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Factors Associated with Medical Students' Readiness of Interprofessional Education Implementation: Findings from A Medical School in Indonesia

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Abstract: This study aimed to analyse factors affecting medical students' readiness for interprofessional education (IPE) implementation. This is an observational cross-sectional study conducted at the Faculty of Medicine, Universitas Muhammadiyah Surakarta, Indonesia. We performed a total sampling approach targeting all medical students, inviting voluntary participation through online messages. Data collection utilised validated questionnaires: the Indonesian version of the Readiness for Interprofessional Learning Scale (RIPLS) and The Interdisciplinary Education Perception Scale (IEPS). All statistical analyses were performed using STATA-BE 18 software. Responses were obtained from 654 medical students, the majority (83.49%) being preclinical students. The mean RIPLS score was 67.28 ± 6.70, and the mean IEPS score was 63.09 ± 5.73. No statistically significant differences in RIPLS scores were found based on age, gender, or educational level. However, there was a significant difference in RIPLS scores between students who had experienced IPE education and those who had not (p-value=0.028). Exposure to IPE education significantly influences medical students' readiness for IPE implementation, regardless of demographic characteristics or educational level.

Keywords: Interprofessional education, medical students, readiness, RIPLS score.

Introduction

Interprofessional education (IPE) is a method of teaching to prepare students from various health professions backgrounds to provide care to patients as a collaborative team (Buring et al., 2009; Venketsamy et al., 2022). Although IPE itself is not a new concept, its popularity increased recently because of the endorsement of the Institute of Medicine in incorporating IPE as integral component of medical education (Johnston et al., 2024; Peterson, 2003). Previous evidence showed that working collaboratively as an interdisciplinary team will result in patient care quality enhancement, decreased treatment costs, and mitigate medical errors (Bosch & Mansell, 2015).

Although abundance of evidence support IPE for health professions students (Spaulding et al., 2021), it has not fully implemented in health profession education curriculum in Indonesia. Previous research has identified that major barrier in IPE curriculum implementation is difficulty in coordinating and harmonising curriculum between health professions

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(Homeyer et al., 2018). However, we hypothesise that beyond these structural obstacles, other factors, such as students' characteristics including age, entry year, and exposure to initial IPE information, might affect their readiness of interprofessional education implementation (Bogossian et al., 2023; West et al., 2016).

To deliver high-quality care services, collaborative practice between different health professions is required (WHO, 2010). This interprofessional collaboration, if effectively conducted, can result in increased patients' quality of life and care satisfaction (Gougeon et al., 2017). It can be achieved because this collaborative practice utilises not only individual skills and expertise but also collective skills of the healthcare professionals. Effective teamwork among healthcare professionals will create a synergy of care that results in improved patient outcomes (Franklin et al., 2015).

Teaching interprofessional education materials to health students is important to prepare them for collaborative practice when they are already working in the healthcare field (Dewi et al., 2019; O'Leary et al., 2023). However, the integration of IPE materials into educational curricula encounters various challenges, both intrinsic and extrinsic. Internal impediments such as communication barriers, reluctance, and ego clashes, alongside external factors like time constraints, scheduling conflicts, and hierarchical structures, pose significant obstacles (Zechariah et al., 2019). Previous studies have proposed several solutions to address these challenges, including delivering education through online platforms, involving students in clinical case studies and simulations, and fostering communication among students from diverse health professions (Ansa et al., 2020).

In light of the recognised significance of collaborative practice in healthcare, universities face the challenge of establishing and sustaining IPE initiatives as integral components of their healthcare education (Diggele et al., 2020; Jorm et al., 2016). In undertaking this challenge, universities should consider various elements including the availability of resources, subject contents, teaching methods, learning outcomes, and evaluation mechanisms (Aldriwesh et al., 2022; Wu et al., 2021).

Method

This is an observational study with a cross-sectional design. This study was conducted from November to December 2023 at the Faculty of Medicine, Universitas Muhammadiyah Surakarta, Indonesia. The study protocol has been reviewed and obtained ethical clearance from the Health Research Ethical Committee of the Faculty of Medicine Universitas Muhammadiyah Surakarta with reference number 5127/B.2/KEPK-FKUMS/X1/2023.

In this present study, we performed a total sampling targeting all medical students of Universitas Muhammadiyah Surakarta, Indonesia. The students are invited to join the study through broadcast online messages. However, students' participation in this study is voluntary, not mandatory.

Data were collected through an online questionnaire in Google Forms. All participants have agreed to participate in this study by filling in the written informed consent. We collected demographic data including age, sex, entry year, education level (preclinical or clinical phase), and whether they have exposed to IPE materials or not. Personal information collected from the participants was anonymised.

In this study, we employed the Indonesian version of the Readiness for Interprofessional Learning Scale (RIPLS) to assess the student's readiness for interprofessional learning. This questionnaire version has been validated by Tyastuti et al. (2014) to be used in Indonesian health professional students. The Likert scale with five points (1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree) was used to answer the questionnaire.

We also employed The Interdisciplinary Education Perception Scale (IEPS) to assess students' perceptions of IPE courses. For this purpose, only students who have completed the IPE course were asked to fill out this questionnaire. The modified Indonesian version of IEPS we used has been translated and validated by Devica (2014) and has been shown to have good reliability. This modified IEPS questionnaire contains 12 questions with six-point Likert scales (1 = strongly disagree; 2 = disagree; 3 = slightly disagree; 4 = slightly agree; 5 = agree; 6 = strongly agree).

Data were analysed using STATA-BE 18 software. The categorical data are presented as frequency and percentage, while continuous data are presented as mean and standard deviation. The differences between sex, education level, and IPE material with the RIPLS scores were analysed using the Mann-Whitney test. While the correlation between age and students' RIPLS scores was analysed using Pearson analysis. Subsequent analysis with Kruskal-Walli's analysis and Dunn-test was used to unveil the relationship between entry year and RIPLS scores in the study population who already received IPE material (Sulaiman et al., 2021).

Result and Discussion

A total of 654 medical students provided their consent to participate in this study. The predominant demographic among our participants was female

(72.78%), and the majority were in the pre-clinical phase of their studies (83.49%). The mean age of the participants was 20.42 ± 1.99 years. Notably, a higher proportion of students had been exposed to Interprofessional Education material compared to those who had not (54.13% vs. 45.87%). The mean RIPLS score of our participants was 67.28 ± 6.70, while the mean IEPS score of our participants was 63.09 ± 5.73.

Table 1. Characteristics and Questionnaire Results of the Participants

Parameters (n=654)	Value
Age (years), [mean ± SD]	20.42 ± 1.99
Female, [n(%)]	476 (72.78)
Education Level, [n(%)]	
Pre-clinical	546 (83.49)
Clinical	108 (16.51)
IPE material, [n(%)]	
Received	354 (54.13)
Not yet	300 (45.87)
RIPLS, [mean ± SD]	67.28 ± 6.70
IEPS, [mean ± SD]	63.09 ± 5.73

Our analysis revealed that the sole factor demonstrating a significant association with RIPLS scores was exposure to Interprofessional Education (p-value = 0.028), indicating that exposed to IPE material is correlated with heightened readiness for interprofessional learning. Conversely, other variables including age, sex, and education level did not exhibit any statistically significant associations with RIPLS scores.

Table 2. Correlation between Covariates with Students' Readiness for Interprofessional Learning

Covariates	P-Value
Age[1]	0.113
Sex[2]	0.234
Education Level[2]	0.939
IPE Exposure[2]	0.028*

[1] Pearson Correlation

[2] Mann-Whitney test *Significant result

Following the identification of a significant difference in readiness for interprofessional learning between students who already received IPE materials and they who haven't received it yet, we performed sub-analysis on this population. Utilising Kruskal-Wallis analysis, we examined the association between various entry years and RIPLS scores. Our analysis demonstrated a statistically significant relationship between entry year and RIPLS scores (p = 0.0168). Subsequent post-hoc analysis employing the Dunn-test unveiled significant differences between specific pairs of entry years: 2010 and 2015 (p = 0.048), 2010 and 2016 (p = 0.047), 2010 and 2022 (p = 0.047), 2010 and 2023 (p = 0.047), 2015 and 2018 (p = 0.014), 2015 and 2021 (p = 0.043), 2016 and 2018 (p = 0.034), 2017 and 2018 (p = 0.026), 2018 and 2019 (p = 0.003), 2018 and 2020 (p = 0.003), 2018 and 2021 (p = 0.032), 2018 and 2022 (p = 0.034), and 2018 and 2023 (p = 0.034).

Discussion

In this present study, we found that medical students who were exposed to IPE material had significantly higher RIPLS scores than their peers who had not yet been exposed to IPE material (Zhang et al., 2024). Notably, within our faculty, the IPE material was given to the preclinical students within the framework of the public health module, where medical students collaborate with other health profession students to carry out field labs at the Community Health Centre for one week. While for the clinical students, the IPE material was given once during one of the clinical rotations. Despite these brief exposure periods, it proved to be effective in adequately preparing students for engaging in interprofessional education initiatives.

We found that students' readiness for interprofessional learning is not different between students from the preclinical and clinical phases. This result was unexpected since a previous study suggested that students who had experience in collaborating would be more ready for interprofessional education (D'Costa et al., 2022; Lestari et al., 2016). During clinical rotation, students typically engage in patient care management to a limited extent, often operating under the supervision of senior doctors within their respective departments. Consequently, they may have fewer opportunities to interact and collaborate with peers from other health disciplines such as nursing or pharmacy. Moreover, the proportion of clinical students represented in our study was relatively low (16.51%). All of these factors might be contributing to why there is no significant difference in interprofessional learning readiness between preclinical and clinical students.

The insignificant difference in students' readiness between different genders was already anticipated since previous studies have also reported that gender is not associated with RIPLS scores (Alruwaili et al., 2020). Moreover, the age range within our study population was relatively narrow, thus the absence of significant differences in age was anticipated.

This study also has several limitations. First, the data collected, although obtained from total sampling might not be able to be generalised in every university in Indonesia because it was obtained one time at one university. Second, we have not included several factors that might affect students' readiness for interprofessional learning such as grade point average (GPA) and students' motivation to study in medicine.

Previous studies suggest that these factors might contribute to students' perception and readiness for interprofessional education (MacDonald et al., 2007).

Conclusion

Medical students' readiness in IPE implementation is affected by exposure to IPE information, independent of their demographic characteristics or educational level. This finding underscores the importance of integrating IPE material into the curricula of all medical students, irrespective of their learning phase, whether preclinical or clinical.

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Conflicts of Interest
The authors report no conflict of interest.

References

Aldriwesh, M. G., Alyousif, S. M., & Alharbi, N. S. (2022). Undergraduate-level teaching and learning approaches for interprofessional education in the health professions: a systematic review. *BMC Medical Education*, *22*, 1–14. https://doi.org/10.1186/s12909-021-03073-0

Alruwaili, A., Mumenah, N., Alharthy, N., & Othman, F. (2020). Students' readiness for and perception of Interprofessional learning: A cross-sectional study. *BMC Medical Education*, *20*, 1–7. https://doi.org/10.1186/s12909-020-02325-9

Ansa, B. E., Zechariah, S., Gates, A. M., Johnson, S. W., Heboyan, V., & Leo, G. (2020). Attitudes and behavior towards interprofessional collaboration among healthcare professionals in a large academic medical center. *Healthcare (Switzerland)*, *8*(3). https://doi.org/10.3390/healthcare8030323

Bogossian, F., New, K., George, K., Barr, N., Dodd, N., Hamilton, A. L., Nash, G., Masters, N., Pelly, F., Reid, C., & others. (2023). The implementation of interprofessional education: a scoping review. *Advances in Health Sciences Education*, *28*(1), 243–277. https://doi.org/10.1007/s10459-022-10128-4

Bosch, B., & Mansell, H. (2015). Interprofessional collaboration in health care: Lessons to be learned from competitive sports. *Canadian Pharmacists Journal*, *148*(4). https://doi.org/10.1177/1715163515588106

Buring, S. M., Bhushan, A., Broeseker, A., Conway, S., Duncan-Hewitt, W., Hansen, L., & Westberg, S. (2009). Interprofessional education: Definitions, student competencies, and guidelines for implementation. *American Journal of Pharmaceutical Education*, *73*(4). https://doi.org/10.5688/aj730459

D'Costa, M. P., Jahan, F., & Al Shidi, A. (2022). Health professions students' attitude, perception, and readiness toward interprofessional education and practice in Oman. *Journal of Taibah University Medical Sciences*, *17*(2), 248–255. https://doi.org/10.1016/j.jtumed.2021.10.004

Devica, U. (2014). *Persepsi Mahasiswa Fakultas Kedokteran Dan Ilmu Kesehatan Uin Syarif Hidayatullah Jakarta Terhadap Interprofessional Education* [Skripsi: Jurnal Fakultas Kedokteran]. Retrieved from https://repository.uinjkt.ac.id/dspace/handle/123456789/25511

Dewi, E., Pratiwi, A., Kurniati, Y. P., & Soh, K. L. (2019). Undergraduate students' perceptions and readiness: An evaluation of inter-professional education at central Java, Indonesia. *International Journal of Learning, Teaching and Educational Research*, *18*(11), 193–204. Retrieved from http://www.ijlter.net/index.php/ijlter/article/download/449/443

Diggele, C., Roberts, C., Burgess, A., & Mellis, C. (2020). Interprofessional education: tips for design and implementation. In *BMC Medical Education* (Vol. 20). https://doi.org/10.1186/s12909-020-02286-z

Franklin, C. M., Bernhardt, J. M., Lopez, R. P., Long-Middleton, E. R., & Davis, S. (2015). Interprofessional Teamwork and Collaboration Between Community Health Workers and Healthcare Teams: An Integrative Review. *Health Services Research and Managerial Epidemiology*, *2*. https://doi.org/10.1177/2333392815573312

Gougeon, L., Johnson, J., & Morse, H. (2017). Interprofessional collaboration in health care teams for the maintenance of community-dwelling seniors' health and well-being in Canada: A systematic review of trials. *Journal of Interprofessional Education and Practice*, *7*. https://doi.org/10.1016/j.xjep.2017.02.004

Homeyer, S., Hoffmann, W., Hingst, P., Oppermann, R. F., & Dreier-Wolfgramm, A. (2018). Effects of interprofessional education for medical and nursing students: Enablers, barriers and expectations for optimizing future

interprofessional collaboration - a qualitative study. *BMC Nursing*, *17*(1). https://doi.org/10.1186/s12912-018-0279-x

Johnston, S., Parker, C. N., French, S., Mitchell, J., & Theobald, K. (2024). What interprofessional education teaching and learning approaches are being implemented in baccalaureate health professional curricula in wound care education? A scoping review. *Nurse Education in Practice*, 104080. https://doi.org/10.1016/j.nepr.2024.104080

Jorm, C., Roberts, C., Lim, R., Roper, J., Skinner, C., Robertson, J., Gentilcore, S., & Osomanski, A. (2016). A large-scale mass casualty simulation to develop the non-technical skills medical students require for collaborative teamwork. *BMC Medical Education*, *16*(1). https://doi.org/10.1186/s12909-016-0588-2

Lestari, E., Stalmeijer, R. E., Widyandana, D., & Scherpbier, A. (2016). Understanding students' readiness for interprofessional learning in an Asian context: A mixed-methods study. *BMC Medical Education*, *16*(1). https://doi.org/10.1186/s12909-016-0704-3

MacDonald, M. E., Carnevale, F. A., & Razack, S. (2007). Understanding what residents want and what residents need: The challenge of cultural training in pediatrics. *Medical Teacher*, *29*(5). https://doi.org/10.1080/01421590701509639

O'Leary, N., Salmon, N., O'Donnell, M., Murphy, S., & Mannion, J. (2023). Interprofessional education and practice guide: profiling readiness for practice-based IPE. *Journal of Interprofessional Care*, *37*(1), 150–155. https://doi.org/10.1080/13561820.2022.2038551

Peterson, C. (2003). Health professions education: a bridge to quality. *Tar Heel Nurse*, *65*(4). https://doi.org/10.1111/j.1945-1474.2004.tb00473.x

Spaulding, E. M., Marvel, F. A., Jacob, E., Rahman, A., Hansen, B. R., Hanyok, L. A., Martin, S. S., & Han, H. R. (2021). Interprofessional education and collaboration among healthcare students and professionals: a systematic review and call for action. *Journal of Interprofessional Care*, *35*(4). https://doi.org/10.1080/13561820.2019.1697214

Sulaiman, N., Rishmawy, Y., Hussein, A., Saber-Ayad, M., Alzubaidi, H., Al Kawas, S., Hasan, H., & Guraya, S. Y. (2021). A mixed methods approach to determine the climate of interprofessional education among medical and health sciences students. *BMC Medical Education*, *21*, 1–13. https://doi.org/10.1186/s12909-021-02645-4

Tyastuti, D., Onishi, H., Ekayanti, F., & Kitamura, K. (2014). Psychometric item analysis and validation of the Indonesian version of the Readiness for Interprofessional Learning Scale (RIPLS. *Journal of Interprofessional Care*, *28*(5). https://doi.org/10.3109/13561820.2014.907778

Venketsamy, R., Hu, Z., & Razlog, R. (2022). Exploring students' experiences of interprofessional education to improve quality learning outcomes. *Journal for the Education of Gifted Young Scientists*, *10*(3), 385–398. https://doi.org/10.17478/jegys.1126020

West, C., Graham, L., Palmer, R. T., Miller, M. F., Thayer, E. K., Stuber, M. L., Awdishu, L., Umoren, R. A., Wamsley, M. A., Nelson, E. A., & others. (2016). Implementation of interprofessional education (IPE) in 16 US medical schools: common practices, barriers and facilitators. *Journal of Interprofessional Education & Practice*, *4*, 41–49. https://doi.org/10.1016/j.xjep.2016.05.002

WHO, W. H. O. (2010). *Framework for Action on Interprofessional Education & Collaborative Practice. Practice*. Retrieved from https://www.who.int/publications/i/item/framework-for-action-on-interprofessional-education-collaborative-practice

Wu, D., Shen, H., & Lv, Z. (2021). An artificial intelligence and multimedia teaching platform based integration path of IPE and IEE in colleges and universities. *Journal of Intelligent \& Fuzzy Systems*, *40*(2), 3767–3776. https://doi.org/10.3233/JIFS-189410

Zechariah, S., Ansa, B. E., Johnson, S. W., Gates, A. M., & Leo, G. (2019). Interprofessional education and collaboration in healthcare: An exploratory study of the perspectives of medical students in the united states. *Healthcare (Switzerland)*, *7*(4). https://doi.org/10.3390/healthcare7040117

Zhang, C., Wang, X., Xing, Y., Luan, W., & Jin, T. (2024). Correlation between learning styles and attitudes toward interprofessional education among medical students: a cross-sectional study. *BMC Medical Education*, *24*(1), 1010. https://doi.org/10.1186/s12909-024-05710-w