demographic shift. Life expectancy in Latin America has increased by roughly 7.5 years since 1990, reaching 72.9 years for males and 78.8 years for females (Wordometers, 2024), despite the temporary setback caused by the COVID-19 pandemic (WHO-PAHO news, 2024; Cepal, 2022). On the other hand, since 1960, the region's population growth rate has dropped by 2.5% (CELADE, 2024). At the regional level, the increase in life expectancy and the decrease in birth rate represent a significant demographic shift, characterized by a rapidly aging population. On the other hand, the composition of Latin American populations represents a mix of European, African, Amerindian, and Asian descendants, among others (Sosa et al., 2024). This unique genetic “fingerprint” requires population-specific neuroscientific research since most brain-related diseases have a degree of underlying genetic basis.

The impact of disability acquired from neurological disorders such as cerebrovascular disease and dementia is well known in Latin America and is a heavy burden on health pension systems and caregivers (Feigin et al. 2020). Regarding neurological disorders during development, the increasing detection of cognitive-behavioral disorders beginning in early childhood, as well as the prevalence of academic difficulties already at elementary school levels, demonstrates the need to identify risk factors and determinants of impact on our population (Brown and Pollitt, 1996). The interrelation of genetic, cultural, biochemical,

environmental, psychosocial, structural, and neurophysiological research is necessary to better understand learning mechanisms and to protect and enhance them. Comprehending brain function can significantly impact health policies, education, and criminal justice.

For this reason, through a process initiated in late 2019 and formalized in February 2021, Latin American scientific societies, institutions, academy of sciences, and thematic networks, agreed to organize and coordinate their efforts to advance Brain sciences in Latin America and to foster a regional, interdisciplinary approach to brain research. This initiative is expected to create spaces for societal reflection on the changes required to further strengthen and accelerate progress in the field. It was with this intention that the Latin American Brain Initiative (LATBrain) was created. LATBrain brings together academic and non-academic organizations and institutions interested in developing brain science in the region with the purpose of facilitating the dissemination of new knowledge about the prevention, treatment, and cure of brain disorders, and promoting new technologies as well as changes in education, culture, economy, and other areas of life in society (www.latbrain.com). Other regions of the world have already understood the opportunities offered by this type of research, and Latin America is joining this great challenge, seeking to be a protagonist for brain health.

Despite this rich expertise, scientific investment in the region remains critically low. Most countries allocate less than 1% of their Gross Domestic Product (GDP) to Research and Development (R&D), far below the global average of 2.4% (OCDE, 2024). For instance, while Brazil leads with 1.15%, Chile (0.33%), Mexico (0.22%), and Colombia (reaching a historic low of 0.15% in 2025) lag significantly behind. This chronic underfunding constrains productivity, limits access to cutting-edge technology and fuels a sustained “brain drain” of local talent (Bonilla, 2025; Else, 2017).

International organizations such as the International Brain Research Organization (IBRO), the European Molecular Biology Organization (EMBO), the Grass Foundation, and Chan Zuckerberg, among others, have been crucial in supporting brain research in Latin America. Programs like the IBRO Mini-Series and Return Home Fellowships provide training opportunities abroad and facilitate technology transfer and scientific exchange (Salles, 2023). However, disparities persist in access to funding, networking, and career advancement, particularly for young researchers (Corsi-Zuelli, 2025) and women in neuroscience (Silva et al., 2021).

Latin America must take decisive action to accelerate the development of brain sciences in the region. To support the development of a strategic regional plan, we conducted the first comprehensive survey to assess researchers' and professionals' perceptions of the current state and structural challenges in the brain sciences in Latin America. This report details the results and conclusions of that assessment.

Methods

Survey

The LATBrain survey was developed as a strategic instrument using Google Forms, with contributions from representative members of the LATBrain initiative. It focused on gathering demographic and professional data from individuals in academic and non-academic sectors across Latin America, capturing their perceptions regarding regional strengths and systemic needs.

The survey was conducted between May 19, 2022, and December 18, 2023, and disseminated through specialized mailing lists of national and regional brain-related associations. Eligibility was verified

independently by two researchers according to the following inclusion criteria: respondents were (1) required to reside in Latin America or the Caribbean and (2) directly involved in brain science research, promotion, study, or policymaking related to brain sciences in the region. Brain sciences were defined as disciplines that investigate aspects of brain function, either directly or through interdisciplinary approaches (e.g., clinical neuroscience, neurophysiology, computational neuroscience, cognitive neuroscience, behavioral neuroscience, etc.).

Although the total population of individuals directly engaged in brain research, promotion, or advocacy in the region is unknown, we estimated, based on the number of researchers per country and the number of researchers and students represented in FALAN (~4000), that it ranges from 5,500 to 6,500. That range considers that, although most brain scientists are affiliated to neuroscience societies, there are also researchers doing brain research that are associated with others scientific or professional societies. Assuming a 95% confidence level and a 5% margin of error, we consider the sample size ($n = 341$) adequate for a perception-based landscape assessment.

The survey was designed to minimize ethically sensitive or compromising responses, and full access to the dataset was restricted to five authors responsible for data analysis. Given the opinion-based nature of the survey and the absence of personal or sensitive information, formal approval from an ethics committee was not required. All datasets were anonymized prior to analysis, and no additional sensitive information was requested from participants.

No duplicate responses were detected. Missing data were minimal and not imputed. For certain items, respondents selected “I do not know”; these responses were excluded from the final tables and figures.

The survey was structured into six sections. The first section focused on collecting demographic and professional data of the targeted audience, including questions about the country of work, the highest academic level attained, the primary position within Brain sciences, and the specific sub-discipline. The second section was designed to provide information about the research lines of respondents and the techniques they are proficient in. The third section focused on identifying the research group’s needs and limitations in training, technology, and infrastructure, as well as issues related to supply acquisition, funding, and geographic location. The fourth section explored the perceptions of respondents about the strengths and limitations of the Brain sciences in the country of work, as well as the human resource training, technology, infrastructure, and economic support available for research. The fifth and sixth sections focused on obtaining the respondents’ opinions on regional needs and limitations, including the need for training researchers in specific areas, cooperation, the incorporation of innovation and technology (neurotechnology), priority topics, and areas of social interest. An optional space was provided for additional comments where respondents could provide suggestions or feedback on the development of Brain sciences in Latin America (Table 1).

LATBrain survey employed a mixed-methods approach, combining quantitative and qualitative methodologies to gather comprehensive insights. Data obtained from quantitative variables were expressed in percentages or counts.

Qualitative analysis

The qualitative component focused on the analysis of four open-ended survey questions: (1) strengths of research groups, (2) needs of research groups, (3) strengths of countries in neuroscience, and (4) needs or limitations of countries in this field. A thematic analysis approach was applied following an inductive, data-driven strategy (Clarke and Braun, 2016). All responses were first read in full to achieve familiarization with the content. Initial codes were generated based on recurring ideas and expressions present in the data, and these codes were subsequently grouped into broader semantic themes through iterative comparison and refinement. Responses were classified into four analytical categories corresponding to the survey questions: group-level

Table 1
Structure of the survey.

Category	Survey Question
General and demographic information	<ul style="list-style-type: none"> • Email Address • Name of Researcher • Country of Work • Region • Highest Academic Level Achieved • Current Position in Brain Sciences • Age Range • Gender
Research focus and expertise	<ul style="list-style-type: none"> • Subdisciplines in Brain Sciences • Research Lines • Techniques Mastered
Strengths and needs	<ul style="list-style-type: none"> • Strengths of the Research Group • Needs of the Research Group (training, technology, infrastructure) • Challenges in Funding, Supplies and Collaboration
National context	<ul style="list-style-type: none"> • Strengths of Neuroscience in the Country • Needs and Limitations in Research Infrastructure, Technology and Training
Strategic priorities	<ul style="list-style-type: none"> • Areas for Research needed to be prioritized (e.g. Neurodegenerative Diseases and Translational Research)
Training and innovation	<ul style="list-style-type: none"> • Topics of Public Interest in Neuroscience • Specific Areas for Researcher Training in Latin America • Importance of Neurotechnology and Proposed Areas for Innovation

strengths, group-level needs, country-level strengths, and country-level needs. Each response could contribute to more than one theme. Regarding missing data, only responses provided for each open-ended question were included in the thematic analysis for that question category. When a participant did not answer a given open-ended question, that response was treated as absent for all themes corresponding to that category and coded as zero, reflecting the lack of content associated with any theme.

Two independent coders performed the thematic coding of the responses. Inter-rater agreement was assessed using the Prevalence and Bias Adjusted Kappa (PABAK; Byrt et al., 1993), due to low prevalence on binary codes, as seen in this study ($M = 14.8\%$). Overall agreement observed was 84.3% (PABAK = 0.69), indicating substantial agreement between coders. No qualitative analysis software was used; instead, Microsoft Excel was employed to code responses into thematic categories. Discrepancies were resolved through discussion and consensus between the two coders until agreement was reached.

For each question category, the frequency of each theme was calculated by dividing the number of responses reflecting that theme by the total number of valid responses to that question. This approach allowed comparison of the relative prominence of themes across levels (group vs. country) and types of perception (strengths vs. needs).

Potential sources of bias include voluntary participation, self-selection of respondents, and unequal representation across countries. These factors may influence the generalizability of the qualitative findings and should be considered when interpreting the results. Graphs were generated using Microsoft Excel (version 16.94) and Google Spreadsheet.

Results

General information of respondents

A total of 341 individuals (50.9% female and 49.1% male) related to brain research from different Latin American and Caribbean countries, completed the survey. The first section, designed to gather demographic information about the respondents, showed that the following age groups: 18–24 years (2.7%), 25–34 years (17.4%), 35–44 years (27.5%), 45–54 years (24%), 55–64 years (20.4%), 65 and older (8%). When

examining the highest academic qualifications held by the participants, 60.2% had a Doctor of Philosophy (PhD) degree, 9.7% held a medical doctor (MD) degree, 22.1% were graduate students, and 7.6% were undergraduate students. Concerning the current position at the moment of the survey, 71% were researchers in basic sciences, 19.4% were clinical investigators, 5% were both clinical and basic investigators, 3.8% were identified in other positions, and 0.9% were members of a civil association (Table 2).

Research focus and expertise

The survey revealed that the most prevalent research areas among the survey respondents were “Central Nervous System Disorders” (27.9%), “Cognition and Behavior” (27.5%), and “Neural Excitability” (14.5%) (Fig. 1).

The techniques highlighted by the researchers in their groups included “Behavioral testing”, “Histology”, “Molecular biology”, “Neurobiochemistry”, and “Electrophysiology” (Fig. 2).

Strategic priorities and public interest

In this section, 49% of responses indicated the following areas should be strategic priorities for their country: “Neurodegenerative and Psychiatric disorders”, “Neurodevelopment”, “Public policies”, “Education in brain health”, “Cognition and Behavior” (Fig. 3).

The topics most frequently identified by respondents as being of public interest in the Brain sciences were “Neurodegenerative disorders” (18.9%), “Psychiatric disorders” (11.6%), “Other pathologies of the Central Nervous System” (11%), “Cognition, Behavior and Behavioral disorders” (8.5%), “Neurodevelopment” (6.7%), “Neuroeducation” (5.42%) and “Addictions” (4.6%) (Fig. 4).

Training, innovation and national context

The training of human resources in the Brain sciences was considered

Table 2
General and demographic information of the respondents.

Category		%	% Male	% Female
Country of work	México	24.3	57.8	42.2
	Argentina	20.2	46.4	53.6
	Brazil	11.1	50.0	50.0
	Cuba	10.9	45.9	54.1
	Costa Rica	9.7	48.5	51.5
	Colombia	7.3	44.0	56.0
	Uruguay	6.9	69.6	30.4
	Chile	5.3	66.7	33.3
	Panamá	0.9	0	100
	Paraguay	0.9	66.6	33.3
	Perú	0.9	100	0
	Honduras	0.6	100	0
	Bolivia	0.6	0	100
República Dominicana	0.6	0	100	
Highest academic level achieved	Bachelor’s Degree	7.6	46.2	53.8
	Master’s Degree	22.1	45.3	54.7
	Doctor of Philosophy (PhD)	60.3	49.3	50.7
	Doctor of Medicine (MD)	9.7	66.7	33.3
Current position in Brain Sciences	Member of a Civil Association	0.9	66.7	33.3
	Clinical Researcher	19.4	57.6	42.4
	Basic Sciences Researcher	71.0	45.0	55.0
	Clinical & Basic Science Researcher	5.0	76.5	23.5
	Other	3.8	53.8	46.2

Values are expressed in percentage of the total of respondents.

excellent and good (24% and 50% respectively) by the respondents. In addition, 59.61% absolutely agree that there is a need to train researchers in specific areas such as “Cerebral health and disease” (25%), “Basic sciences” (19.4%), “Translational neuroscience” (7.79%), “Social problems” (6.9%), Bioinformatics and methods for analysis of signals and images (6.57%), Neurodevelopment (6.25), Development of technology (5.59%), Cognition and behavior (4.6%), Neuroeducation (3.28%), Multidisciplinary activities (1.64%) and Aging (1.64%). Besides, 11.18% indicated that the support is needed across all areas related to Brain science (Fig. 5). When asked specifically about their satisfaction with technology, 77% of respondents absolutely agree and 21% agree on the need to incorporate new technology into Brain sciences. The main reasons to incorporate new technology were “to study and treat mental disorders”, “to be more competitive” and “to obtain new research possibilities”. To facilitate the integration of this technology, several actions were proposed, “training courses”, “regional cooperation”, “research funding for exchanges”, and “reduced costs for its access”. When asked specifically about their satisfaction with the infrastructure and funding, only 3% and 35% considered that the infrastructure in their countries was excellent or good, respectively. 33.7% of respondents indicated the necessity of funding to carry out brain research. Consistently, just 1% and 12% considered that funding support in their countries was excellent or good respectively.

Thematic analysis of perceptions of strengths and needs in neuroscience in Latin America

Thematic analysis of the open-ended responses identified seven themes that represent the most frequently cited areas of strength or need in Brain Sciences across Latin America. *Logistics and Standardization* refer to processes and strategies for managing scientific work, fostering growth, and achieving long-term sustainability through standardized methodologies and cohesive planning. *Training and Education* encompasses opportunities for professional development, including academic programs, workshops, and expert-led seminars to enhance researchers' skills and knowledge. *Infrastructure and Laboratories* involve availability and quality of physical spaces, technological equipment, and specialized facilities necessary for research. *Financing and Economic Resources* covers economic support mechanisms such as scholarships, grants, and subsidies for research activities. *Collaboration and Networks* refer to partnerships and collaborative efforts within local and international scientific communities. Finally, *Human Resources* involves the availability and expertise of researchers, including both technical and interpersonal skills. The theme *Specific to a Group/Country* refers to responses that describe unique features of a particular research group or country. These include aspects that are not generalizable to the region but instead reflect specific technologies, research traditions, scientific specializations, or local conditions. Due to its heterogeneous nature, this theme was not included in the comparative analysis across question categories, as its content did not allow for consistent comparison across groups and countries.

In addition to these seven themes, a set of country-specific needs emerged exclusively in the analysis of national-level challenges. These included concerns related to limited job opportunities, the centralization of research resources in major cities, insufficient time available for research due to competing responsibilities, brain drain resulting from lack of reintegration mechanisms, and persistent difficulties in communicating the societal relevance of science. While these themes were not comparable across all analytical categories, they provide important context for understanding the structural challenges that impact neuroscience development in the region.

At the group level, corresponding to the *group-strengths* question category, the two most frequently mentioned strengths were *Collaboration and Networks* (32%), reflecting research groups' ability to establish strong partnerships and engage in effective collaborative initiatives, and *Human Resources* (24%), which highlights the availability and expertise

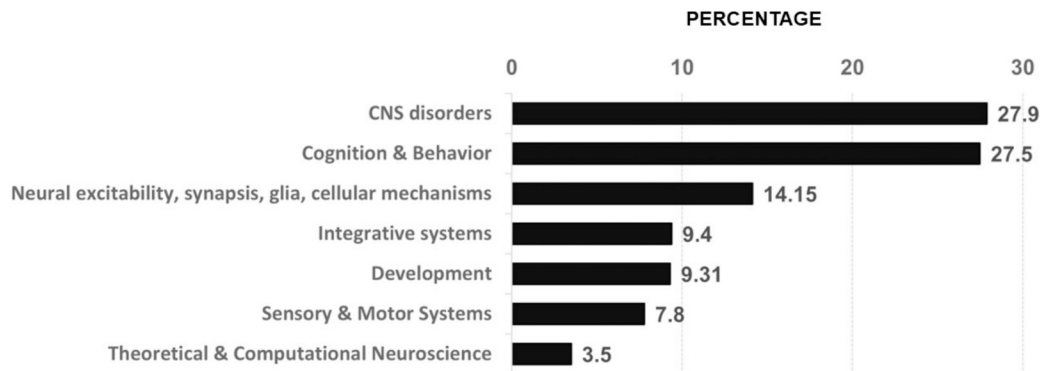


Fig. 1. Research lines of the surveys respondents. Values are expressed in percentage.

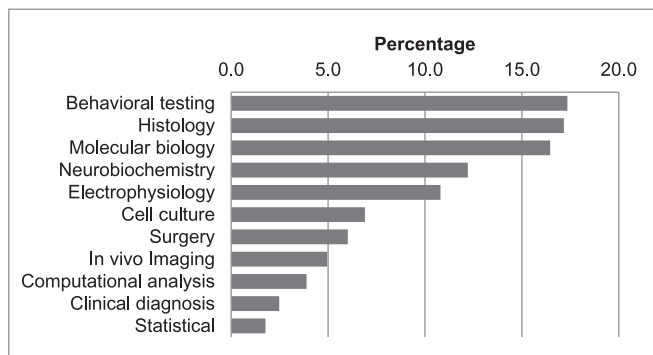


Fig. 2. Techniques mastered and highlighted by Latin American groups involved in brain research.

of researchers with both technical and interpersonal skills. Conversely, the most prominent weaknesses, captured through the *group-needs* question category, were *Infrastructure and Laboratories* (52%), with frequent references to outdated equipment and inadequate facilities, and *Financing and Economic Resources* (25%), which underscores the lack of sufficient funding to support research activities and acquire necessary resources. Full distributions of all themes across question categories are

presented in Table 3.

Training and Education played a dual role, cited both as a strength (22%) and a need (22%) at the group level. Some groups identified it as a strength due to access to academic programs, workshops, and professional development opportunities, often obtained outside the Latin American region. Others highlighted it as a weakness, pointing to limited access to specialized training, advanced techniques, and interaction with international experts. This dual perception reflects disparities in training opportunities across groups and emphasizes the need to ensure equitable capacity-building in the region. A comparison graph contrasting strengths and needs at the group level can be found in Fig. 6.

At the country level, corresponding to the *country-strengths* question category, the three most frequently reported strengths were *Human Resources* (55%), emphasizing the presence of highly skilled researchers and a solid academic foundation; *Collaboration and Networks* (20%), reflecting the capacity to establish regional and international scientific partnerships; and *Training and Education* (19%), associated with established educational programs and specific capacity-building efforts. Conversely, the main weaknesses, identified through the *country-needs* question category, were *Financing and Economic Resources* (48%), highlighting widespread concerns regarding insufficient research funding and infrastructure; *Infrastructure and Laboratories* (30%), pointing to significant gaps in access to modern facilities and equipment; and *Logistics and Standardization* (10%), referring to challenges in national-

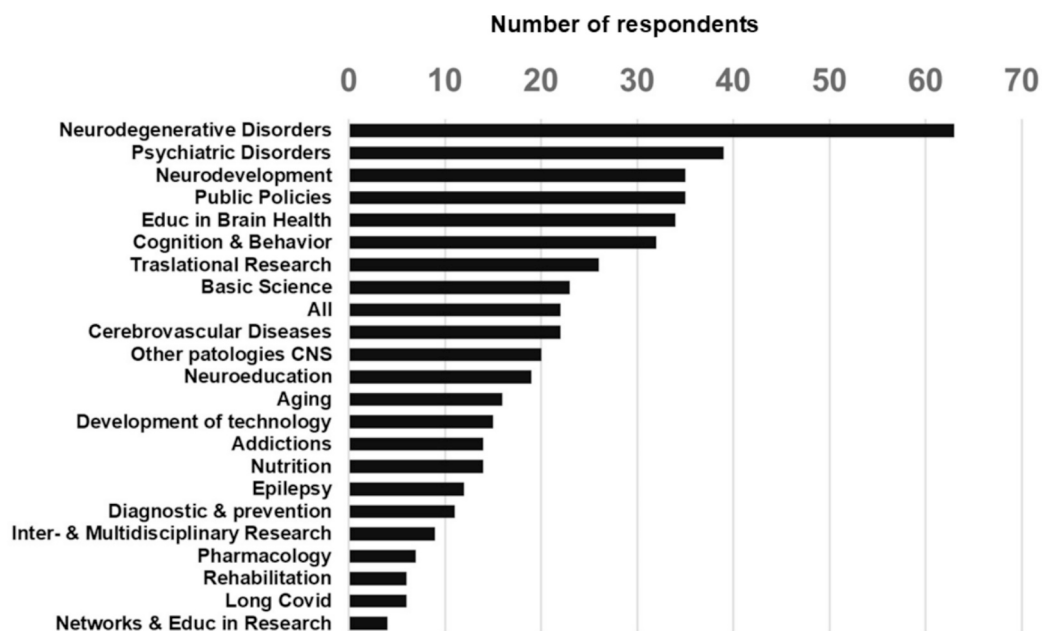


Fig. 3. Number of respondents indicating areas that should be strategic priorities in brain science in the country of work.

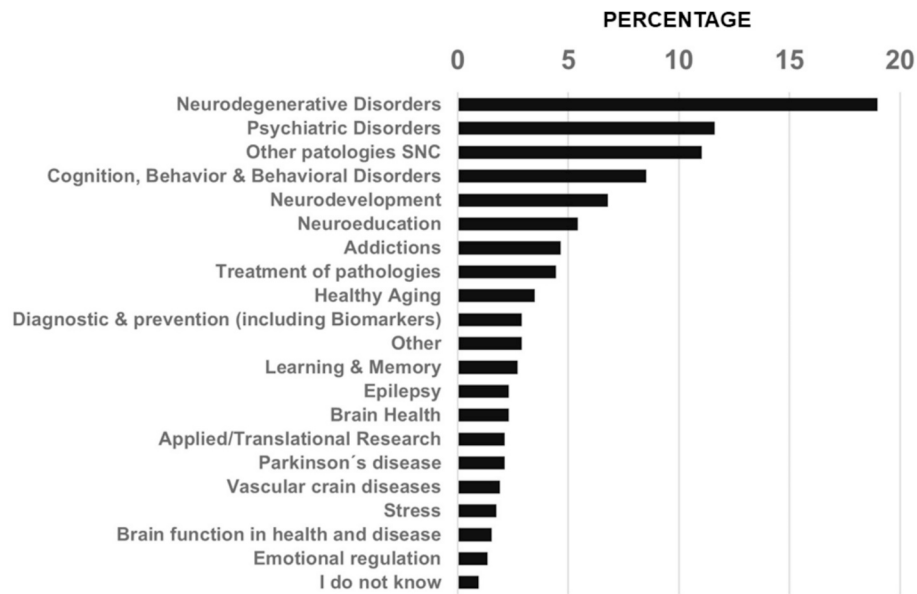


Fig. 4. Perceptions of respondents about topics of public interest in the Brain sciences. Values are expressed as percentage.

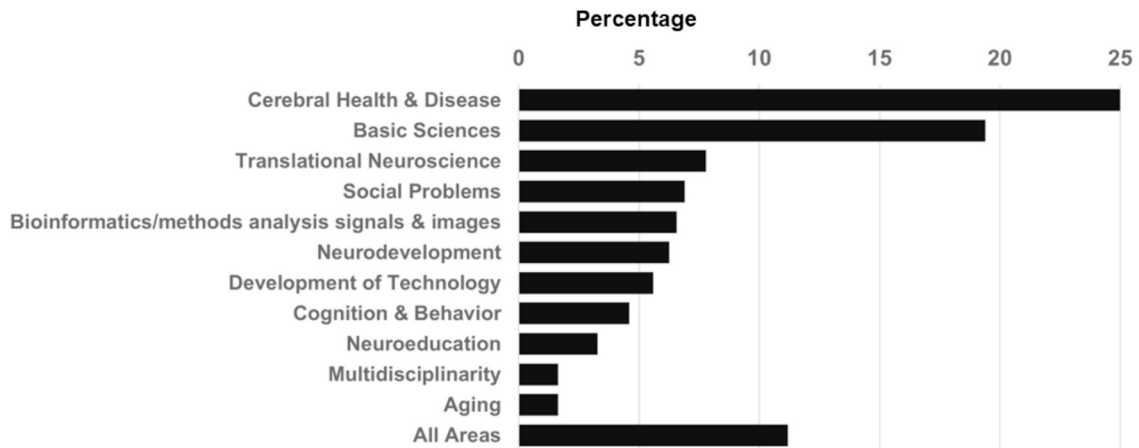


Fig. 5. Perceptions of respondents about areas to train researchers in Latin America. Values are expressed in percentage.

level coordination, long-term planning, and the adoption of standardized research practices. A comparison graph contrasting strengths and needs at the country's level can be found in Fig. 7.

In addition to these six overarching themes, several country-specific needs emerged exclusively at the national level. While not directly comparable across group/country levels or strengths/needs categories, these provide important contextual insights into structural challenges affecting neuroscience in the region. *Job Opportunities* (8%) were described as scarce, limiting young researchers' ability to build stable careers: "Few job positions exist to reintegrate specialized talent in the field." *Centralization* (5%) was flagged as a systemic issue, with most resources and research centers concentrated in a few large cities, leaving regional and rural institutions underfunded and underserved. *Time Dedication of Researchers* (4%) was another concern, as high teaching workloads and financial instability often forced researchers to divide their time. As one participant noted, "Researchers must split their time between multiple institutions to complement their income, leaving little time for research." *Brain Drain* (1%) was also mentioned, with researchers trained abroad often unable or unwilling to return due to insufficient opportunities and infrastructure. Finally, *Communicating the Importance of Science* (1%) was cited as a persistent challenge: "Science is not considered a priority in public policy or media coverage,"

underscoring the need for greater science advocacy and public engagement.

Discussion

The present study provides the first large-scale, mixed-methods assessment of the status, strengths, and challenges of brain sciences in Latin America, offering a comprehensive regional perspective that integrates quantitative indicators with qualitative thematic analysis. The data obtained underscore relevant issues, including the need for financial investment, fostering local neurotechnology development, regional cooperation, and building interdisciplinary research networks and education.

Research priorities, public interest, and benefits to society

Important efforts have been carried out by Latin American neuroscientists to understand the pathophysiology of common brain disorders such as neurodegenerative diseases, addictions, and mental health problems, translating the findings from preclinical models to clinical studies (Torres-Berrio et al., 2018). The present survey supports the idea that, at present, a high percentage of neuroscientists from the region

Table 3
Thematic frequencies across group- and country-level responses.

Response category by question	Theme	n	AT	Valid (%)
Group-strength	Specific Strengths of the Group	293	132	45%
	Logistics and Standardization	292	51	17%
	Training and Education	296	65	22%
	Infrastructure and Laboratories	296	15	5%
	Financing and Economic Resources	296	6	2%
	Collaboration and Networks	296	96	32%
	Human Resources	296	70	24%
Group-need	Specific Needs of the Group	280	84	30%
	Logistics and Standardization	279	31	11%
	Training and Education	283	62	22%
	Infrastructure and Laboratories	285	149	52%
	Financing and Economic Resources	285	70	25%
	Collaboration and Networks	285	19	7%
	Specialization and Human Resources	285	33	12%
Country-strength	Specific Strengths of the Country	290	51	18%
	Logistics and National Standardization	289	16	6%
	Training and Education	290	56	19%
	Infrastructure and Laboratories	290	33	11%
	Financing and Economic Resources	290	18	6%
	Collaboration and Networks	290	57	20%
	Specialization and Human Resources	290	159	55%
Country-need	Specific Needs of the Country	279	23	8%
	Logistics and Standardization	280	28	10%
	Training and Education	323	38	12%
	Infrastructure and Laboratories	323	96	30%
	Financing and Economic Resources	323	155	48%
	Collaboration and Networks	323	42	13%
	Specialization and Human Resources	323	19	6%
	*Job Opportunities	287	24	8%
	*Time Dedication of Researchers	287	11	4%
	*Brain Drain	287	4	1%
	*Communicating the Importance of Science	287	3	1%
	*Centralization	287	15	5%

n = number of valid responses for each question category. Non-responses were excluded from the analysis; AT = Number of open-ended responses assigned to the theme. Themes marked with an asterisk emerged exclusively in responses to the country-needs question category.

focus their research on brain disorders, cognition, and behavior. The survey also indicates that the respondents consider that their interest in research mostly agrees with the public interest, that they consider is the need for Brain sciences to focus more on relevant topics related to diseases and solving social problems (e.g. neurodegenerative and psychiatric disorders) supported by a strong fundamental science. Even though most respondents worked in fundamental or basic neuroscience, they are aware of the necessity of training and education on topics related to brain health and disease in a more interdisciplinary way, specifically with better integration and communication between basic and clinical research.

Structural challenges and policy implications

The analysis of the information collected indicates that respondents also agree that a high academic level represents the most important

strength of their countries, showing that Latin America has a strong scientific community on which to continue building science and to contribute to current challenges and those of the coming decades. The evidence indicates that Latin America produces high-quality neuroscience research and is significant, in terms of total publications (similar to Oceania, Eastern, or the Middle East; see Scimago Lab Countries Publications). However, the total numbers are significantly lower than in Western Europe, the USA, Canada, or small countries from Asia (e.g. Japan). Considering its total population, it should represent a much larger number. Respondents recognized the region's creativity and motivation, attributes contributing to a vibrant research environment despite limited resources. Indeed, the outstanding contributions of young Latin American researchers are recognized by international organizations such as IBRO (Salles, 2023). Young Latin American neuroscientists must be considered as the future human resources to improve Brain research in the region. However, the respondents recognize the need for actions focused on research and training to resolve brain disorders.

However, one of the biggest concerns among professionals in brain science in Latin America is the lack of stable research funding, which hinders large-scale studies and scientists' access to necessary equipment and materials. There is indeed a documented sustained growth and high-quality scientific productivity in Latin American neuroscience despite persistent funding limitations (Forero et al., 2020; Hurtado-Parrado et al., 2020). This lack of resources impedes training students in modern techniques, which is crucial to keeping up with global advancements. Access to new and advanced technology must no longer be a limitation on the development of brain science in the region. Higher investment in science would also increase the number of scientists (also reducing brain drain) in Latin America, which is also one of the limitations to increasing its contribution of knowledge to the world.

Comparative context: Latin America and global brain research initiatives

A critical comparison with other world regions reveals pronounced asymmetries in funding, infrastructure, and technological capacity. Major global brain research initiatives such as the International Brain Initiative (IBI), the European Human Brain Project, and the Chinese Brain Project benefit from sustained public investments typically exceeding 2–3% of GDP, enabling the development of centralized infrastructure platforms, large-scale technology programs, and long-term interdisciplinary research agendas. In contrast, most Latin American countries invest less than 1% of GDP in R&D, creating structural constraints that directly limit experimental scope, technological innovation, and workforce stability.

Despite these disadvantages, Latin America demonstrates remarkable scientific resilience. Respondents of this survey and international scientific leaders consistently highlighted the high academic quality, creativity, and collaborative abilities of Latin American scientists, suggesting that human capital represents a major comparative advantage for the region. This combination of limited resources and high scientific potential implies that targeted investments in brain research could yield high returns, both in the scientific impact and societal benefits.

Regional literature over the last decade supports these findings and reveals a paradoxical landscape. While scientific productivity in neuroscience has increased, the discipline remains structurally fragmented and lacks a unified regional policy framework (Ciocca and Delgado, 2017; Forero et al., 2020; Pasquini et al., 2026). Unlike prior analyses primarily focused on publication outputs, our present survey provides novel insights into the underlying systemic challenges and perceived strategic priorities, thereby offering actionable evidence to guide science policy and institutional decision-making. Avoiding the definition of research agendas by external funding cycles or international societies and strengthening sovereign regional priorities.

The results also support previous studies that emphasize the importance of regional cooperation, interdisciplinary research, technology

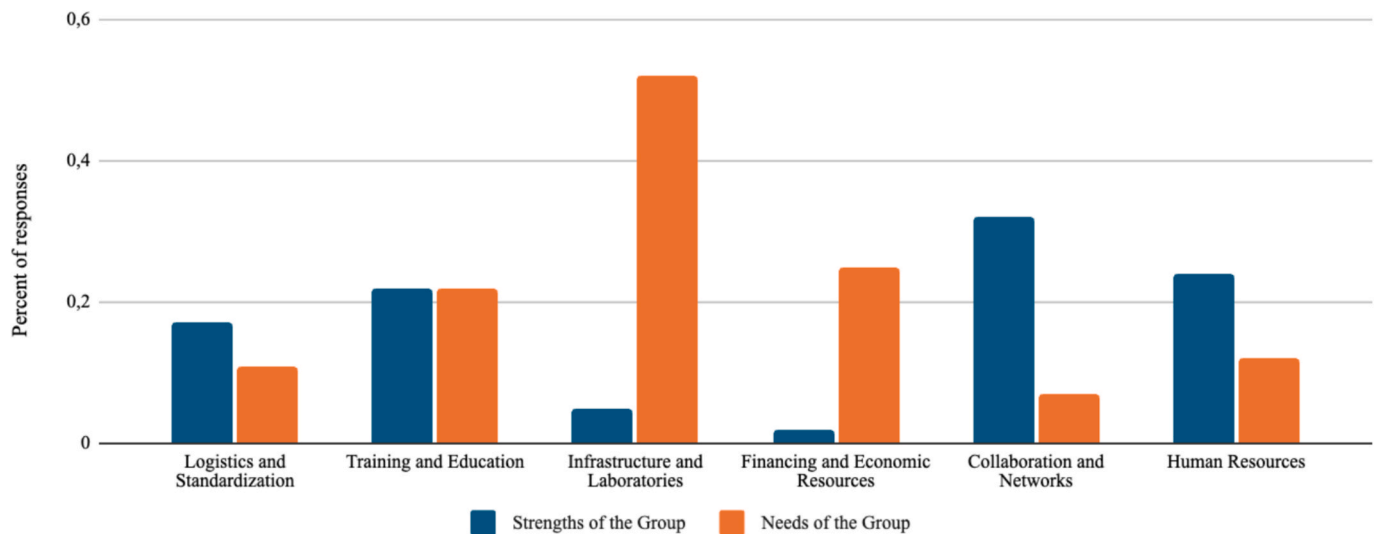


Fig. 6. Comparison of strengths and needs by theme at the group level.

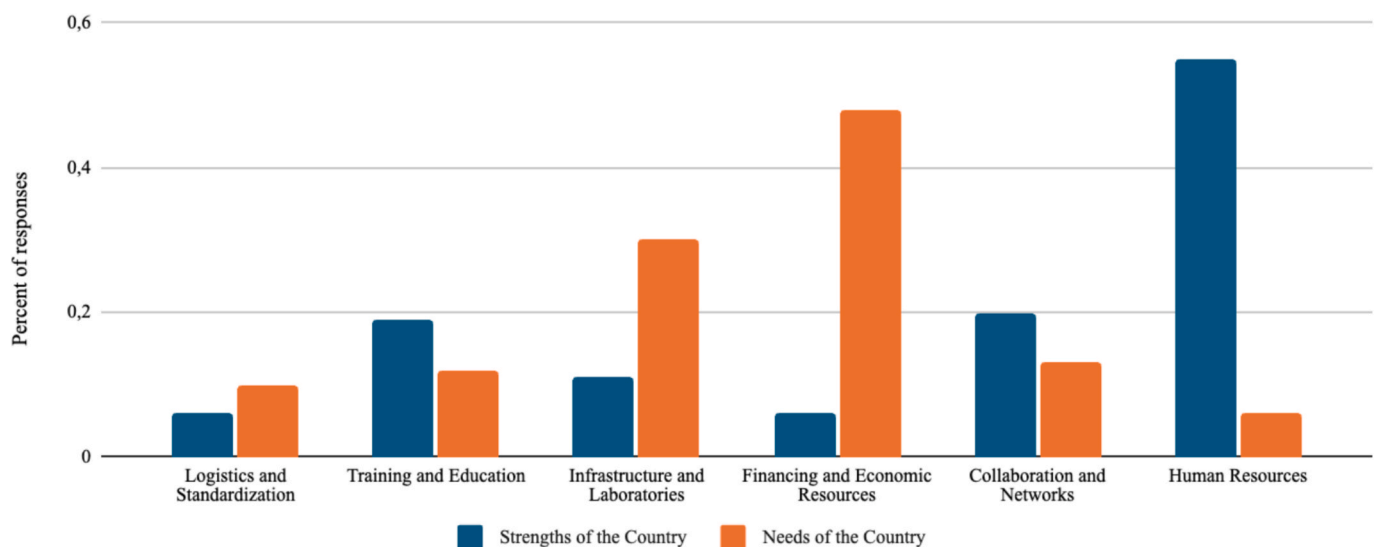


Fig. 7. Comparison of strengths and needs by theme at the country level.

development, translational research, and investment in science, addressing brain drain to improve and consolidate brain research in Latin America (Forero et al., 2020; Bonilla, 2025). Actions to increase integration and collaboration, the establishment of regional networks with an interdisciplinary vision, and increased access to patients and collaboration with the health system are needed to foster brain science in Latin America.

It is important to consider that brain research in Latin America can be fragmented due to the limited number of effective collaboration networks. The formation and reinforcement of scientific networks promoted by initiatives such as LATBrain can open new opportunities for the region. Indeed, there are successful Latin American consortia focused on multidisciplinary innovation and translational impact with the vision of promoting local ideas in a panorama of global networks and obtaining opportunities from the actual condition of the region (Ibanez et al., 2021).

Unique regional opportunities

Latin America has unique genetic diversity and socio-environmental resources, specific risk factors to mental disorders, and large populations

of families showing brain diseases (Fonseca et al., 2021; Quiroz et al., 2025). It also has attractive and exclusive conditions worldwide such as natural models useful to study brain disorders like the *Proechimys guyannensis*, a rodent resistant to develop epilepsy (Sanabria et al., 2020) as well as ancient culture in traditional medicine (Pedersen and Baruffati, 1985). Latin America represents an important region for research with opportunities to contribute to the global scientific community and advance knowledge about the brain (Galvez-Contreras et al., 2022).

It is also evident that the region can solidify its position as a global leader by reducing funding gaps for brain sciences, enhancing access to technology and developing it at the local level, improving training and increasing number of researchers, and increasing within region and international collaboration in science. LATBrain has a strategic plan (www.latbrain.com) to advance Brain sciences in Latin America, which is already having a significant impact in the region. Some of our immediate challenges include establishing conversations with partner companies, governmental and non-governmental organization, and funding agencies in the different countries to raise awareness of our challenges and opportunities and work together to advance Brain sciences in the region.

In this study, our primary objective was to identify strengths,

opportunities, and challenges for brain sciences in Latin America and the Caribbean, rather than to test differences within subregions. Analyses focused on regional variation or other kinds of comparisons will be addressed in future surveys designed specifically to examine how perceptions of brain-science development differ across the region and how they evolve over time. That said, several findings were sufficiently robust that, although small regional differences were observed (data not shown), they did not alter the overall conclusions but made them stronger in some cases. Besides, we want to note that even though there were many coincidences in group vs countries' needs and weaknesses, some responses (e.g., greater concerns about funding of science for the country than for their own group) show that respondents were thinking about the common interest of developing brain sciences in the region more than in their own groups.

Limitations

This study had some limitations. A key limitation was using a Google Forms survey that can generate self-selection bias and social desirability bias. Although the recruitment strategy of open dissemination through academic networks could have limited the representativeness of the sample, regional participation (North, Central, and South America) was broadly proportional to the distribution of researchers across these areas.

One limitation of the present study was the heterogenous distribution of the participants across countries and the low number of respondents in some countries. For example, we must note that participation from Brazil was lower than expected, reducing south America contribution to the survey. Another limitation is the data collection using a non-probability sampling method. Although this procedure is appropriate for pilot studies, it limits generalizability and lack of representativeness throughout the region. It is evident from the necessity of future studies to validate the results obtained. However, as previously mentioned, some of the results are very compelling and clearly indicate the most important challenges faced by the region.

This study contributes to advancing Brain Sciences in Latin America, as it represents the first systematic effort to map the needs, strengths, and challenges of the field across the region. The findings consolidate a shared vision among Latin American neuroscientists and lay the groundwork for evidence-based strategies to foster regional collaboration, improve funding, and strengthen scientific training. By identifying both the obstacles and the unique opportunities that Latin America offers to the global neuroscience community, this survey serves as a foundation for future initiatives, such as those promoted by LATBrain, aimed at positioning the region as a significant contributor to brain research worldwide.

CRedit authorship contribution statement

Luis Aguilar: Writing – original draft, Formal analysis. **Juan E. Belforte:** Writing – original draft, Formal analysis, Data curation. **Newton Canteras:** Formal analysis, Data curation. **Fernando P. Cardenas:** Writing – original draft, Formal analysis. **María Carreira:** Writing – original draft, Formal analysis. **Zulma Dueñas:** Writing – original draft, Methodology. **Juan F. Montiel:** Writing – original draft, Formal analysis, Data curation. **María Pertusa:** Writing – original draft, Formal analysis. **Alberto Javier Ramos:** . **Laura V. Sánchez-Vincitore:** Writing – original draft, Formal analysis. **Roberto Rodríguez-Labrada:** Formal analysis. **Daniel E. Olazábal:** Writing – original draft, Formal analysis, Conceptualization. **Luisa Rocha:** Writing – original draft, Supervision, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.neuroscience.2026.05.006>.

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