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Impact of Emotional Intelligence on Academic Performance of Health Science Undergraduates: A Systematic Review

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Abstract

Perceiving, using, understanding, and managing our own and others emotions is generally considered as emotional intelligence (EI). EI is a predictor of academic success of university undergraduates and it is also associated with the successful performance of healthcare professionals. It is an important character that should be inculcated among health sciences undergraduates in order to make them more successful in academic performances and help them to achieve professional success. In this systematic review, the impact of EI on academic performance of health sciences undergraduates was evaluated. A systematic search was performed following the PRISMA Statement in MEDLINE and ERIC databases and also by a manual search to identify studies that evaluated the impact of EI on academic performance of nursing, dental and medical undergraduates. We used the search terms "Impact" OR "Effect", "Emotional Intelligence", "Academic performance" and "Health Sciences Undergraduates" (Nursing, Dental and Medical). Original studies which were published in English language till 31st June 2021 were reviewed with the agreement of authors. Search strategy returned136 articles, of them only 23 articles based on original studies met all inclusion criteria. They included seven studies focused on nursing undergraduates, three on dental undergraduates and thirteen on medical undergraduates. EI was found to be linked with the successful academic performance of health sciences undergraduates at either theory or clinical examinations in fourteen studies (60.9 %) (3 nursing, 3 dental and 8 medical). Nine studies (39.1%) (4 nursing, 5 medical) did not find an association between EI and academic performance. A majority (60.9%) of reviewed studies have observed an impact of EI on academic performance of health science undergraduates that was identified in observational studies. Interventional studies in the context are recommended to confirm this association.

Keywords: Academic Performance, Emotional Intelligence, Impact, Health Science Undergraduates, Systematic Review.

Introduction

Emotional intelligence (EI) which is also known as emotional quotient (EQ) is generally described how a person deals with intrapersonal (own) and interpersonal (with others) emotions and maintains such relationships. Mayer and Salovey defined EI as the ability to perceive emotions, to understand emotions and emotional knowledge, and to reflectively regulate emotions (Salovey and Mayer, 1990). A model of EI has been described with four-branches namely perceiving, using, understanding, and managing emotions (Salovey and Grewal, 2005).

Perceiving, using, understanding, and managing emotions (Salovey and Grewal, 2005) of own and others are vital for health care professionals as they are dealing with human beings in an environment with a multitude of stressors (Pau et al., 2007). Higher levels of EI have been shown to be associated with lower levels of stress and effective functioning among health care professionals (Pau et al., 2007).

Since EI is a part of the character development, it cannot be developed soon after the individual becomes a healthcare professional. It should be introduced from childhood and included in the education programmes from primary to tertiary level education. Further, EI is a quality that should be inculcated among health sciences undergraduates at least while they are receiving their foundation education in the university. Health sciences undergraduates are supposed to learn a curriculum with a wide subject content blend with both a theoretical component learnt in classrooms and a clinical component practiced at the real patient environment within a stipulated time period. They undergo training in a highly stressful environment with heavy workload and long hours of training. Furthermore, they have to interact with different personnel including patients, families and different categories of healthcare professionals (Singh et al., 2020). Further, they need to work under the supervision of a group of clinical experts which makes them more stressful. Therefore, dealing with emotions is an important attribute of health sciences undergraduates, especially those in medical, dental and nursing streams, who are involved with direct patient management.

Many studies have shown that EI has a close association with academic success at schools and higher education institutes including universities (Singh et al., 2020). Health sciences undergraduates' evaluations include a theoretical component evaluated with the paper-based examinations and clinical competency evaluated in a real patient environment. Therefore, it can be assumed that well performed academic grades of these two components of health sciences undergraduates might also have a direct relationship with EI.

However, it is uncertain whether EI has a direct impact on the academic success of undergraduates who follow health science streams. Since EI is an important character to be grown among the future health care professionals to provide quality patient care, exploring how EI influences academic performance of them is important. Therefore, in this systematic review, the impact of EI on academic performance of health sciences undergraduates was evaluated.

Methodology

Electronic databases (MEDLINE and ERIC) were searched for studies assessing the impact of EI on academic performance of health sciences undergraduates using the search term "Impact" OR "Effect", "Emotional Intelligence", "Academic performance", "Health Science Undergraduates (Nursing, Dental and Medical)" by one investigator following the PRISMA Statement. A manual search was also performed to find out the bibliographic references of relevant articles and existing reviews. Journal articles published in English language with no restriction of year were included. The articles based on the original studies focused on association/relationship/influence/impact of EI on objectively measured academic performance (overall, theory or clinical/practical) at examinations of nursing, medical and dental undergraduates studying in universities/measured undergraduate performance of final year were considered as the inclusion criteria. Systematic reviews/meta-analysis, general opinions, letters to editors, commentaries, articles published in other languages were excluded. Further, articles based on original studies focused on university undergraduates, however the academic performance evaluated with university entrance qualifications and other measures such as perceived academic or clinical competency, communication skills, and stress management were also excluded. All eligible studies were verified with the other investigators.

The data extracted from the studies were authors; year of publication; country; target population; sample size; tools/methods used to assess EI and academic performance and association/relationship/influence/impact between EI and academic performance (Table 1).

Results

Search Strategy

A total of 136 articles were identified through electronic database searches. Among these studies, duplicates, studies not fulfilling the selection criteria were excluded and finally only 23 articles based on original studies were selected for this review (Figure 1). They included seven studies focused on nursing undergraduates, three on dental undergraduates and thirteen on medical undergraduates (Table 1). Fifteen studies were cross-sectional in design while 05 were longitudinal and 03 were prospective/retrospective studies.None of the studies were interventional. Methods used in the studies and findings of the studies are summarized in Table.

Table 1: Methods Used and Findings of the Studies in the Review (n=23)

No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
Studies focused on nursing undergraduates – Positive association						
1	Fernandez et al., 2012 (Australia)	1st year nursing undergraduates, n=81 (80% females)	Prospective survey	Trait Emotional Intelligence Questionnaire	GPA scores at 6 months course commencement	EI score showed a positive correlation with overall academic performance (β=0.25, p=0.023)
2	Rankin, 2013 (UK)	1st year nursing undergraduates n=178 (168 females)	Longitudinal study	Schutte Self-Report Emotional Intelligence Test	Mean score for all assignments in year 1 and practice performance by clinical assessment tool	EI score showed a positive correlation with overall academic performance (r=0.16, p<0.05) EI score and clinical practice performance were positively correlated (R^2=0.68)
3	Beauvais et al., 2014 (USA)	Nursing undergraduates in all years n=73	Descriptive correlational	Mayer-Salovey-Caruso Emotional Intelligence Test	GPA of all years	Only one branch of EI (perceiving emotions) showed a positive correlation with GPA (r=0.23, p=0.04) However, EI score did not show a significant correlation with overall academic performance (p>0.05)

Table 1: Methods Used and Findings of the Studies in the Review (n=23)

No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
Studies focused on nursing undergraduates – No association						
1	Cheshire et al., 2015 (USA)	1st and 2nd semester nursing undergraduates n=96 (71 females)	Descriptive causal comparative	Mayer–Salovey–Caruso Emotional Intelligence Test	GPA in 2 courses for and final clinical evaluations	EI score showed no significant correlation with either overall academic performance or clinical evaluations ($p>0.05$)
2	Suliman, 2010 (Saudi Arabia)	Nursing undergraduates in all years n=98 (all females)	Cross-sectional	Bar-On emotional quotient inventory	GPA of all years	EI score showed no significant correlation with overall academic performance ($p>0.05$)
3	Por et al., 2011 (UK)	1st year nursing undergraduates, n=130 (117 females)	Prospective correlational	Schutte Self-Report Emotional Intelligence Test	Mean GPA of five modules in year 1	EI score and overall academic performance were not correlated ($p>0.05$).
4	Roso-Bas et al., 2016 (Spain)	3rd year nursing undergraduates n=114	Cross-sectional	Trait Meta-Mood Scale	Ratio of number of academic subjects passed to number of subjects registered last year for year	EI score overall academic performance showed no significant correlation ($p>0.05$)
Studies focused on dental undergraduates – Positive association						
1	Kumar et al., 2016 (India)	Final year dental undergraduates (just passed out from the universities) n=200 (131 females)	Retrospective correlational	Emotional Quotient Self-Assessment Checklist	Low and high performance of final year results	EI score showed a positive correlation with academic performance ($R^2=0.42$, $p<0.05$)

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No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
2	Partido and Stafford, 2018 (USA)	1st and 2nd year dental hygiene students n=45 (44 females)	Cross-sectional	Emotional quotient self-assessment checklist	Academic and clinical grades and GPA	EI score positively predicts the overall GPA of academic performance (R^2=0.35, p<0.001) EI score positively predicts the clinical performance grades (R^2=0.33, p<0.001) The EI subsets of self-control, motivation, and self-confidence were the predictors of overall academic performance. The EI subsets of social competence, empathy, and motivation were the predictors of clinical performance
3	Victoroff and Boyatzis, 2013 (USA)	Year 3 (n=62) and year 4 (n=38) dental undergraduates	Cross-sectional	Emotional Competence Inventory-University version	Weighted GPA from courses of year 1 and 2 and Overall clinical grade GPA	EI one subscale (self-management) showed an inverse correlation with and overall academic performance (β=0.39, p<0.05) EI one subscale (relationship management) showed a positive correlation with overall academic performance (β=0.50, p<0.001) EI one subscale (self-management) clinical GPA were positively correlated (β=0.49, p<0.05)

Table 1: Methods Used and Findings of the Studies in the Review (n=23)

No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
Studies focused on medical undergraduates – Positive association						
1	Fallahzadeh, 2011 (Iran)	Final year medical undergraduates n=223 (153 females)	Cross-sectional	Bar-On emotional quotient inventory	Mean last-year university GPA	EI score showed a positive correlation with (r=0.14, p=0.039) academic performance
2	Radfa et al., 2012 (Iran)	All years medical undergraduates (n=150, all males)	Cross-sectional correlational	Bar-On emotional quotient inventory	GPA of different years	EI score and academic achievements were positively correlated (p = 0.001, r=0.305).
3	Chew et al., 2013 (Malaysia)	1st year (n=84; 58 females) and 2nd year (n=79) medical undergraduates	Cross-sectional	Mayer-Salovey-Caruso Emotional Intelligence Test	Continuous assessments and final examination results	Overall EI score showed positive correlations with overall continuous assessments (r=0.24, P=0.03) and final examination (r=0.21, P=0.01) Subscale analysis: Perceiving and understanding emotion correlated with continuous assessments as well as final examination marks
4	Unnikrishnan et al., 2015 (India)	2nd, 3rd and 4th year medical undergraduates n=532 (316 females)	Cross-sectional	Schutte Self-Report Emotional Intelligence Test	Grades of all three years divided into different levels as 1st classes, 2nd class, passes and fails	EI categories and performance categorieswere positively correlated (p=0.001)

Table 1: Methods Used and Findings of the Studies in the Review (n=23)

No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
5	Wijekoon et al., 2017 (Sri Lanka)	Final year MBBS undergraduates (just passed out) n=130	Cross-sectional	Genos Emotional Intelligence full version	Final MBBS results in the first attempt	Total EI score was an independent predictor of final MBBS results [β-0.018, p = 0.006] after adjusting for gender
6	Austin et al., 2005 (UK)	1st year medical undergraduates n=156	Longitudinal	Austin, Saklofske, Huang, and McKenney scale	Year 1 students' written scores in 3 end-of-term examinations	EI score correlated with one term one subject score only (r=0.22, P=0.007)
7	Brannick et al., 2013 (USA)	Medical undergraduates of year 1 and year 2, followed till the year 4 n=203	Longitudinal	Mayer-Salovey-Caruso Emotional Intelligence Test	GPA of year 1and 2 combined, GPA year 3 and year 4 and clinical skills assessed in 12 OSCE stations	EI score predicts GPA year 3 (r=0.17, P<0.05) and GPA year 4 (r=0.16, P<0.05) EI score showed no significant correlation with clinical examination performance
8	Ranasinghe et al., 2017 (Sri Lanka)	Medical undergraduates of 2nd, 4th and final years n=471	Cross-sectional	Schutte Self-Report Emotional Intelligence Test	Examination results of different years	Only among final year undergraduates, those who passed the Clinical Sciences examination in the first attempt had a higher EI score (p <0.001)

Table 1: Methods Used and Findings of the Studies in the Review (n=23)

No	Author, Year & Country	Study population & Sample size	Study design	EI Scale used	Outcome measurement	Association/Correlation/Influence
Studies focused on medical undergraduates – No association						
1	Altwijri et al., 2021 (Saudi Arabia)	4th-6th year medical undergraduates n=296	Cross-sectional	Schutte Self-Report Emotional Intelligence Test	GPA in the most recent examination	EI showed no correlation with academic success ($p > 0.05$)
2	Holman et al., 2016 (New Zealand)	1st year medical undergraduates (48 males)	Cross-sectional	Schutte Self-Report Emotional Intelligence Test	Course performance grade	EI score and academic performance showed no correlation ($p = 0.31$).
3	Humphrey-Murto et al., 2014 (Canada)	Two cohorts of medical undergraduates (n=120 and 106) followed in years 2, 3, and 4	Longitudinal	Mayer-Salovey-Caruso Emotional Intelligence Test	Mean written examination scores of year 1, 2, 3	EI scores showed no significant correlations with written examination scores in both groups ($p>0.05$)
4	Stratton et al., 2005 (USA)	3rd year medical undergraduates of 2 different cohorts n=165	Cross-sectional	Trait Meta-Mood Scale	Clinical skills assessed by standardized patients in 12-station OSCE.	EI score and clinical skills were not correlated ($p>0.05$)
5	Austin et al., 2007 (UK)	Medical undergraduates of years 1, 2, and 5 (188 females, 85 males)	Longitudinal	Austin, Saklofske, Huang, and McKenney scale	End-of-year marks of year 1, year 2 and year 5	EI score was not associated with end-of-year marks for any year ($p>0.05$)

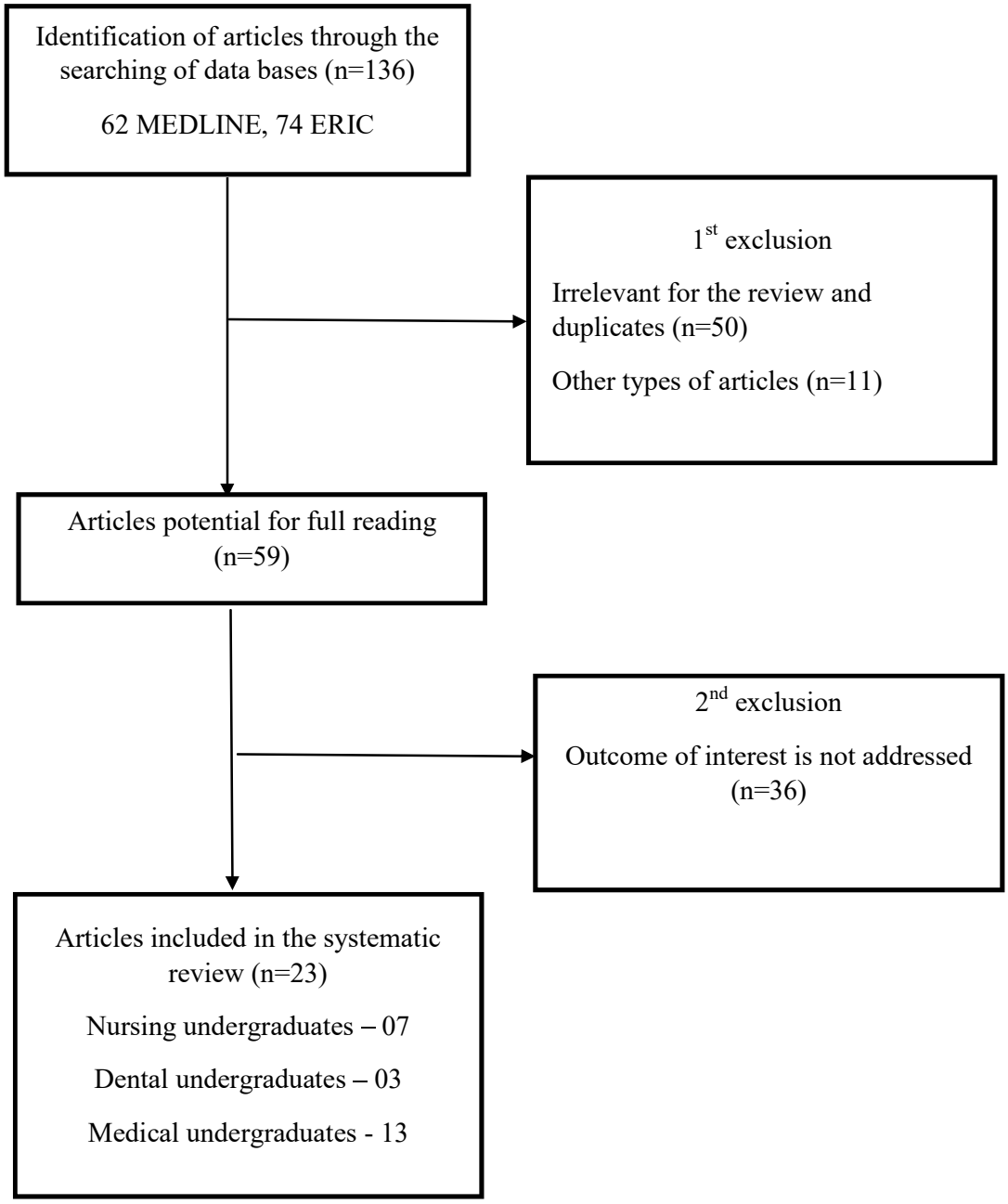

Figure 1: Summary Results of the Literature Search (PRISMA*)*

Tools Used to Assess the EI and Academic Performance

Among these studies, EI has been measured by several tools including Schutte Self-Report Emotional Intelligence Test (n=06), Mayer-Salovey-Caruso Emotional Intelligence Test (n=05), Bar-On emotional quotient inventory (n=03), Trait Emotional Intelligence Questionnaire (n=02), Emotional Quotient Self-Assessment Checklist (n=02), Austin, Saklofske, Huang, and McKenney scale (n=02), Genos Emotional Intelligence full version (n=01), Trait Meta-Mood Scale (n=01) and Emotional Competence Inventory (n=01). Further, academic performance has been assessed by taking the grade point average (GPA) score, student's year/semester/final year/continuous assessment test scores for either theory component or clinical/practical component.

Impact of EI on Academic Performance of Health Sciences Undergraduates

Of the 23, fourteen studies (60.9 %) (3 nursing, 3 dental and 8 medical) have shown that EI is linked with the successful academic performance of health sciences undergraduates. Nine studies (39.1%) (4 nursing, 5 medical) have not been able to reveal an association between the EI and academic performance (Table 1).

Impact of EI and Academic Performance in Nursing Undergraduates

EI scores were found to be positively correlated with overall academic performance evaluated with GPA scores (β=0.25, p=0.023) (Fernandez et al., 2012) and mean score for all assignments in year 1 (r=0.16, p<0.05) and clinical practice performance (R^2=0.68) (Rankin, 2013) of nursing undergraduates in Australia and UK, respectively. Beauvais et al have shown that only one branch of EI (perceiving emotions) correlates with academic performance assessed with GPA (r=0.23, p=0.04) (Beauvais et al., 2014); however, overall EI score showed no correlation with overall academic performance (p>0.05) of nursing undergraduates of the USA. Further, a few studies reported no association between EI and academic success in either clinical or theory competency measured with GPA among nursing undergraduates in the USA (Cheshire et al., 2015) and overall academic performance of nursing undergraduates in Saudi Arabia (Suliman 2010) and Spain (Roso-Bas et al., 2016).

Impact of EI and Academic Performance in Dental Undergraduates

EI has shown positive correlations with academic performance (R^2=0.42, p<0.05) of Indian dental undergraduates evaluated using final year grades (Kumar et al., 2016). Similarly, Partido and Stafford have shown EI scores to positively predict the overall GPA (R^2=0.35, p<0.001) and clinical performance grades (R^2=0.33, p<0.001) among dental undergraduates of the USA. The EI subsets of

self-control, motivation, and self-confidence have been identified as the predictors of overall academic performance while EI subsets of social competence, empathy, and motivation were the predictors of clinical performance (Partido and Stafford, 2018). Victoroff and Boyatzis have also shown EI subscale (relationship management) to be positively correlated with the overall academic performance (β=0.50, $p<0.001$) and self-management subscale to be positively correlated with clinical GPA (β=0.49, $p<0.05$) of another cohort of dental undergraduates in the USA. Furthermore, the clinical performance of dental undergraduates including diagnostic and treatment planning skills, time utilization, preparation and organization, fundamental knowledge, technical skills, self-evaluation, professionalism, and patient management have also shown to be significantly associated with EI scores. However, EI subscale on self-management was negatively correlated with the overall academic performance (β=0.39, $p<0.05$) of these undergraduates (Victoroff and Boyatzis, 2013).

Impact of EI And Academic Performance in Medical Undergraduates

EI have shown positive correlations with academic performance measured with GPA among medical undergraduates of Iran (Fallahzadeh, 2011; Radfa et al., 2012). Overall EI scores of Malaysian medical undergraduates have also shown positive correlations with overall performance at continuous assessments ($r=0.24$, $p=0.03$) and final examination ($r=0.21$, $p=0.01$). Further, in the subscale analysis, both perceiving and understanding emotions subscales have shown positive correlations with continuous assessments as well as final examination marks (Chew et al., 2013). EI categories have shown significant associations with grades of all three years divided into different levels of academic achievements ($p=0.001$) among medical undergraduates of India (Unnikrishnan et al., 2015). Similarly, a Sri Lankan study has also observed that total EI score as an independent predictor of final MBBS results [β-0.018 (95% CI 0.005-0.031); $p = 0.006$] after adjusting for gender of medical undergraduates (Wijekoon et al., 2017).

EI score of UK medical undergraduates has shown positive correlations only with one term one subject score ($r=0.22$, $P=0.007$) where subjects scores of other semesters showed no correlation with EI (Austin et al., 2005). A study from the USA has shown that medical undergraduates EI score is correlated with the GPA of theoretical component of examinations and is not correlated with clinical component (Brannick et al., 2013) while a Sri Lankan study providing evidence that EI scores are higher among medical undergraduates who passed clinical examinations successfully at the first attempt with good grades (Ranasinghe et al., 2017). In contrast to above studies, a Saudi Arabian study has shown EI is not associated with academic success of undergraduates (Altwijri et al., 2021). A few studies from the West also reported that EI has no association with academic performance in both theoretical components (Holman et al., 2016; Humphrey-Murto et al., 2014; Austin et al., 2007),

as well as in clinical performance evaluated based on OSCE scores (Stratton et al., 2005) of medical undergraduates.

Discussion

The main purpose of the review was to identify the impact of EI on academic performance of health sciences undergraduates. A majority of reviewed studies (n=14, 60.9%) have clearly observed that EI has a significant association with academic success in health sciences undergraduates while others have observed no associations. Studies that showed an inverse association were less in numbers. This observation is concordant with the studies which identified the relationship between EI and academic success of other categories of university undergraduates and school children in different levels. However, the assumption that EI has a significant contribution on academic success of health sciences undergraduates is still contradictory and cannot be generalized to all the health science undergraduates. Most of the studies were cross sectional in design hence considered only an academic performance of a given time. A point analysis may not capture the academic skills of an individual due to many other factors. Studies that capture the academic performance during the entire period of study or in critical evaluations such as barrier exams are likely to generate more valid information.

Though some of the studies have observed an association between EI and academic performance measured in both clinical and theoretical components, these studies have used different scales to evaluate the EI and academic performance. And further, some studies have not reported the adaptability criteria of EI tools they used for the countries and cultures (Stough et al., 2009). These reasons further limit the generalizability of observed associations between EI and academic success of health sciences undergraduates.

The academic success is not purely predicted by the EI, the IQ level, personality, childhood character development, social status, ethical behaviour and communication skills also may influence that(Epstein and Hundert, 2002)**.** Apart from that, the tools that have been used to assess the academic performance might not have captured the EI since the tools did not contain criteria focused on EI (Cheshire et al., 2015). The studies which did not observe the association between the EI and academic success might be due to these reasons.

The main limitation of this review is that we considered only the objectively measured academic performance. However, review would have been better if it was more elaborated on the contribution of EI on the competencies of future healthcare professionals such as professionalism, ethical behaviour, and ability to build a professional relationship as well. Therefore, we recommend further studies

mainly in interventional nature while considering the important aspects of professionalism, ethical behaviour and soft skills as well with proper objective measurement tools.

Conclusions

A majority of studies have observed an impact of EI on academic performance of health sciences undergraduates; however almost all the studies were cross sectional and considered only the performance at a given time. Therefore, this association needs to be tested in larger samples followed up for the entire period of study.

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