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University experiences of students and graduates with neurodiversity: tools for creating a specialized mentoring program related to working life

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Introduction: The term neurodiversity encompasses a range of conditions, including autism, attention deficit and hyperactivity disorder, dyslexia, and dyscalculia. In higher education, students with these conditions often face barriers that hinder their optimal academic performance. These barriers stem from their specific needs and institutional requirements. This situation can also negatively impact their ability to transition into the workforce. Therefore, it is necessary to design strategies that ensure specialized support for this population, guided by the opinions of neurodiverse students. The objective of this study is to identify the needs, difficulties, and tools related to the transition into the workforce, as reported by neurodiverse students and graduates from the bachelor's degree in psychology program, who present some conditions of neurodiversity.

Methods: For this purpose, a qualitative/phenomenological research was carried out.

Results: The gathered opinions revealed that the main needs of students include the following: increased awareness and capacity within higher education institutions for timely diagnosis, the implementation of reasonable adjustments for better integration into their activities, provision of supportive environments, the development of strategies to enhance cognitive and emotional aspects, such as planning skills, time management, and emotional regulation skills.

Discussion: The results of this study are consistent with other studies that emphasize the importance of creating a compassionate pedagogy in educational settings. This involves a greater commitment from educators to address and improve pedagogical practices, provide necessary tools, and develop strategies to help students with neurodiversity conditions throughout their careers. The limitations of this study include the small sample size and restricted depth of the interviews. Therefore, future research should increase the number of participants and explore the interviews in greater depth.

KEYWORDS

neurodiversity, higher education, learning, specialized tutoring, work life

Introduction

The present study is part of a doctoral research project, which is a component of the macro project "Enabling Students with Neurodiversity (ENTENDER)," focused on neurodiversity. This project is a collaboration of different universities worldwide and is funded by the European Union through ERASMUS, with the aim of supporting education, training, and sport.

The term NDD and its conceptualization have emerged in recent years as part of a movement advocating for the visibility and rights of people with autism [known as autism spectrum disorder (ASD)]. This movement aims to redefine various neurodevelopmental disorders, which consequently recognizes neurological entities as natural variations in human diversity, akin to differences in cultures, races, or genders (Armstrong, 2012). It refers to the atypical clinical presentations of individuals of this collective, seeking their acceptance in society and treatment similar to that provided to neurotypical people (Singer, 1998; Armstrong, 2011). The neurodiversity paradigm, along with the social model of disability, promotes an approach focused on the wellbeing and depathologization of people with autism, which leads to their full acceptance and inclusion (Walker, 2021). Other conditions such as learning disorders (dyslexia and dysgraphia), attention deficit hyperactivity disorder (ADHD), and Tourette syndrome have been added to the category of neurodiversity (Clouder et al., 2020).

According to the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-5-TR; American Psychiatry Association, 2022), the estimated prevalence of some of the conditions classified under the concept of neurodiversity is as follows: Autism is prevalent in 1% of the child and adult population, ADHD is observed in 5% of the child population and 2.5% of the adult population, and specific learning disorders such as dyslexia or dyscalculia are present in 4% of the adult population.

In higher education (HE), there has been a gradual increase in the number of students with some conditions of neurodiversity. These students have a basically normal intelligence quotient (IQ) and exhibit different styles of learning, cognition, and socialization. These nuerodiverse students are generally functional, highly competitive, and autonomous and perform well academically throughout their university journey without setbacks. However, some students may face adaptation problems and drop out of school without completing their HE, posing a challenge for teachers and educational institutions (Clouder et al., 2020).

While neurodiversity and its associated conditions, as well as educational achievements at higher levels, have been studied in the United States, Australia, the United Kingdom, and Spain, there is a notable lack of empirical research on neurodiversity in Latin America. Amador Fierros et al. (2021) noted that this gap in research evidences a lack of knowledge and an absence of proposals because the concept is still being adopted in Spanish-speaking countries. In this context, it is observed that the diagnosis of learning disabilities often occurs late, typically after students present low academic performance in HE, along with adaptive and emotional problems (Schulte et al., 2017).

On the other hand, students with ASD may face challenges when transitioning from high school to HE. In such cases, making small adjustments in their learning approach, such as engaging in short summer programs, receiving tutoring, and undergoing curriculum review, can be greatly beneficial (Hotez et al., 2018). This approach known as, "transition planning," may also positively affect and support students transition from education to the workplace (Wei et al., 2016; Schulte et al., 2017).

Considering the above discussion, establishing effective university tutoring practices during a student's academic career is essential. Lara (2009) defined tutoring as the process of personal and academic support throughout a student's formative process aimed at improving academic performance, addressing school problems, and developing study habits, work skills, reflection, and social coexistence. For this purpose, it seeks to accompany students throughout their university education to ensure successful completion. Considering the tutoring program is generally designed for neurotypical students, in this project, we gather the opinions of neurodiverse students on their specific needs and tools necessary for them to incorporate into working life. This information will subsequently help us design a specialized tutoring program. Implementing good practices in HE facilitates better awareness and understanding of neurodiversity among students, teachers, and administrative staff.

After reviewing different specialized databases such as EBSCO, Google Scholar, and Proquest using keywords which include "design, tutoring, program, for neurodiverse students," it was found that there were minimal relevant studies and none specifically addressing this topic. This finding confirms that there is a lack of scientific evidence on designing tutoring programs that consider the individual characteristics of neurodiverse students. It is essential to understand the tools and support that neurodiverse students require to improve their autonomy, functionality, and social interaction, which result in enhanced quality of life, both academically and socially (Gavranic Solari, 2014). It also serves as a resource to support their smooth transition into working life.

To achieve this support, it is necessary to understand the needs and difficulties faced by neurodiverse students when entering the labor market by listening to their experiences and feelings. Therefore, the following research question was posed in this study: What are the needs, difficulties, and tools related to the experiences of transition into working life, as reported by students and graduates with neurodiversity from the Bachelor's Degree in Psychology program?

This study aimed to identify the needs, difficulties, and tools related to the transition into working life as reported by neurodiverse students and graduates from the Bachelor's Degree in Psychology program who present some conditions of neurodiversity.

Materials and methods

Type of study: qualitative/phenomenological

Phenomenological qualitative research emphasizes the individual's subjective experience and aims to identify and understand the meanings that people give to their experiences. It involves interpreting how individuals define their world and act accordingly. In essence, it is about seeing the world through

TABLE 1 Description of the research sample based on gender, neurodiversity status, type of participant, and age.

Participant no.	Genre	Neurodiversity condition	Type of participant	Age
1	Male	ADHD	EG-POS	28
2	Female	Dyslexia and ADHD	PR-EG	21
3	Male	Autism	EG-POS	34
4	Male	ADHD	PR-EG	21
5	Male	ADHD	EG-LAB	38
6	Female	Autism	EG-LAB	41

EG-POS, Graduates studying a postgraduate degree; PR-EG, Students about to graduate; EG-LAB, Graduates currently working.

the eyes of other people through description, understanding, and interpretation.

Ortiz (2014) proposed a series of elements necessary to conduct this type of study, which were used in our research:

- Selection of the case study (population with neurodiversity conditions).
- Bibliographic documentation.
- Identification of potential subjects to be studied (students and graduates with neurodiversity).
- Generation of strategies for accessing the case study.
- Identification of key informants (participants).
- Design of an approximate schedule.
- Planning of available resources (economic, human, temporal, and technical).
- Consideration of ethical aspects (interviewees sign the letter of informed consent, which emphasizes the protection of personal data and the use of data for academic and research purposes only).

Type of sampling and participants: design of planned actions (methods)

A non-probability sampling method was utilized, by convenience (Otzen and Manterola, 2022).

The sample consisted of six participants, who were contacted using the "snowball" method, which involves creating a social network by identifying a first participant with the characteristics determined according to the objectives of the study, i.e., from the contact data provided by other participants (Blanco and Castro, 2007).

The participants presented the following characteristics: two participants were in their last semester of the Bachelor's Degree in Psychology and were about to graduate (PR-EG), two graduated the Bachelor's Degree in Psychology and were pursuing graduate studies (EG-POS), and two participants were working psychologists (EG-LAB). Among the different neurodiversity conditions, the participants exhibited ADHD, autism, and dyslexia (see Table 1).

Instruments

Before conducting the study, a letter of informed consent was distributed among the participants and their signatures were collected. The letter provided information on the following aspects:

- Brief description of the concept of neurodiversity,
- The objective and procedure of the project, and
- Ethical and legal aspects related to the handling of the information obtained.

Guide for conducting the in-depth interview

A guide is an instrument designed to conduct in-depth interviews with students and graduates of the Bachelor's Degree in Psychology who present some conditions of neurodiversity. It consists of 15 trigger questions for collecting information about their experiences in relation to the needs, tools, and difficulties, as well as overall experiences related to their transition into working life.

Procedure

After the participants were contacted, the interviews were scheduled by agreeing upon the date, time, and place. The interviews were recorded and subsequently transcribed using a tool called Google Colab, which serves as an environment for data analysis. This tool provided an Application Programming Interface (API) of ChatGPT called Whisper for transcribing audio to text using artificial intelligence.

The following commands were entered into the API for the transcription of the interviews:

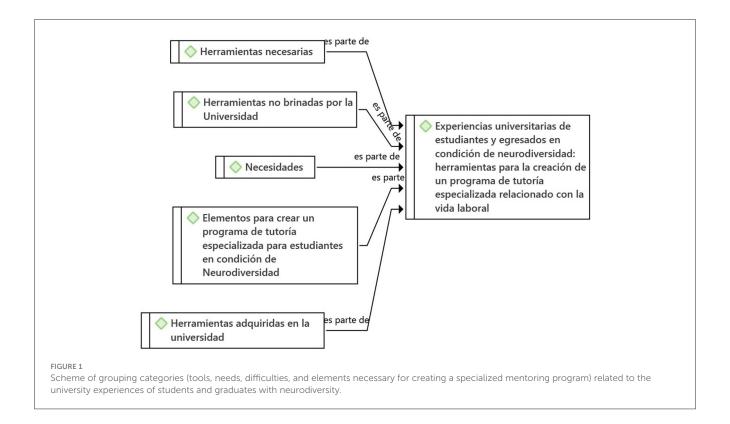
- To install Whisper on the remote server: "pip install U openai-whisper."
- To provide the necessary elements for the proper execution of Whisper: "pip install git+https://github.com/openai/whisper. git."
- To give the transcription command to the program: "Whisper audio.mp3 –model medium."

In addition, it was necessary to upload the audio files to the Google Colab environment for Whisper to access them. Once the files were uploaded, the audio file name was changed from "audio.mp3" to "entrevista.mp3."

Based on the opinions gathered, the content obtained from the in-depth interviews was analyzed by each participant using Atlas.ti Version 23.

Results

The responses to the interviews were in Spanish. The findings of the present study based on the responses, organized according to the objectives of the study, are presented below.



Five categories emerged from the analysis

- 1. Tools needed to enter the workforce.
- 2. Tools acquired at the university.
- 3. Tools that were not provided by the university.
- 4. Specific needs according to each neurodiversity condition.
- 5. Elements needed to create a specialized mentoring program.

Figure 1 shows the results from the categorization of the responses in relation to the tools, needs, difficulties, and elements necessary to create a specialized tutoring program for students who present some conditions of neurodiversity to aid their transition into working life.

For easy reading and understanding of the results, each of the categories and codes resulting from the analysis of the interviews (qualitative analysis) are described below.

Qualitative analysis

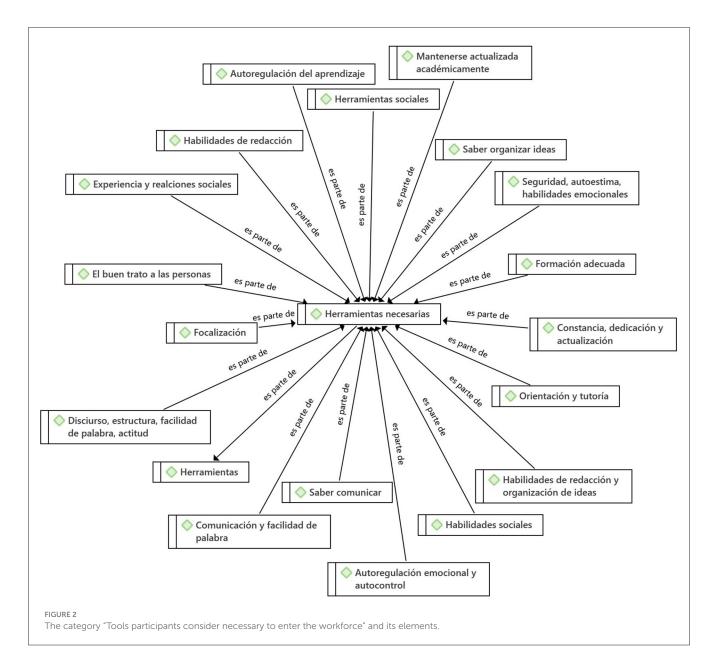
Category 1: tools the participants consider necessary to enter the workforce

As tools necessary to enter the workforce, participants highlighted self-regulation of learning, practical experiences, social relations, and social skills as being essential. Participants stated as follows: "I would think of an experience that supports you, secondly to make contacts. This is precisely the part that is difficult for me since I do not like to interact" (DC). "I think that for people with neurodivergence, to have tools such as self-regulation of learning, since they range from planning to emotional" (AC).

"I feel that having adequate training in whatever it is you want to work, besides having social tools in any job, is something indispensable to be able to communicate what you really want to communicate, to know how to organize your ideas, and, depending on the profession, also to make a good writing, since it is used for a diversity of things, like elaborating a trade" (AM). "Right now I am making an effort, a lot of effort not to go off on a completely different topic, sometimes I forget what I am talking about, that I go off on such a tangent that I say, hey wait, but why am I telling you this? for example right now, it was about tools, the tools, I think that ADD itself helps me, because my personality is more hyperactive" (US). "Constancy, dedication, daily consultation, these are elements that I can see. Yes, yes, I feel that they have helped me to fit this profile, maybe in other areas I would not know how to say it." (FL). "Ease of speech, eloquence, an elaborated, structured speech, then, that convinces people a lot and clearly a very own security, speaking from non-verbal language, an erect back, addressing properly, articulating well, then I feel that those skills are the ones that can be found in people who are going to hire you for a certain position" (HO).

The participants also emphasized the importance of having a reliable support through the tutoring process. "I had a good tutor, teacher Martha, a very good tutor in the degree; she asked me to be her tutor, she told me, I see this potential, you come here, she introduced me to several people and she guided me and gave me techniques and strategies, for example, techniques to write and to organize my ideas" (US).

Figure 2 shows the category "Tools participants consider necessary to enter the workforce" and its elements.

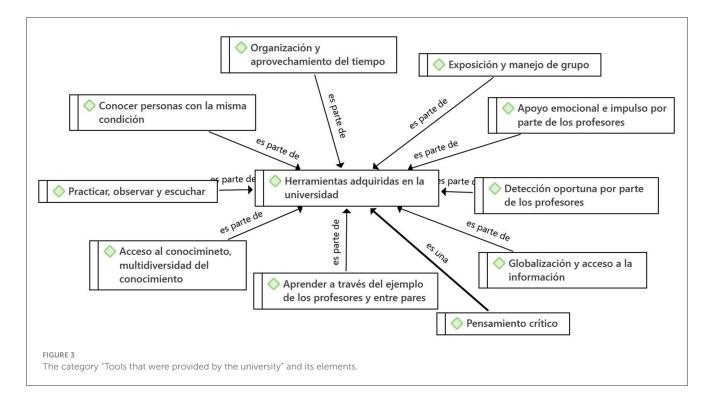


Category 2: tools that are provided by the university

Regarding the tools that are provided by the university, the main responses that the participants provided highlighted the opportunity that the university provided them to meet and interact with other people with the same condition, as well as the access to global knowledge. The participants stated as follows: "First of all globalization, access to public information... To meet other profiles similar and even with greater difficulty than mine and in that sense the University also gave me that. I think it developed in me critical thinking, very important because in this way you can evaluate the information you are receiving and for me for example, for different jobs there were things I did not learn, for different jobs there were things that I did not learn directly in school, but these tools, such as critical thinking, information search, helped me to find texts about a specific activity that I had to develop or a situation in the job that I wanted to solve, even with computer programs" (AC).

In this section, they also highlighted the importance of teachers noticing the difficulties that neurodiverse students face and making the necessary modifications or adaptations to provide the required support, termed as reasonable accommodations. In addition, they highlighted the importance of emotional support. Participants stated as follows: "They also identified some of them as these barriers that I had and they supported me and not even individually, but they did it as a group. For example, I had a great evaluation teacher who identified some deficiencies in the writing of our reports, and one day he supported us in a class with adjustments in writing and spelling. I think my teachers have always been present and have been really supportive, if I talked to them about some difficulty they did their best to incorporate me and make adjustments, considering that I did not feel less or that I did not feel less capable" (AM).

The participants referred to aspects related to organization and time management: "What happened? I made my schedule and I



would arrive, hey, I have an average of 98 and I am working and look, I made this mess of my schedule because sometimes I had it very messed up. Then, at the coordination office because of my average, because I was working, because of my socioeconomic situation, they would tell me, well we are going to help you, we are going to take this one, we are going to put that one and they would help me to organize myself. The fifth semester is coming, Ulises is coming, and already, they would say, hey, you need advice to organize your schedule, no, Simon, at what time are you going to work? No, because now I am going to work in the morning, ok, so the options in the afternoon are these, which one suits you, so I needed this kind of support and they helped me a lot to provide me with that" (US).

The participants also emphasized the importance of tools such as communication and expression in front of a group, as well as study strategies: "A great ability in front of the group and to be able to manage a presentation, but it is very different the way I used to express prior to entering the degree now that I can stand in a group of 50 people and that there is total or majority control of the group management then I feel that the University has helped me a lot to potentiate tools that I already had, one helped me to recognize them and two is helping me a lot to potentiate them, Then I feel that the University has helped me a lot to potentiate tools that I already had. The University has polished my ways of how I acquire that knowledge because previously I could only develop in a single format, I tell you, my previous way of acquiring knowledge was to underline, summarize and machete, machete, machete. I have realized that sometimes with a single concept and with key words I can completely develop a questionnaire or completely develop a review. So it is something very important, because they have also helped us with different graphic organizers, so when it comes to synthesizing information I no longer feel overwhelmed that I have to make a 40-page summary, now I only have to make a 40-page concept map" (HO).

They emphasized the importance of learning by example and collaborating with peers. The participants stated as follows: "it gave me much more than I expected, because I was formed with what my teachers taught me from their model, from how they came to the classroom, from what they saw as motivation to give, to share, even their own lack of motivation, it also taught me many things and I learned a lot with my classmates and my peers" (FL).

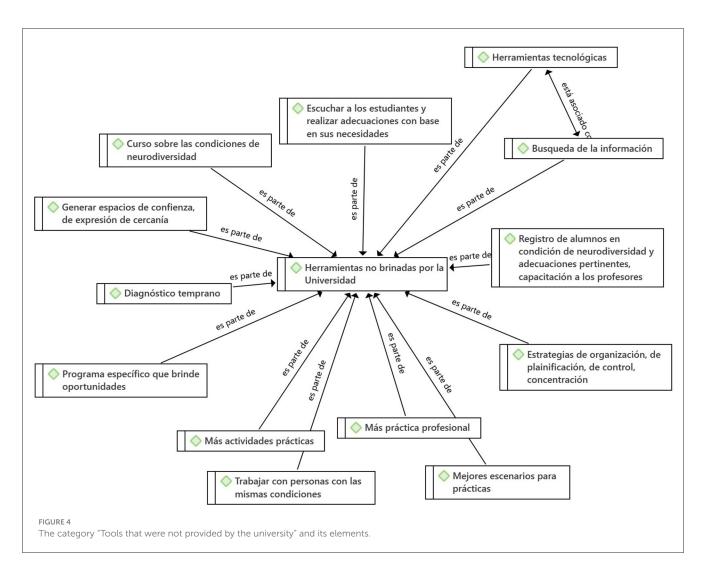
Figure 3 shows the category "Tools that are provided by the university" and its elements.

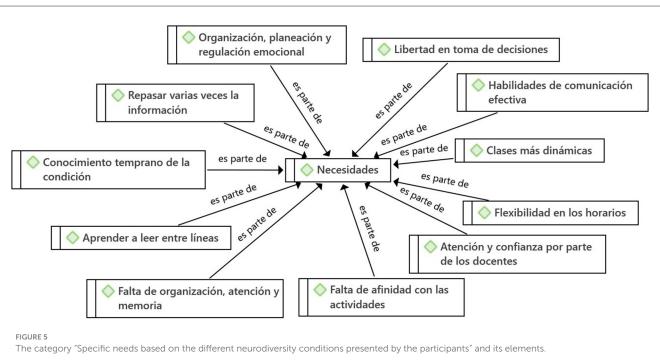
Category 3: tools that are not provided by the university

The participants highlighted technological tools as the ones not provided by the university. "Technological tools that facilitate the organization of school activities, or in general. For example, knowing that you can organize an activity into smaller tasks, some visual aids to have important dates always in sight." They emphasized the lack of an early diagnosis: "I would think that an early diagnosis would have made my life easier."

The participants mentioned the possibility of implementing a specific program that provides more opportunities for students with neurodiversity, as well as strategies to help them in organizing, planning, and focusing on their activities: "You know, these types of strategies for organization, planning, control of the environment to be able to concentrate and do work are what I think are missing to be explored at the university."

Figure 4 shows the category "Tools that are not provided by the university" and its elements.





Category 4: specific needs based on the different neurodiversity conditions presented by the participants

In their responses in relation to specific needs, the participants highlighted flexibility in their schedules. "There are very normative jobs that are watching the schedules a lot: how long you last in the bathroom, how long it takes to go for a glass of water, that kind of thing for people with neurodivergence, in my case, it is very frustrating because they are things that you start to worry about." The participants also mentioned the need to know about their condition early: "I am thinking that well I do not know, they inform us what the disorder is, what the limitations are and beyond labeling us, they tell us: well, you have this condition, this can be difficult, it would be good for you to interact with people similar to you and also why not? Work on that part of loneliness. That feeling of, I am strange or curious, I am hostile, I don't like to approach people, I better stay away, in that sense, it would have been easier to know what was going on." Some participants highlighted the need for teachers to be sensitive to their condition and their specific needs as well as the need for classes to be more dynamic: "I mainly feel that psychology is one of the careers that require a lot of reading, and that they are requested from 1 day to the next, to be able to have the openness and confidence to tell my teachers and to have support, to be listened to, and with respect to attention, to have a dynamic class, that also helps me a lot, particularly because of the stimulus factors and it is very difficult to be in a 2-h class trying to pay full attention and in reality there are at least 6 h in school every day, so that is also a challenge to face."

Figure 5 shows the category "Specific needs based on the different neurodiversity conditions presented by the participants" and its elements.

Category 5: elements for creating a specialized mentoring program

The participants mentioned that it is necessary to incorporate elements related to communication strategies in workshops: "workshops or courses for verbal expression toward people, that is, to know how to communicate properly and know how to organize ideas, how to speak in public and communication skills, as a workshop. I would think that also as the interaction part, because sometimes it is even difficult for us to be tactful. These are things that may sound very basic, but for someone with, for example, my condition, I had to literally train it. Sometimes it still happens to me, they say good morning or something and I don't know how to answer, that is, I do answer but I get introjective in a very unnecessary way. For example, they tell me: how was your day, and I answer: well this happened, this happened, and this happened, and the person just wanted to say hello." They also mentioned that it is important to implement tools for the elaboration of tasks, attention and concentration, organization and planning, as well as emotional regulation: "I think one of the main ones is emotional regulation. Strategies to regulate oneself emotionally, that personal problems also influence work. Also this question of structure: learning strategies to facilitate tasks, dividing them into smaller parts, established schedules for breaks."

Furthermore, participants emphasized writing techniques and strategies: "For me in particular, support in writing, since a lot of our professional work is reports, documents, writings, so I feel that support in that part would help me a lot in my working life."

Figure 6 shows the category "Elements for creating a specialized mentoring program" and its elements.

Discussion

The primary objective of this study was to analyze the needs, tools, and difficulties associated with the transition into working life of neurodiverse students who are undergraduate students at the University Center of Health Sciences, University of Guadalajara.

The study identified a series of elements that provided a comprehensive view of the needs of graduates with neurodiversity entering the labor market.

Similarly, at the methodological level, this research allowed us to develop a well-structured procedure to identify the needs and tools required by neurodiverse graduates, the procedures and elements necessary for specialized tutoring programs, and the difficulties that graduates face while transitioning into working life.

The findings of this study are consistent with the proposals of Hamilton and Petty (2023), who highlight the importance of generating a compassionate pedagogy in educational settings. Compassionate pedagogy involves educators' commitment to improving pedagogical practices, thereby providing tools and generating strategies to help neurodiverse students throughout their education. The study highlights two fundamental aspects that were reflected in the opinions collected: institutional flexibility in processes and the importance of considering students' opinions, as reflected in the main objective of this study.

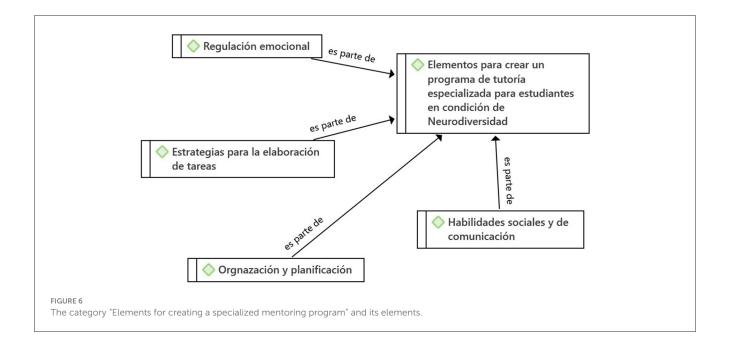
The impact of this study is significant, considering the percentage of neurodiverse students in higher education institutions in Mexico and globally.

In terms of public policies, this study contributes to the review and eventual restructuring of public policies related to the education sector, particularly for neurodiverse students requiring support, accompaniment, and attention for their specific needs.

For educational institutions that have not developed specific actions to address neurodiversity, this study serves as a valuable resource.

The following strategies are suggested for higher education institutions to develop and sustain a specialized tutoring program based on the needs identified in this study.

- 1. Program design: containing modules that address the following demands and needs: emotional regulation, techniques and tools for homework development, communication strategies, social skills improvement, and organization and planning strategies.
- 2. Elaboration of a schedule of activities and development of each module to align the activities with the stages of a tutoring program: entry, trajectory, and exit.
- Establishment of goals, agreements, and rules for the program operation.
- 4. Program evaluation and follow-up.
- Institutionalization of the specialized tutoring program within the framework of an educational inclusion policy applicable at all levels of education.



Limitations

This study has certain limitations. The sample size was small; therefore, future research involving a larger number of participants would help obtain the opinion of individuals with different neurodiverse conditions from various educational institutions. In addition, the depth of the interviews was limited, so further inquiry into the specific needs associated with each condition is recommended.

Conclusion

Tutoring is an indispensable process in higher education, not only as a normative practice but also as a fundamental activity during the training of students. It is also a right of students, which favors their development both individually and as a group and is an essential aspect of educational quality. Tutoring involves all actors within an institution; in this case, HE, specifically teachers and students, is involved (Martínez Clares et al., 2020).

This study identified that students with neurodiversity conditions have specific needs that can be addressed through a specialized tutoring process.

Therefore, it is essential to consider such opinions in the development of specialized tutoring programs to meet the academic and administrative needs of students who present some neurodiversity conditions.

This research results identified that the primary needs and tools for neurodiverse students focus on the awareness and capacity of higher education institutions to identify students with neurodiversity conditions in a timely manner. It is necessary to create strategies to enhance cognitive and emotional skills, including planning skills, time management, and emotional regulation skills. In addition, communication,

writing and interaction skills and the use of technological tools are fundamental needs in the academic journey of students with neurodiversity conditions.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Comité de ética del Centro Universitario de Ciencias de la Salud. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

GA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. CM: Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing. TV-C: Conceptualization, Methodology, Writing – review & editing. MV: Conceptualization, Methodology, Writing – review & editing, Data curation, Formal analysis, Investigation, Resources, Supervision, Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

that could be construed as a potential conflict of interest.

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