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Evaluation of the impact of international academic exchanges on 113 medical students' academic successes and satisfaction at Université Paris Cité Medical school

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Abstract

Purpose: International mobility is a unique opportunity for medical students to discover new healthcare systems, improve their autonomy, and broaden their medical knowledge. However, concerns about academic achievement have led to fewer academic exchanges in medicine than in other fields. Each year, 40-50 students (out of 800) at Université Paris Cité Medical School (UPC) participate in international academic exchange programs. In this study, we examined the relationship between long-term academic exchanges and students' academic performance, career choices, and satisfaction.

Methods: We included UPC students who had completed an academic exchange abroad (Erasmus+ program) for at least one semester between 2016 and 2021 ("Erasmus students"). Their grades on faculty exams before and after their departure were compared to those of their peers ("UPC students"). Their final French national ranking exam (NRE) results were compared to those of UPC students and nationwide. A survey was used to assess their subjective feedback.

Results: A total of 113 Erasmus students were included in the study. Of those students, 92.3% completed their international mobility during their third year, and 81.4% completed it for a full academic year. Additionally, 56.2% were in the top two quartiles of their cohort before leaving, and 73.3% were in the top two quartiles the year after returning. From 2021 to 2023, 81 Erasmus students took the NRE. They performed significantly better than the national cohort (median rank: 2,535 vs. 4,502 in 2022; $p < 10^{-3}$) and better than UPC students, though not significantly (median rank: 2,535 vs. 3,502 in 2021; $p = 0.058$). Nearly all Erasmus students (96%) were satisfied with their experience, and 84% were satisfied with their grades and subsequent career choices.

Conclusion: Erasmus students reported very positive feedback about their stay abroad and performed at least as well as their peers academically, if not better. This suggests that the international exchange did not negatively impact their academic achievements. These results should encourage both students and medical schools to increase international academic exchanges during the medical curriculum.

Practice Points

- Medical students benefit from international exchange programs, which offer opportunities to explore different healthcare systems, develop autonomy and expand medical knowledge.
- However, concerns about academic achievement can lead to fewer academic exchanges.
- Erasmus students performed at least as well as their peers academically, if not better.
- Almost all Erasmus students (96%) were satisfied with their international experience.

INTRODUCTION

The Erasmus program, short for the **E**u**R**opean **A**ction **S**cheme for the **M**obility of **U**niversity **S**tudents, was created in 1987. It is named after Desiderius Erasmus, a renowned Dutch theologian (1466-1536).

Starting with 3,000 students in 1987, the program enabled the mobility of over 649,000 participants across 33 countries in 2021. Nearly 41,000 French students participated in 2016/2017. Since 2014, the program has been called Erasmus+. In 2021, it had a total budget of €2.9 billion. It allows students to spend up to 12 months studying abroad at any level. Since 2020, the European Union has set a goal for 20% of higher education graduates to benefit from transnational mobility.

Few studies focus on Erasmus exchanges for medical students. Three previous reports listed the advantages of international mobility that were most frequently highlighted by health students. These advantages include personal development, increased self-reliance and confidence, new experiences, learning foreign languages and cultures, meeting new people, living outside one's country, improved employment prospects, and independence (1–3). Several factors were identified as possibly deterring students from studying abroad: lack of foreign language skills, separation from family and friends while studying abroad, and costs (4).

Compared to other academic fields, academic exchanges during undergraduate medical training are relatively rare. Yet, more medical students benefit from clinical experiences abroad, usually clinical electives, also known as international health electives (IHEs). These short-term exchanges (lasting from one week to three months) typically only include clinical rotations, so students do not participate in academic classes or exams. A systematic literature review of IHEs conducted from 1990 to 2009 found that IHE experiences contributed to better training for medical students, who reported greater cultural competence (5). A more recent article on German medical students showed that the mean duration of an IHE was eight weeks (6).

To our knowledge, no study has assessed the success of long-term academic Erasmus programs in medicine apart from these works, which only evaluated IHEs. In particular, there is no objective data comparing the results of students who participated in an international academic exchange program with those of their peers. Students and professors may fear that, despite their own benefits, IHEs could jeopardize academic performance at a student's home university. Curriculums differ from one country to the next, so students may not receive the full curriculum usually taught at their home institution. Thus, such data is crucial for evaluating the potential impact of these international academic exchanges on students' academic success and for developing international program strategies for our medical schools.

Created in March 2019, Université Paris Cité (UPC) is the result of the merger of Université Paris Descartes and Université Paris Diderot, both of which had medical schools. The new medical school is now the largest in Europe with 25,000 students and approximately 800 new students entering medical studies each year. The two former medical schools both had dynamic international programs, including academic Erasmus exchanges and IHEs. Prior to the pandemic, 150–220 students participated in a summer IHE (lasting up to two months), and 40–50 students enrolled in an academic exchange program (lasting four to ten months), primarily through the Erasmus program. Since restrictions due to the pandemic ended, exchanges have resumed and finally reached similar numbers in 2023–24. However,

only 5 to 10% of medical students participate in an international program at least once during their six-year curriculum. By contrast, 25% of medical students in Norway participate in international mobility programs, and the goal is to increase this number to 50% in the coming years (https://eurydice.eacea.ec.europa.eu/national-education-systems/norway/mobility-higher-education).

Our aim was to evaluate the impact of international academic exchanges during undergraduate medical studies. We did so objectively by comparing grades at the national and university levels and subjectively. Due to the size of our medical school and the large number of students who have engaged in academic exchanges since 2017, we conducted a retrospective and participatory study. We compared students' scores on faculty exams before and after their exchange, as well as their ranks on the online National Ranking Exam (NRE) at the beginning of the sixth year. We compared these results to those of their peers from UPC and at the national level. Additionally, we contacted all students to complete a satisfaction survey about their exchange program and its personal and professional impact on their career choices.

METHODS

Inclusion criteria: Students from the UPC Medical School who participated in an international academic exchange program through the Erasmus+ program ("Erasmus students") between September 2017 and July 2021 were included. All Erasmus students were emailed to inform them about the study and to confirm that they did not object to the anonymous use of their academic scores. They were also invited to complete an online questionnaire, which was developed for this study (see supplementary S1).

Objectives:

1) Evaluation of the grades of Erasmus students compared to their peers from the same cohort who did not participate in an Erasmus exchange (referred to as "UPC students," excluding Erasmus students) at faculty exams and the National Resident Exam (NRE).

2) Evaluation of their personal experience through an online survey.

To homogenize the data, we compared success rates before and after the Erasmus mobility program, but only for the 105/113 students who participated in the program during their third year.

Data collection:

We collected

- Grades obtained at faculty exams the year before and after the Erasmus mobility. Grades obtained at faculty exams by the full cohort. The students in the cohort were separated into four quartiles according to their grades. Quartile 1 included the 25% of students with the highest grades, and quartile 4 included the 25% of students with the lowest grades. Then, Erasmus students were placed in each quartile according to their grades. To determine whether the Erasmus exchange was beneficial to their academic

performance, we compared each student's quartile between year N-1 (the year before they left for the international exchange, year two) and year N+1 (the year they returned, year four). We also evaluated whether any students failed a year, had to repeat a year, or left medical school.

- Rankings obtained at the NRE, which ranks all French medical students from the same cohort from 1 to >9000 depending on the year. We compared the ranks of the Erasmus students with those of the French medical students from the same year, as well as with those of the UPC students.

The online questionnaire was created using items adapted from two recently published articles that evaluated the satisfaction of health science students after an Erasmus mobility experience (4,7). The questionnaire consisted of single-choice questions and a Likert-type scale that allowed participants to specify their level of agreement or disagreement with a series of statements on a symmetric agree-disagree scale. To increase the survey's response rate, participants' anonymity was guaranteed.

Statistics:

Data are presented as the median (interquartile range) for quantitative variables and as the number (percentage) for qualitative variables. NRE ranks were compared using Wilcoxon's two-sample test for the following groups:

1) Erasmus students and other UPC students

2) Erasmus students and students in their final year from all other French universities (referred to as the "national cohort")

3) Other UPC students and the national cohort A two-sided p-value of less than 0.05 was considered statistically significant. All collected data were analyzed primarily using Excel (Microsoft Corporation, 2018), and all analyses were performed using R (R Foundation for Statistical Computing, Vienna, Austria).

The questionnaire used in this study was developed for this study and has not been previously published elsewhere.

Ethics approval and consent to participate

According to the Université Paris Cité Insitutional Review Board (UPCité IRB), this study does not require submission to an ethical committee under French law, as it does not involve therapeutic modifications to patient care, nor does it aim to advance specific medical or biological knowledge, and therefore falls outside the scope of the Loi Jardé (Law n° 2012-300, 5/03/2012 relative to research involving humans).

Informed consent to participate was obtained from all participants in the study, under French regulations, as confirmed by the UPCité IRB. Indeed, students were informed and had 1 month from the date of information to refuse to participate. This study is in compliance with the declaration of Helsinki.

RESULTS

Cohort description

As shown in Figure 1, 154 UPC medical students participated in an international academic program through Erasmus+ from September 2017 to July 2022. Five students were excluded from the study because they could not be informed nor object to their participation due to having no valid email. To evaluate success rates, students who took a gap year during or before medical school were excluded. A total of 113 students were included in the study (Figure 1, Table 1). Of those, 81 had taken the NRE by the time the article was written.

Of the 113 Erasmus students, 92.3% completed their international mobility during their third year (Table 2), and 81.4% completed it for the entire academic year (nine to ten months). The most popular destinations were Spain (Cádiz, Granada, Madrid, N = 36); Italy (Florence, Milan, Pavia, Rome, N = 26); Germany (Berlin, Heidelberg, N = 15); and the United Kingdom (Manchester, N = 13).

Association of Erasmus mobility with grades on faculty exams

To achieve homogenization, we compared success rates before and after the Erasmus mobility program for 105 out of 113 students who participated in the program during their third year.

Before their mobility, the vast majority of students were in the second and third quartiles out of four (the first including the cohort's top performers) (Figure 2). Only 5.7% of students were in the first quartile. After the exchange, most students remained in the second and third quartiles (85.7%), though the proportion in the first quartile doubled to 13.3%.

As shown in Figure 3, the majority of students remained in the same quartile: 61% in 2020-2021, 50% in 2019-2020, and 43% in 2018-2019. Depending on the year, between 39% and 46% of students performed better after their Erasmus exchange, gaining one or two quartiles (39% in 2020–2021, 44% in 2018–2019, and 46% in 2017–2018). A small percentage of students performed worse after their exchange (0% in 2020–2021, 6% in 2018–2019, and 11% in 2017–2018). Thus, nearly all students had similar success rates and/or performed better on faculty exams the year after their exchange than before leaving (Figure 3). Overall, only two students (out of 120) had to repeat an academic year due to insufficient academic results after the Erasmus mobility.

During the 2019-2020 academic year, we observed a different situation than in previous years. Indeed, after their mobility, students underperformed on faculty exams: 30% lost one quartile, 52% remained in the same quartile, and only 19% improved their results after returning home. However, they all had a similar success rate on the NRE (Figure 4). Interestingly, that year, students were abroad when the pandemic and lockdowns began in March 2020.

Association of Erasmus mobility with grades on National Ranking Exam (NRE)

Students who participated in an Erasmus program from September 2017 to July 2020 took their NRE at the end of their sixth year in 2021, 2022, or 2023, respectively.

Table 3 and Figure 4 show the median rank of Erasmus students, UPC students, and the national cohort (all medical students in their final year nationwide), as well as the number of students in each group. Between 2021 and 2023, 81 Erasmus students passed the NRE. They performed significantly better than the national cohort (median rank: 2,535 vs. 4,502 in 2022; $p < 10^{-3}$) and UPC students (median rank: 3,502; $p<10^{-5}$). Erasmus students performed better than UPC students each year, though not significantly (median rank: 2,535 vs. 3,502 in 2021; $p = 0.058$).

Overall, 84% were satisfied with their specialty and university choices, which they secured based on their NRE results (Table 4).

Subjective survey

The results of the survey sent to the students are summarized in Table 4 and in Supplementary Tables 1 and 2. Of the 57 students who completed the online survey (a 38% response rate), 96% were very satisfied with their Erasmus experience (54 out of 57 scored their stay a 7 or higher on a scale of 1 to 10). According to the students, the top three reasons to participate in an Erasmus exchange are (i) personal development, (ii) discovering foreign cultures, and (iii) changing their environment. Most Erasmus students (86%) would recommend that their peers experience an Erasmus academic exchange, particularly in their third year.

All answers from the online survey are available in the supplementary data. Of the 57 students who completed the survey, 30 took the opportunity to write a comment. All of these comments are extremely positive and can be found in the Supplementary Data.

DISCUSSION

In this study, we examined the impact of international academic exchanges on medical students in a large, monocentric French cohort of 113 students over four years. We found that the majority of students performed at least as well, if not better, on their final exams after their exchange than before. Additionally, three years after their Erasmus exchange, Erasmus students performed significantly better than their UPC peers and the national cohort of French students in the NRE. They also tended to perform better than their UPC peers, though this difference was not statistically significant, possibly due to a lack of power.

Regarding the subsequent matching process, the academic exchange program did not prevent Erasmus students from accessing a wide variety of specialties and universities for their residencies. Accordingly, they reported a high level of satisfaction with their final match. These results are significant because they demonstrate that an early Erasmus exchange during medical school does not hinder academic

achievement and may even improve test scores in subsequent years, despite different curricula in different countries. These results also underscore the importance of selecting students who are best suited for an academic exchange—those who are most likely to thrive and benefit from the experience.

From a subjective standpoint, the students who responded to the survey demonstrated a high level of satisfaction. Nearly 90% want to participate in another international program during or after their residency, and only 5% felt that the cost of an Erasmus program outweighed its advantages. As previously shown, our students reported that participating in an Erasmus exchange had enhanced their personal growth through transformative learning (8).

However, these results should be considered in light of the low response rate of 38%. This rate is similar to those of previous studies (1), but it may skew the results toward more enthusiastic respondents.

Several limitations should be noted. First, the monocentric nature of the study may limit its generalizability, especially since the success of an Erasmus exchange depends on the host institution, the home institution's chosen partners, differences in curricula between countries, students' language skills, and many other factors that differ from one university and country to another. Furthermore, nearly all of our students left for their Erasmus exchange during their third year. Therefore, we cannot extrapolate the outcome of leaving for Erasmus later in the medical curriculum, especially as final exams approach. Further work in different settings is needed to confirm these results.

An important note is that the findings are from the 2019-2020 academic year, which was characterized by the first wave of the pandemic. Erasmus students from the 2019/2020 academic year had a lower success rate on faculty exams after their international exchange compared to peers who stayed in France. There are probably multiple reasons for this, but living in lockdown in a foreign country far from home at the start of the pandemic may have contributed to these poor results. However, the pandemic's impact was not evident in their NRE ranking results, suggesting that they caught up and succeeded by the end of their sixth year. Nonetheless, even when taking this specific year into account, only two Erasmus students had to repeat an academic year during the four years we examined, and none stopped studying medicine. In conclusion, the Erasmus year did not negatively impact our students' academic achievements. In fact, they performed even better than before leaving, except for the 2019-20 cohort. These results encourage us to continue promoting these academic exchanges.

Thanks to a large cohort of students and academic partners across Europe, this work demonstrates that long-term academic exchanges abroad during the medical curriculum were successful for the vast majority of students, both academically and personally, despite some limitations. These limitations include the small number of respondents to the survey and its monocentric nature. We hope these results will ease students' anxiety about international experiences and convince potential partners of the positive impact of academic exchanges in medicine.

Declarations

Acknowledgements

We wish to thank the students for their participation, as well as our international academic partners across the world, without whom the Erasmus+ exchanges would not be possible.

Ethics approval and consent to participate

According to the Université Paris Cité Insitutional Review Board, this study does not require submission to an ethical committee under French law, as it does not involve therapeutic modifications to patient care, nor does it aim to advance specific medical or biological knowledge, and therefore falls outside the scope of the Loi Jardé (Law n° 2012-300, 5/03/2012 relative to research involving humans). All students were informed that their grades could be used anonymously for this work and had 1 month from the date of information to refuse to participate.

Consent for publication

All authors give their consent for publication.

Availability of data and materials

All data can be made available upon request.

Competing interests

All authors declare they have no conflict of interest.

Funding

No funding was necessary for this work

Authors' contributions

FBH wrote the main manuscript text ; YN performed the statisticacl analyses and prepared figures.

Conception and design of the work was led by VDL and FBH

MVE, SG, AFC helped with the acquisitionand interpretation of data;

JG, CL, PR and VDL have reviewed the manuscript and substantively revised it

All authors reviewed the manuscript.

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Conflict of interest statement:

All authors declare they have no conflict of interest with this publication.

According to the rules of our institution, IRB approval was not necessary as this work was designed solely for quality improvement and evaluation of UPC’s medical school international exchanges program. All analyses were conducted anonymously. Students were informed of the study and could refuse to participate.

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Tables

Table 1. Number of Erasmus students, and number of students per school year.

	2017/2018		**2018/2019**		**2019/2020**		**2020/2021**	
	Erasmus	Total cohort	Erasmus	Total cohort	Erasmus	Total cohort	Erasmus	Total cohort
Year 3	28	439	32	406	27	424	18	523
Year 4	2	442	4	405	1	390	0	400
Year 5	0		0		1		0	

Table 2. Description of the cohorts of Erasmus students.

Year of study				
	year 3			105
	year 4			7
	year 5			1
Length of stay				
	< 6 months	(4 or 5 months)		2
	6 months			19
	9 -10 months			92
Erasmus Exchange	**University name**		**Country**	**N° students**
	Freie Universität, Berlin		Germany	5
	Université Libre de Bruxelles		Belgium	1
	Semmelweis Egyetem, Budapest		Hungary	14
	Universidad de Cádiz		Spain	1
	Università degli Studi di Firenze		Italy	3
	Universidad de Granada		Spain	5
	Universität Heidelberg		Germany	10
	Universidade de Lisboa		Portugal	2
	Univerza v Ljubljani		Slovenia	3
	Universidad Complutense de Madrid		Spain	30
	University of Manchester		United-Kingdom	13
	Università degli studi di Milano		Italy	1
	Università degli Studi di Pavia		Italy	11
	Università degli Studi di Roma 'LaSapienza'		Italy	11
	Karolinska Institutet, Stockholm		Sweden	3
TOTAL				**113**

Table 3. Comparison of students' results at National Ranking Exam (NRE)

Year of NRE	Student group	Number of students	Median [IQR]	p-value	
2021	Erasmus	24	2535 [1345-3895]	p=0.0568	vs others p=0.003
	UPC	742	3502 [1577-5852]		p<0.0001
	National cohort	9027	4602 [2346-6853]		
2022	Erasmus	30	2808 [1581-4456]	p=0.145	vs others p=0.01
	UPC	757	3562 (1578-6009]		p<0.0001
	National cohort	9298	4734 (2413-7060]		
2023	Erasmus	27	3591 [1527-5750]	p=0.122	vs others p=0.0137
	UPC	877	4338 (1956-6687]		p<0.001
	National cohort	9727	4930 (2503-7353]		

p-values were calculated with pairwise Wilcoxon tests between 1) Erasmus students and other Université Paris Cité (UPC) students; 2) Erasmus students and students from other universities (national cohort); and 3) between other UPC students and the national cohort.

Table 4. Summary of answers from the online questionnaire, n=57 respondents.

TOTAL ANSWERS		N=	%
Satisfaction with the Erasmus exchange (on a scale of 1 to 10)	9 to 10	**46**	**81%**
	7 to 8	**8**	**14%**
	6	**1**	**2%**
Are you satisfied by your NRE rating	Yes	**26/31**	**84%**
If you had to give the BEST reason to experience an Erasmus exchange, that would be…	Better Career	**1**	**2%**
	Change of environment	**14**	**25%**
	Improve foreign language	**6**	**11%**
	Meet foreign cultures	**17**	**30%**
	Personal development	**19**	**33%**
Knowing the next reform of medical studies, during which final NRE is undertaken in October of the 6th year, and OSCE in May, would you still have performed an Erasmus exchange?	YES	**49**	**86%**
	NO	**6**	**11%**
	No opinion	**2**	**4%**
If yes, would you have left for Erasmus in …			
3rd year	YES	**45**	**79%**
	NO	**10**	**18%**
	No opinion	**2**	**4%**
4th year	YES	**7**	**12%**
	NO	**48**	**84%**
	No opinion	**2**	**4%**
5th year	YES	**1**	**2%**
	NO	**54**	**95%**
	No opinion	**2**	**4%**

Figures

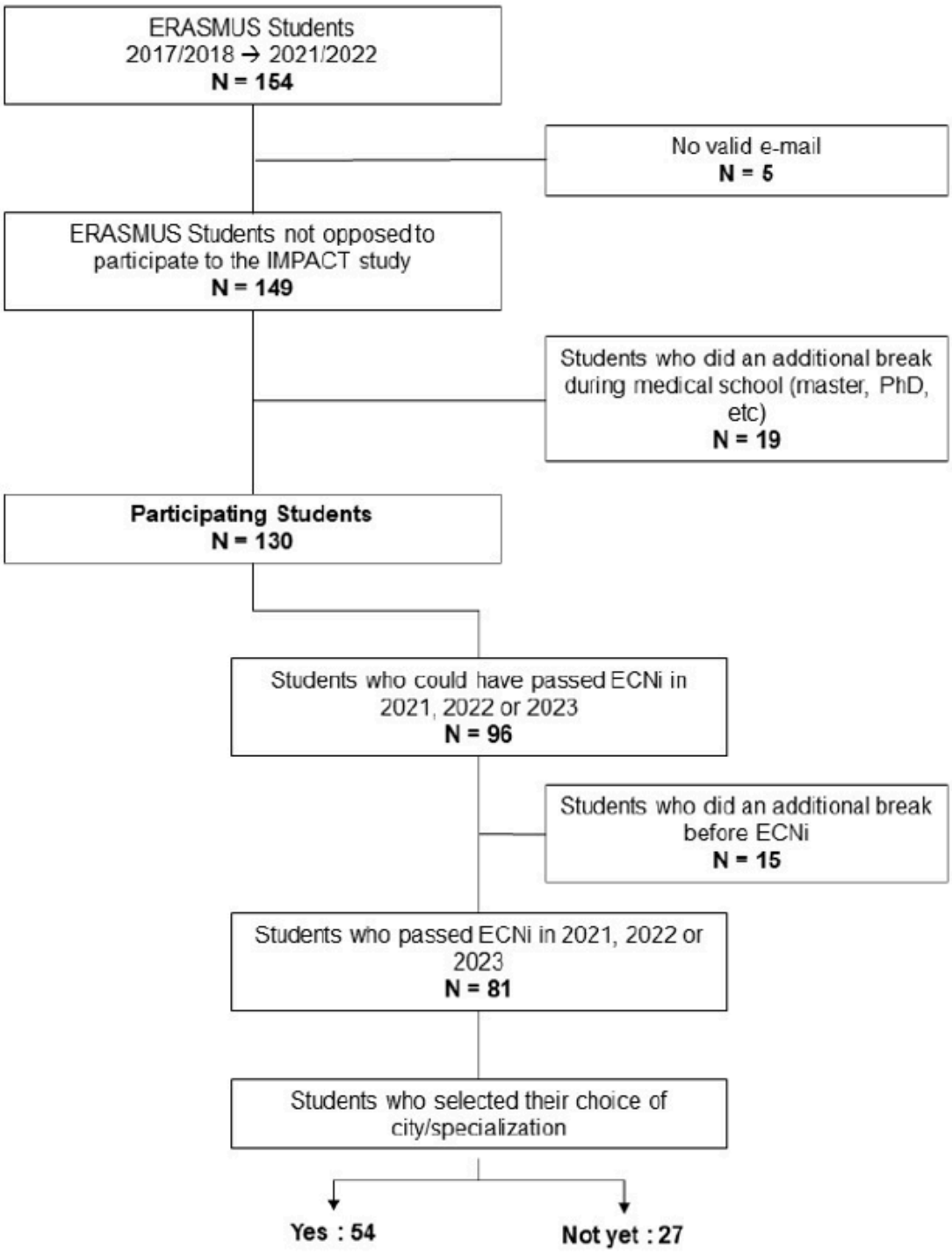


Figure 1

Flowchart of the IMPACT-ERASMUS cohort.

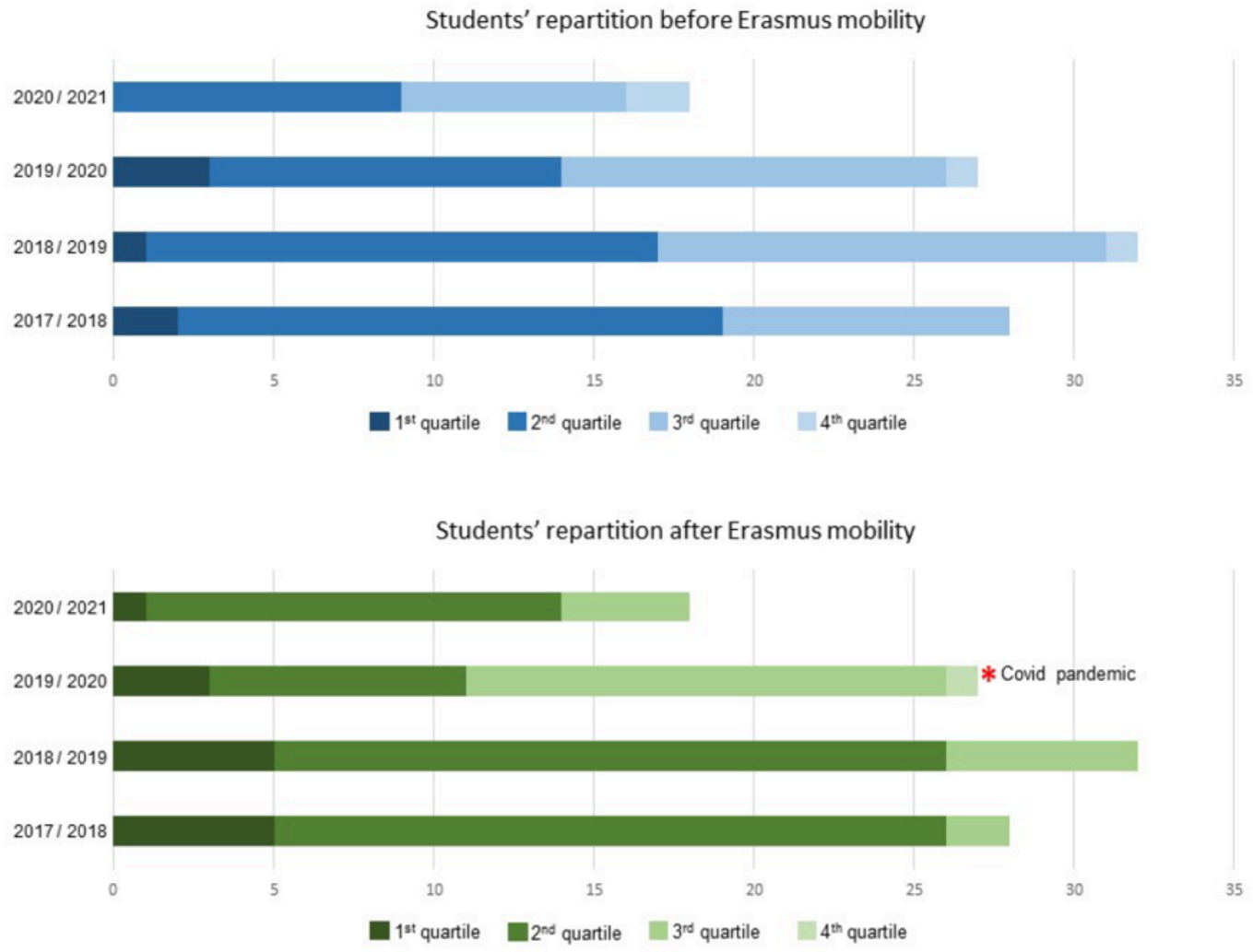


Figure 2

Repartition of Erasmus students within their cohort, before and after their mobility. Horizontal: number of students. Quartile 1 includes the 25% of students with the highest grades, while quartile 4 includes the 25% of students with the lowest grades.

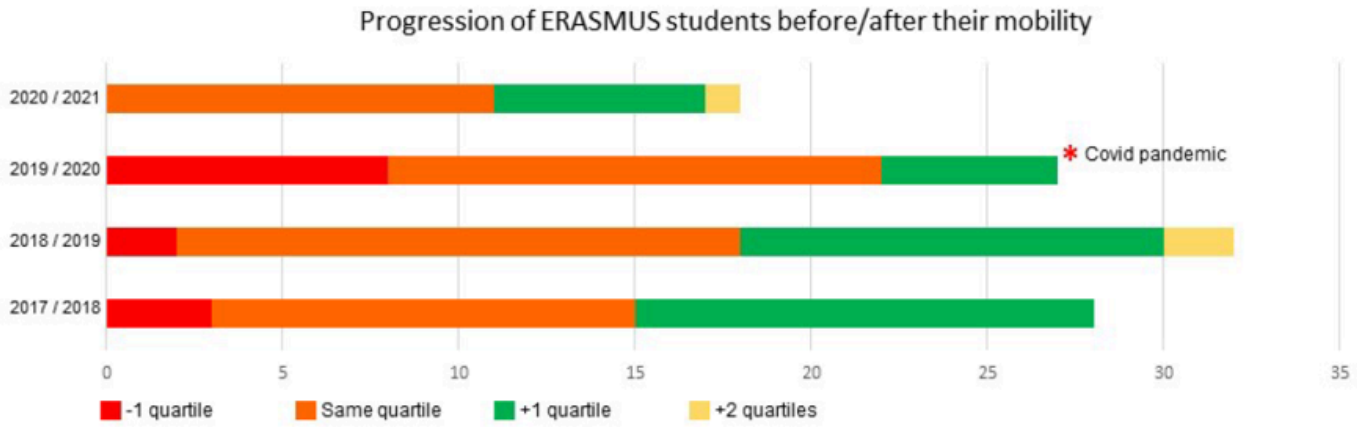


Figure 3

Progression of Erasmus students, before and after their mobility. Horizontal: number of students.

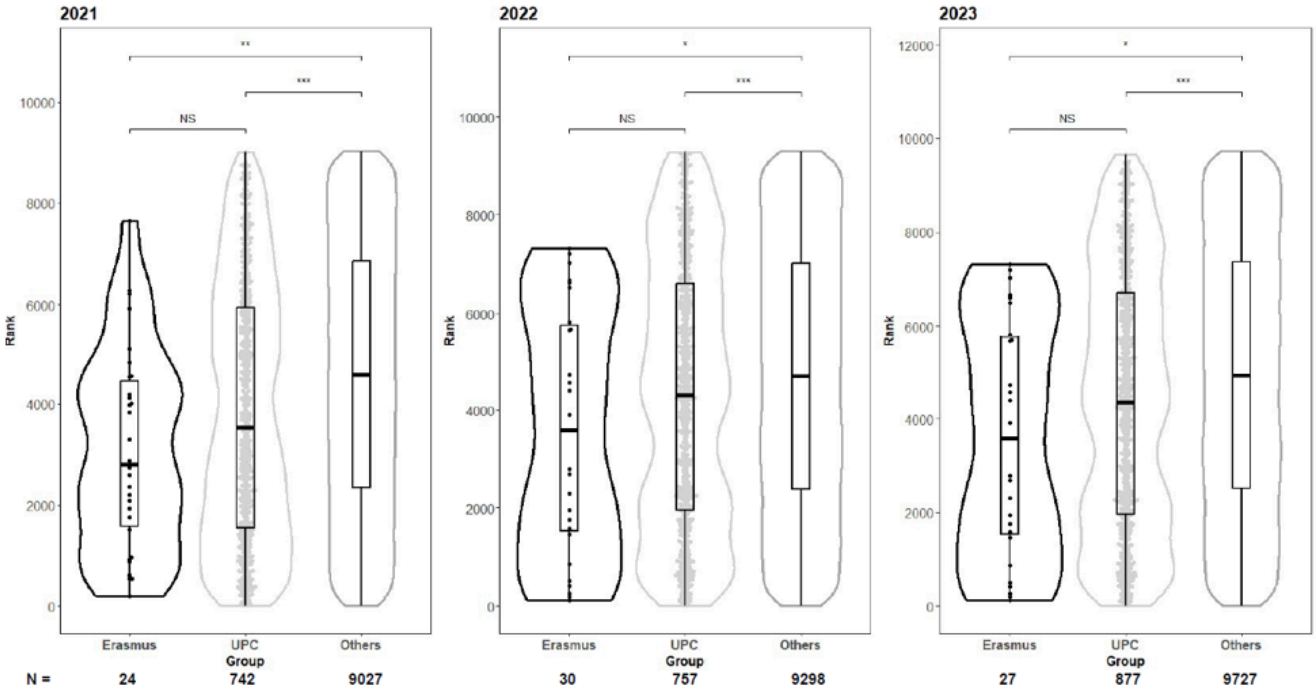


Figure 4

Ranking of Erasmus students and Université Paris Cité (UPC) students on the National ranking exam (NRE) compared to the national cohort (others). p-values were calculated using a pairwise Wilcoxon tests for the following comparisons:

1) Erasmus students vs. other UPC students

2) Erasmus students vs. students from other universities

3) Other UPC students vs. students from other universities

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SUPPLEMENTERYDATA23022026.docx