

Attachment 2: Characteristics of included studies

| Study number | Title | Author, published year | Country | Objective | Study design | Sample size (response rate) | Scale | Empathy level | Determinants |
|--------------|---|------------------------|--------------|---|-----------------|-----------------------------|-------------------------|--------------------------------|--|
| 1 | Is the Empathy Level of Medical Students at KAU Changeable along their Study Years? What is behind this Change? | Ayuob et al. 2016 | Saudi Arabia | To determine the level of empathy among medical students in different study years in the Faculty of Medicine (FOM) at King Abdulaziz University (KAU) and to explore in depth the factors that affect it. | Cross-sectional | 1110 (58.3%) | JSPE-S (Arabic version) | 106.55±19.16 | <p>- year of study: Level of empathy increases along with the study year</p> <p>- family factors: stable marital status of parents, satisfactory relationship with mother and father, having a sick relative, were associated with higher level of empathy</p> |
| 2 | Personal, Cultural and Academic Factors Affecting Empathy Score in Third Year Medical Students | Hamed et al. 2015 | Saudi Arabia | Evaluating the empathy scores in third year undergraduate medical Students in King Abdulaziz University and explore the factors which might have an effect on them and how might these factors affect them. | Cross-sectional | 163 | JSPE-S | M: 100.1±17.3 F: 103.7±12.2 | <p>- specialty preference: Higher scores were observed among students who selected "surgery" rather than "medicine" as their future specialties.</p> <p>-Grade point average: Students who has a higher GPA showed significantly higher scores in level of empathy</p> |

| Study number | Title | Author, published year | Country | Objective | Study design | Sample size (response rate) | Scale | Empathy level | Determinants |
|--------------|---|--------------------------|---------|--|-----------------|-----------------------------|--------------------------|---------------|---|
| 3 | Level of Empathy among Medical Students in Kuwait University, Kuwait | Hasan et al. 2013 | Kuwait | To evaluate the level of empathy among medical students in Kuwait University Medical School and its association with socio-demographic factors, stress levels and personality. | Cross-sectional | 264 (56%) | JSPE-S (English version) | 104.6±16.3 | <ul style="list-style-type: none"> - gender: higher level of empathy among female students - year of study: the level of empathy increased until the 4th year and then decreased - family factors: higher mother's level of education, high household income, satisfactory relationship with the mother were associated with higher level of empathy - stress levels: Stress scores were positively associated with empathy |
| 4 | Measuring Empathy Levels among Kurdish Medical Students in Erbil City, Iraq | Raof. Yassin et al. 2016 | Iraq | To evaluate the empathy levels of students in the College of Medicine at Hawler Medical University (HMU) in Erbil city, Iraq. | Cross-sectional | 927 (93.7%) | JSPE-S (English version) | 101.9±19.2 | <ul style="list-style-type: none"> - gender: higher level of empathy among female students - specialty preference: students who chose people-oriented specialties had higher mean empathy scores, whereas those who selected technology-oriented specialties had lower scores - year of study: Mean empathy scores decreased as academic years increased until the fourth year |

| Study number | Title | Author, published year | Country | Objective | Study design | Sample size (response rate) | Scale | Empathy level | Determinants |
|--------------|---|------------------------|--------------------------|---|-----------------------|-----------------------------|--------------------------|--------------------|---|
| 5 | Cross sectional study on lifelong learning's determinants among medical students in RAK Medical & Health Sciences University, UAE | Afifi 2018 | The United Arab Emirates | To find the association of Empathy, Self-Efficacy, and/or hope with readiness for lifelong learning among medical students. | Cross-sectional | n=221 Arab n= 104 | IRI | Arab: 64.7±12.3 | The associated factors are studied in the overall population (Arab and non-Arab students) and not studied for the Arab population alone |
| 6 | Effect of Targeted Curricular Reform on the Learning Environment, Student Empathy, and Hidden Curriculum in a Medical School: A 7-Year Longitudinal Study | Zgheib et al. 2020 | Lebanon | To assess the effectiveness of a new curriculum in empathy over a period of 7 years. | Longitudinal | - | JSPE-S | Not specified | - curriculum: the new curriculum increase the level of empathy - year of study: Decline in the level of empathy by increase in number of educational years. |
| 7 | Measuring empathy in medical students: A cross-sectional study | Iqbal et al. 2022 | Saudi Arabia | To measure the empathy levels of undergraduate medical students, and to explore whether the empathy level has any significant association with gender, 19 academic year and academic achievement. | Cross-sectional study | 391(43,8) | JSPE-S (English version) | 105.18±12.51 | - gender: Female students had significantly higher empathy scores than males - GPA (grade point average): Students with a higher GPA had higher levels of empathy level than students with a lower GPA - year of study: decrease of levels of empathy by increase in number of educational years |

| Study number | Title | Author, published year | Country | Objective | Study design | Sample size (response rate) | Scale | Empathy level | Determinants |
|--------------|--|------------------------|--------------------------|--|------------------|-----------------------------|---------------------------------|-----------------------------|---|
| 8 | Medical Students Learning Communication Skills in a Second Language: Empathy and expectations | Hashim et al. 2013 | The United Arab Emirates | To identify whether Arabic-speaking medical students experienced difficulty with the different components of the CS training that were conducted in English. | Cross-sectional* | 40 (89%) | IRI (English version) | F : 54.9±5.6 H: 51.8±7.1 | Learning communication skills in a second language: was associated with low empathy scores |
| 9 | Level of Patient Empathy among medical students of Saudi Medical College: A Cross-sectional Survey | ARAIN et al. 2019 | Saudi Arabia | 1. To measure the mean level of empathy among medical students. 2. To compare the level of empathy among various academic years and among gender. | Cross-sectional | 545 | Not specified (English version) | 65.21±7.24 | gender: Mean score of empathy was found to be better among male students compared to female students |
| 10 | A measurement of empathy among Moroccan medical students | Jaafari et al. 2018 | Morocco | To determine the impact of gender and year of study on empathy in medical students. | Cross-sectional | 632 | JSPE (version French) | 97.65±4.10 | gender: Female students had significantly higher empathy scores than males |

JSPE: Jefferson Scale of Physicians Empathy, JSPE-S: Jefferson Scale of Physicians Empathy (student version), IRI: Interpersonal Reactivity Index.

* This is a longitudinal study, but empathy is only measured once. So, in terms of empathy, the study was considered cross-sectional.