

Generational Intelligence in Medical Education: A Convergent Mixed Methods Evaluation of an Educational Reading for Medical Students

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Abstract

Background / Objective:

Generational conflicts in medical education are often considered a challenge in teacher-learner relationships. Although generational intelligence theories are well documented, their application in medical education remains limited. In 2024, the Faculty of Medicine of the University of Ottawa created a generational intelligence reading course for first-year medical students. The objective of our study was to measure the impact of this reading on their knowledge and to gather their perceptions of the reading.

Methods

This is a convergent mixed methods study. The students (N = 193) completed a pre-test prior to the reading (n = 149), followed by a post-test 1 one week later (n = 93) and a post-test 2 approximately two months after the reading (n = 38). Ten students (6 Francophones and 4 Anglophones) also took part in semi-structured interviews. The quantitative data were analyzed with SPSS v30.0 and the qualitative data using inductive thematic analysis.

Results

The results show an improvement in scores after the reading, between the pre-test and post-test 1 ($p < .001$). The Francophone students had better scores than the Anglophones on the three tests: pre-test ($p = .043$), post-test 1 ($p = .045$) and post-test 2 ($p = .010$). Significant knowledge retention was observed with the Anglophone students between the two post-tests ($p < .001$). Analysis of the interviews showed that the students found the reading relevant and interactive, but they suggested including more concrete examples and having representatives present from different generations.

Discussion / Conclusion:

This new reading course helps students to gain a better understanding of generational differences. Its integration into the medical curriculum could lead to better communication and improved relationships within the medical education environment and clinical care teams.

INTRODUCTION

The field of medical education faces an intergenerational challenge similar to that already recognized in the workplace.^{1,2} In clinical placement settings, this issue is the cause of conflicts among members of the healthcare team, particularly between supervisors and their trainees, with a negative impact on the quality of care and the team's performance.³ In university environments, it is also a source of friction

firstly among faculty members from different generations and secondly among faculty and students with, respectively, a negative impact on institutional succession planning in academic medicine^{4,5} and a disruption to students' learning experience. In fact, when relationships between teachers and learners are strained or misunderstood, this can reduce students' academic engagement⁶ and, consequently, lead to a decline in their academic performance.⁷

If we look more specifically at intergenerational issues between teachers and students in medical schools, we soon realize that this is a recurring hot topic, as one generation complaining about another is nothing new.⁸ Hence, the literature highlights several sources of tension between these generations, particularly regarding mismatched expectations around educational technologies and communication methods, teaching and learning approaches, as well as communication and leadership styles.⁹⁻¹² Furthermore, the literature identifies several challenges, including the difficulties different generations face in learning, recognizing and understanding their differences, in enhancing teachers' flexibility and adaptability, and in adopting a collaborative and inclusive approach.⁹⁻¹² At the Faculty of Medicine of the University of Ottawa, it is clear from internal discussions with teachers and students that our faculty is no exception to this reality. Indeed, several intergenerational differences are sources of conflict, including communication methods, the concept of professionalism, students' anxiety about their performance, as well as teachers' perception of the erosion of authority.

To combat this phenomenon, several authors propose descriptive models based on various criteria to explain the distinctive characteristics of each generation.¹³⁻¹⁵ A practical solution involves raising awareness and educating these different generations on the concept of intergenerational intelligence, which refers to the ability of multiple generations to coexist, understand one another and work together within the same educational or professional environment.¹⁶

In this spirit, the Faculty of Medicine of the University of Ottawa recently designed a reading course on generational differences based on descriptive models, in order to raise awareness among the parties concerned, suggest possible solutions and facilitate intergenerational relationships. This new tool administered to first-year medical students has not yet been evaluated as part of a solid project to see if it helps students understand this issue and improve their intergenerational relationships. The purpose of this study was to evaluate first-year medical students' knowledge of concepts related to intergenerational dynamics after completing reading on this topic. The study was also aimed at gathering their opinions on this new resource, including their suggestions for improving its content and associated teaching strategies.

METHODOLOGY

Study Design

To meet the objectives of this study, a convergent mixed methods research design¹⁷ was used, consisting of 1) a quasi-experimental quantitative approach in order to evaluate first-year medical

students' knowledge of concepts related to intergenerational dynamics after reading about this topic, and 2) an interpretive descriptive qualitative approach in order to gather their opinions on this new resource, particularly their suggestions for improving its content and associated teaching strategies.

Using both approaches allowed us to examine changes in students' knowledge while also gaining a better understanding of their experience with the reading and their suggestions for improving it. This study was reported in accordance with the recommendations of the *Mixed Methods Article Reporting Standards (MMARS): Information Recommended for Inclusion in Manuscripts That Report the Collection and Integration of Qualitative and Quantitative Data*.¹⁸

Ethical approval: This study was approved by the University of Ottawa Research Ethics Board (Protocol No. H-06-24-10202) on August 7, 2024, and by the Montfort Hospital Research Ethics Board (Protocol No. 24-25-08-027) on August 27, 2024. Informed consent was obtained from all participants.

Participants and recruitment

Given that the reading on generational differences was mandatory for all first-year students in the Faculty of Medicine, our data collection was conducted outside the existing curriculum and regular class hours.

For the quantitative component, all first-year Francophone and Anglophone students (N=193) were invited to participate in this research project. A power analysis was run by a biostatistician to determine the number of participants required to conduct reliable analyses, knowing that in the field of education, an effect size of 0.4 is significant and acceptable for a given instructional intervention.¹⁹ After ethical approval was obtained, recruitment was conducted using non-probability sampling. To do this, an invitation e-mail was sent to all first-year medical students via the undergraduate medical students association (Aesculapian Society²⁰). This invitation e-mail was sent at least two weeks before the students took the generational intelligence reading and clearly outlined all steps involved in this research, including: pre-test, reading, post-test 1, post-test 2, and qualitative data collection for interested students.

For the qualitative component, students having participated in the project's quantitative component were invited to provide additional information. In this component, the approximate sample size was based on the writings of Guest, Bunce and Johnson,²¹ who suggest that, in a qualitative study aimed at understanding the shared perceptions and experiences of a relatively homogeneous group of individuals, the basic elements of the themes studied are present as early as six interviews, and that theoretical saturation may be reached after the first 12 interviews. Non-probability sampling was also conducted. During the recruitment of participants for the quantitative component, students were invited to indicate if they would like to provide more information after having completed post-test 1. The choice of participants was done on a "first come, first served" basis.

Data collection

For the quantitative component, participants completed an initial online questionnaire (pre-test) on Survey Monkey (see Appendices 2A and 2B for the English and French versions, respectively) no more than one week before the reading, to measure their baseline level of knowledge of the concept of intergenerational differences. They then had the reading on generational intelligence, after which they completed a second questionnaire (post-test 1), no more than one week after the reading, identical to the pre-test, and a third questionnaire (post-test 2), at least two months after the reading, also identical to the pre-test and post-test 1, to assess their retention. The participants had not been told that the pre-test and both post-tests were identical. The questionnaire items consisted of multiple-choice and dichotomous questions to facilitate the calculation of scores. The questionnaire was developed by the research team drawing on the literature on the subject and the reading assigned to the students. The following themes were addressed: culture and generations, different generations in the workplace, and collaboration among different generations. Once developed, the questionnaire was reviewed by all members of the research team and then pilot tested with five first-year students in the Faculty of Medicine of the University of Ottawa.

For the qualitative component, semi-structured interviews were conducted by a research assistant (A.J.) with 10 participants having first completed the pre-test, the reading on generational differences, and post-test 1. The interviews (see Appendices 3A and 3B for the English and French versions, respectively) essentially focused on these students' perceptions of the reading, particularly regarding suggestions for improvement both in terms of content and teaching strategies that can promote learning. Individual interviews were approximately 30 minutes each via Zoom, conducted between October 2024 and February 2025, and recorded for purposes of transcription and analysis. Participants were assigned pseudonyms in the form of numbers during data collection, data analysis and the presentation of results to protect their anonymity.

Data analysis

For the quantitative data, *t*-tests for independent samples were conducted to compare the average scores between the Francophone and Anglophone groups for each measurement time point (pre-test, post-test 1 and post-test 2). Next, one-way analyses of variance (one-way ANOVA) were conducted separately for each group to compare the average scores on the three tests (pre-test, post-test 1, post-test 2). The statistical analyses were conducted using SPSS version 30 software, and a two-sided *p*-value of < 0.05 was considered significant for all analyses. The conditions for applying parametric tests were verified prior to the analyses, including normality of distribution and homogeneity of variances between the groups.

For the qualitative data, once all the interviews were transcribed verbatim by an external firm, we began the analysis. The primary coder (M.P.V.) examined in detail the individual interviews of each of the participants to identify statements relating to their experience with the reading on generational intelligence, particularly in terms of improving their knowledge as well as their opinions on the subject. To proceed with the qualitative analysis, the guidelines of Braun and Clarke²² for an inductive thematic

analysis were used. First, the primary coder became familiar with the data by reading each of the documents. Next, by rereading each of them, preliminary codes were generated to produce a coding manual. These were developed considering the explicit meaning of each data extract in the data set and were applied to each of the transcribed documents. Then, the documents were analyzed systematically with 100% of the data coded manually by the primary coder.

Independent cross-coding was performed on 25% of the corpus, consisting of eight pages corresponding to the full interviews of two participants and half the interview of a third. This cross-coding was carried out by a second coder (A.J.) previously trained by the primary coder on the principles of qualitative analysis. Agreement was thus obtained on 25% of the material to be analyzed. To do this, the second coder sent the analysis to the primary coder, who proceeded to review each of the themes identified for each study question. The codes produced by the primary coder and second coder were similar and showed almost full agreement, thereby allowing for a refinement of the codes.

Next, a thematic tree was developed in order to segment the coded excerpts into themes, identified by the recurrence of similar codes in the data set. A latent thematic analysis using an interpretive approach was used to identify the sub-themes. The themes, sub-themes and representative quotes were then discussed jointly by the primary coder and the second coder. As needed, adjustments were made to better reflect participants' experiences, until a consensus was reached.

Mixed methods integration

After the quantitative and qualitative analyses were completed separately, the findings were brought together during the interpretation of the results. We compared changes in students' knowledge across the three tests with their perspectives shared during the interviews. This allowed us to examine how the qualitative findings supported, complemented, or differed from the quantitative results and to develop a more complete understanding of students' learning and perceptions of the generational intelligence reading.

Reflexivity

The study's research team consists of a physician with a master's degree in health education (A.J.); two physician/researchers in medical education (S.F., S.D.R.) both of whom are assistant professors in the Faculty of Medicine; two medical students (M.P.D., T.A.T.D.); an internal medicine resident (S.M.E.); a family physician (M.A.); an instructional designer in medical education (D.B.L.); a researcher with expertise in developing the Communicator competency for health professions students (M.C.); a psychologist/clinician specialized in qualitative analysis (M.P.V.); and two team dynamics specialists who are both content experts on themes related to generational intelligence (A.M., A.C.). The team was assembled to include a variety of professional backgrounds and areas of expertise, allowing us to obtain different analytical perspectives. All members of the research team have previous research experience and are involved in health education both as teachers and learners. Qualitative data collection was conducted by a research assistant (A.J.) having no direct hierarchical or instructional relationship with

the participants. The members of the team had no direct educational relationship with the participants, which helped minimize the potential influence of power dynamics on the data collected.

RESULTS

Quantitative

Of the 193 students who participated in the generational intelligence reading, 149 (77.2%) completed the pre-test, 93 (48.2%) the post-test 1 and 38 (19.7%) the post-test 2. Complete descriptive statistics by test and by cohort are presented in Table 1, and the changes in mean scores across the three tests are shown in Figure 1.

Table 1: Descriptive statistics (M, SD and N) for all three measurement time points among Francophones and Anglophones.

	Cohort	N (%)	Mean scores	SD
Pre-test	Francophone	46 (30.9%)	6.83	1.29
	Anglophone	103 (69.1%)	6.34	1.37
Post-test 1	Francophone	30 (32.3%)	8.80	2.04
	Anglophone	63 (67.7%)	7.96	1.77
Post-test 2	Francophone	16 (42.1%)	7.75	1.70
	Anglophone	22 (57.9%)	6.56	1.00

Note. The percentages are calculated based on the total number of participants having completed each test (pre-test: N = 149; post-test 1: N = 93; post-test 2: N = 38).

The Francophone students scored higher than the Anglophone students on the three tests. The differences in mean scores of the Francophone students were statistically significant compared to those of the Anglophones, namely, on the pre-test ($p = .043$), post-test 1 ($p = .045$) and post-test 2 ($p = .010$).

A significant increase in scores between the pre-test and post-test 1 was observed with the Francophone students ($p < .001$) as well as the Anglophone students ($p < .001$). A significant increase in scores was observed between post-test 1 and post-test 2 with the Anglophone students ($p < .001$).

Qualitative

Characteristics of students interviewed

Ten students participated in individual semi-structured interviews. Of these, six were from the Francophone cohort and four were from the Anglophone cohort.

General impressions of the reading content

All the students gave positive feedback on the reading. Most students reported that the themes covered were relevant given the intergenerational nature of work in medicine compared to other professions.

Student 7: It's important because in medicine, we'll be interacting with patients from different generations. [...] So, it's important to have an understanding of each different type of generation.

Student 6: The reading led to very interesting conversations between everyone in the class and I really enjoyed that.

Several students confirmed that they had not noticed any contradictions in the material presented, stating that the content was quite clear and coherent. While some students mentioned that this reading will be useful in their medical practice, others stated that they would like: 1) improvement in their knowledge on the more practical aspects of this topic, for example, ways to help patients from different generations feel at ease, and 2) an integration of concepts related to generational intelligence into various other courses given within the Faculty of Medicine. In other words, a longitudinal integration of these concepts into the medical curriculum.

Student feedback on the course format and educational activities

Several students reported having enjoyed the interactive nature of the reading, namely the reflections and discussions.

Student 3: I really liked the interactive format that allowed for more of a discussion rather than just a lecture. The fact that we also had a quiz beforehand, that gave us a little preview of what we were going to see, and then it showed us how much we may think we know.

In addition, the students indicated that the in-class method of delivery for this course was the most appropriate, because it encourages interaction among students. Also, the students stated that this synchronous course delivery should be prioritized especially if this course is offered online in the future.

Student 7: Teaching the course in person is crucial. There's nothing more important than that because you want to engage with the students.

As for the duration of the course, feedback from the students was mixed. Many of them thought it was appropriate.

Student 1: All that to say, I think the length of the course is just right. Not too long, not too short, it's perfect.

While some students mentioned feeling as though there wasn't enough time, few students reported that the course was too long.

Suggestions for other ways to present the intergenerational concept

The students shared a few ideas for presenting the intergenerational concept.

A few students mentioned that it would be interesting to invite people from other generations during the course to have the opportunity to talk and interact with them directly during class.

Student 7: If we had people from each generation come and explain their thoughts about different ways to communicate, I think that would be a good way to really focus on the practical aspect of what we learn theoretically in the course, and to really see it with different people sharing their experiences.

Other students mentioned that an active learning approach incorporating workshops with more emphasis on discussions in small groups or analyzing a case study could be another way to present this concept.

The effect of reading on interaction with people of different generations

Some students stated that the reading helped them to become more aware of this reality and to clarify their perceptions of different generations.

Student 4: [...] I think it made me aware that this is quite an important issue and that it can have a big impact on the conversations you have with people.

Others stated that the reading contributed to a better understanding of their reality and that they believe this will be beneficial in their practice later on.

Student 2: I think it will help me, once I become a physician, to really adapt my communication style depending on the generation.

Integration of quantitative and qualitative findings

Taken together, the quantitative and qualitative findings showed a similar pattern. The improvement in knowledge scores after the reading was also reflected in the interviews, where students described gaining a better understanding of generational differences. The interviews also helped explain what students found useful about the reading and what they felt could be improved.

DISCUSSION

This study examined, firstly, the effect of generational intelligence reading on improving the knowledge of first-year medical students at the University of Ottawa and, secondly, gathered their opinions on this reading. Our results suggest that the reading was associated with improved students' understanding of generational differences, in both language cohorts. Compared to the Anglophones, the Francophone students obtained higher scores on each of the tests. Analysis of the verbatim transcripts from semi-structured interviews shows that the students thought the reading was relevant and well adapted to the

medical context, in particular by helping them tailor their communication to different generations. In addition, the students suggested several possibilities for improving the reading that include incorporating, during class, stories or presentations from people of different generations. In a context in which there are frequent intergenerational interactions in the university and clinical environment, having a limited understanding of these dynamics can hinder communication and professional relationships, hence the importance of this type of reading.

The results of our study showed a significant improvement in students' understanding of generational differences following the reading. This result aligns with what we observe in the field of education, where transmissive approaches, such as reading, are recognized as promoting knowledge acquisition.²³ However, this teaching strategy is often limited when it comes to developing competencies, particularly those of communicator and professional ethics.^{24,25,26}

According to our analyses, the Francophone students obtained higher scores than the Anglophones on each of the tests. Since the language of instruction is recognized as a factor that can affect students' engagement and learning,²⁷ our results support the fact that learning paths may differ depending on the linguistic context in which the reading is provided. More broadly, this difference highlights the potential role of linguistic and cultural contexts in shaping learning processes. They can influence students' performance and knowledge retention, as also reported by other studies.^{28,29}

Analysis of the interviews with students showed that they found the reading on generational differences useful for tailoring their communication style to different generations, and that the reading was well adapted to the medical environment. This result aligns with the recent literature on medical education, which highlights that generational differences may affect communication among students, teachers and health professionals, and that a better understanding of these differences can improve interactions in the clinical setting.³⁰⁻³² Research shows that students perceive this type of instruction as improving communication, making it more respectful and effective in educational and clinical practice.^{32,33} Studies also show that raising awareness of generational dynamics helps future physicians to fully understand the expectations, values and communication styles of individuals with whom they interact, such as their colleagues, supervisors or patients.^{30,31} In this regard, students' positive feedback on the reading suggests that this addresses a need in medical education and that it could promote the development of the communicator competency necessary for the therapeutic relationship, even though these effects have not been directly observed in a real-world clinical setting.

The students suggested the participation of people from different generations as part of the educational activity in order to share their experiences. This suggestion is consistent with the research findings on intergenerational education programs. As an example, the study by Kuo et al³⁴ showed that educational activities during which seniors share their experiences with students help to improve understanding of these experiences, foster the development of interpersonal skills and support theoretical learning. Furthermore, the experiential program *Make a New Old Friend*, which connects medical students with

seniors³⁵, showed positive effects on both students' communication skills and their attitudes towards geriatric care. These findings support the relevance of deliberately incorporating intergenerational interactions into medical reading and strengthen the case for endorsing the suggestion put forward by the participants in our study.

Lastly, these results support the formal integration of content on generational intelligence into the medical education curriculum, particularly in bilingual contexts, in order to improve communication and interprofessional relationships. Thus, this reading could be an appropriate strategy for promoting more effective interactions in the clinical setting.

Limitations

This study has limitations that should be acknowledged. First, the sample size was small, particularly for post-test 2, and this may have an impact on the reliability of the findings and the interpretation of the results on retention. The lower number of participants in the follow-up may have introduced attrition bias, as students who completed post-test 2 may not have been representative of the overall cohort.

Furthermore, the choice of students to participate may have created a selection bias, as those who decided to participate may be more aware or already interested in issues related to communication and generational differences. In addition, the use of self-reported measures to assess perceptions may introduce a social desirability bias.

This study focused primarily on assessing students' level of knowledge before and after completing a reading on concepts related to generational differences, as well as gathering their perceptions of the reading. That said, because the study did not directly assess changes in students' skills or attitudes in real-world clinical settings, it cannot determine whether the reading resulted in improvements in these areas. The mandatory nature of the reading may have influenced the way in which some students completed the questionnaires, particularly by encouraging them to be very thorough in responding. Lastly, the study was conducted in only one faculty of medicine and given that there are currently 18 medical schools across Canada, the applicability of our results to other faculties of medicine with different linguistic, cultural and educational contexts may therefore be limited.

CONCLUSION

This study aimed to measure the impact of generational intelligence reading on first-year medical students' knowledge and perceptions. The results show that this objective was reached, as the reading improved knowledge of generational differences and the students considered the content to be relevant and adapted to the medical environment. The mixed approach also allowed for a better understanding of how learners perceive and value this type of reading. However, this study focused primarily on the assessment of knowledge and perceptions in the short and medium term. Future research should examine the long-term impact of this type of reading, particularly regarding behaviours in real-world clinical settings and interactions among generations in healthcare teams, using competency

assessment methods already in use in clinical settings, such as field assessments, to better demonstrate how learning translates into practice.

Declarations

Ethics approval and consent to participate

This study was approved by the University of Ottawa Research Ethics Board (Protocol No. H-06-24-10202) on August 7, 2024, and by the Montfort Hospital Research Ethics Board (Protocol No. 24-25-08-027) on August 27, 2024. Informed consent was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and materials

The data collected for this study are not publicly available to protect participants' privacy and confidentiality. The data are securely stored at the University of Ottawa. De-identified or aggregated data may be available upon reasonable request from the corresponding author, Dr. Sophie De Roock (sderooc2@uottawa.ca).

Competing interests

The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Author contributions

SDR and SF conceptualized the study. AJ, SF, and SDR contributed to the study methodology. AJ collected the data. MPV and AJ conducted the formal analysis. AJ and SF drafted the manuscript. All authors critically reviewed and edited the manuscript and approved the final version.

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Clinical trial

Not applicable. This study is a Scoping Review and does not involve a clinical trial.

Prior presentations

Findings from this study were previously presented as posters at:

- Meridith Marks Day 2025, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada.
- Journées Montfort 2025, Ottawa Conference and Event Centre, Ottawa, Ontario, Canada.
- International Congress on Academic Medicine (ICAM) 2026, Ottawa, Ontario, Canada.

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Figures

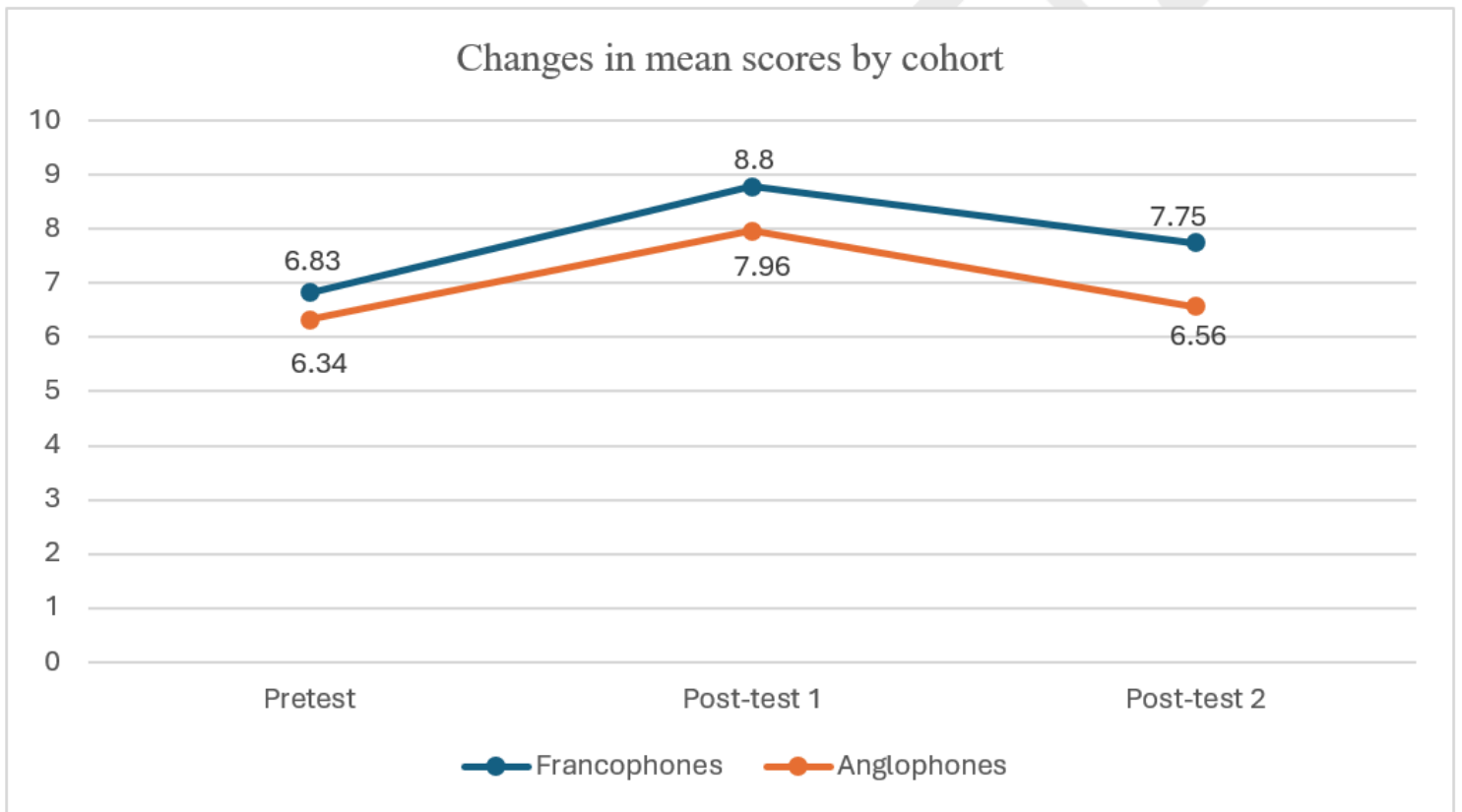


Figure 1

Changes in mean scores by cohort.

Note. The points represent the mean scores on each test.

Supplementary Files

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