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EXPLORING ENGINEERING UNDERGRADUATES' EMOTIONAL INTELLIGENCE: A GENDER COMPARISON STUDY IN MALAYSIA

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Emotion intelligence (EI) identifies with how a person manages emotions. It has been linked to career based competency such as leadership, management, and social skills. Engineering, on the other hand, is generally pictured as a rational and logical profession that is not associated with emotionality (Roeser, 2012). This has caused this profession to be labelled as 'male' profession and thus marginalising women in engineering (Price, Svensson, Borell, & Richardson, 2017). This study aims to explore if there are gender differences in EI of engineering undergraduates in Malaysia. EI was explored based on four different factors which are well-being, self-control, sociability, and emotionality. A quantitative study was done on 218 electronic engineering undergraduates in Malaysia using the Traits Emotional Intelligence Questionnaire – Short Form (TEIQue-SF). Based on the findings, there was no significant difference between genders for EI and its factors. Overall, male undergraduates were found to have higher but statistically insignificant EI scores As for EI factors, female respondents were found to have higher levels of self-control and emotionality whereas male respondents had higher levels in wellbeing and sociability. The correlation between EI and its' factors were similar and showed strong to medium positive relationship for both genders. Therefore, concluding that the disparity between genders in regards to emotional intelligence are not apparent but both genders have their own emotional forte that may be directed for meaningful professional growth in engineering.

Keywords: Engineering education, emotional intelligence, gender differences.

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1. Introduction

Emotional intelligence (EI) is defined as the "the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (Mayer & Salovey, 1990, p.189). EI has been found to be significant in education and career growth (Maguire, Egan, Hyland, & Maguire, 2016). Addressing EI is an interdisciplinary approach to explore technical and non-technical knowledge that may influence professionalism in the knowledge society (Marcos-Jorquera, Pertegal-Felices, Jimeno-Morenilla, & Gilar-Corbí, 2017). In addition, EI also advocates emotional stability and regulation which are important aspects of the workplace, education, and adaption in new situations (Nur Hafizah, 2015). Therefore, over the past decade, EI has received a great amount of attention in academia. Researchers are exploring EI traits that relates it to cognitive and affective learning outcomes (Kashani, Azimi, & Vaziri, 2012) and this has widened the understanding of how personality and emotions may influence learning outcomes (Sanchez-Ruiz, Mavroveli, & Poullis, 2013). An individual with high EI was reported to have high satisfaction in life, high self-esteem (Muhamad Saiful Bahri et al., 2011), pleasant, resilient, positive (Serrat, 2009), goal oriented (Lawson, 2002) and is able to manage a negative situation positively (Kruger, 2008). From the educational perspective, students with high EI have been found to able to positively manage their emotions towards excellence in their academic achievement (Azlina & Lee, 2012). EI has been found to influence learning adaptability hence academic achievement (Fei-Zhou, Wen-Chen, Hui-Xie, & Hong-Xie, 2014). However, as beneficial as EI is, Zeidner, Matthews, & Roberts (2009) claims that students today are not trained sufficiently in EI that will enable them to perform in the working environment. The last platform available for educators to help develop the right EI skills before they enter the workforce is usually through higher educational institutions (HEI). EI being a learnable skill further accentuates the role of HEI in developing the right skills that portray the positive working behaviour and aptitudes (Chisholm, 2010; Nizaroyani, Norhamidi, Dzuraidah, & Ja'afar, 2011). One of the main benefits of EI is its positive influence towards mental health, psychological adjustment threshold and adaption (Fei-Zhou et al., 2014).

EI is beneficial in learning as it increases awareness and confidence in self-abilities and concurrently helps students manage stress, anxiety, motivation, self-regulation, study habits and indirectly their academic achievement (Fei-Zhou et al., 2014; Zeidner et al., 2009). Nevertheless, in some studies, it was found that EI did not affect learning achievement (Olatoye, Akintunde, & Yakasai, 2010; Stamatopoulou, Kargakou, Konstantarogianni, & Prezerakos, 2015) yet only influenced the overall academic achievement of the students (Azlina & Lee, 2012; Fei-Zhou et al., 2014; Muhamad Saiful Bahri et al., 2011). Murphy and Janeke (2009) claims that students with high EI are more creative in nature and are willing to explore new possibilities especially in learning whereas low EI students prefer simplistic methods that are straightforward. High EI students were also able to cope with academic stress and improve their academic achievement (Azlina & Lee, 2012). Thus, Oyewunmi, Osibanjo, and Adeniji (2016) recommended integrating EI in university curriculum as it will help the undergraduates in regards to motivation, social interaction, psychological health and concurrently the academic achievement. This is concurrent with the demands of the current knowledge society that requires competence in technology and interpersonal skills thus rejecting how we perceive traditional monodisciplinary professions such as engineering (Marcos-Jorquera et al., 2017).

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2. Literature Review

2.1. Emotional intelligence and engineering education

According to Lord, Layton, & Ohland (2011) it is crucial to understand the educational goal of an engineer. Their education has been found to be a good platform to develop creativity and innovation skills as they are trained to build and design (Chin, Raman, Yeow, & Eze, 2014). It is also universally accepted that engineering is highly correlated with high IQ levels (Thadhani, 2016) which is their cognitive ability. Yet, IQ is not only predetermined by intelligence factor. A person's cognitive ability may also be linked to emotions because it influences rational thoughts, information processing, and problem-solving skills. Therefore, even in engineering education, holistic education will enable an individual to have the right skills to adapt to the demands of the engineering industry. According to Marcos-Jorquera et al., (2017), they found engineering students academic performance improved adaptability in the professional environment if an interdisciplinary approach is taken. Roeser (2012) explained that having empathy, for instance, will enable engineers to understand the users' needs and create solutions that are more user-oriented.

Furthermore, the demanding nature of today's workforce has called for higher education institutions to integrate management and leadership skills training for future engineers (Lappalainen, 2014). Hence, another aspect of emotional management that is crucial for the engineering profession. According to Boyatzis, Rochford, & Cavanagh (2017), most engineering programs do not emphasise the education and development of EI even when these emotional competencies could be developed without hindering the technical content of the curriculum. Riemer (2003) reported that the integration of EI in an engineering curriculum in universities such as in Poland and Germany have shown improvements in the social adaption, leadership and knowledge acquisition which are essential career skills. Studies in Malaysia such as by Noriah, Siti Rahayah, Izham, & Salleh (2009) also found that engineering students with high EI have shown better leadership skills. Nizaroyani et al. (2011) added that these skills will be very desirable when undergraduates are in the workforce. Concluding that utilising and managing emotions to succeed is important irrelevant if it's in the academia or industry (Oyewunmi et al., 2016).

2.2 Emotional intelligence, engineering, and gender

Gender is defined as sexual identity relating to individuals' masculinity or femininity (Barth, 2012). Thadhani (2016) claims that usually females are perceived as emotional species and males as the rational species. Therefore, in engineering which is deemed as a 'rational' profession, there has been gender stereotyping that has labelled it as a 'male' type of profession (Roeser, 2012). However, being emotional and having a repertoire of emotional skills are two different aspects. According to McNulty, Mackay, Lewis, Lane, and White (2015), there has been no agreement on the difference between genders in regards to EI nor its sub-scales. Petrides (2009) explained that based on the global traits EI, males respondents tend to score higher than female respondents however the results had very small effect size.

Nevertheless, engineering is gendered profession (Lord et al., 2011) and according to Olmedo-Torre et al. (2018) the number of women in engineering has dropped through these years especially in the area of computing and electrical engineering. It has been found that electrical engineering especially has

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the lowest percentage of women enrolment worldwide (Lord et al., 2011) and in research, the under-representation of women in engineering and female undergraduates has not changed much for decades (Blosser, 2017; Price et al., 2017). A study done by Olmedo-Torre et al., (2018) found that low enrolment of females in Science, Technology, Engineering and Mathematics (STEM) are usually due to the social stereotype of the profession. This is also apparent in Malaysia. Female engineering undergraduates were also found to be lacking in self-confidence and the difference is also apparent in regards to academic achievement, satisfaction, and commitment to the profession (Hartman & Hartman, 2009). Yet, Lappalainen (2014) found similarities in how both genders emotional communicate however reported differences in how they show empathy in the workplace. In addition, Lord et al., (2011) found no difference in regards to the determination in completing an engineering course nor progressing in the workplace. Self-confidence, adaptability, and satisfaction are some of the attributes that are influenced by emotional intelligence. In Malaysia, Ng, Tay, Law, and Goh (2012) claims that male engineering undergraduates have higher levels of EI than female students. Zhou (2010) also states that male engineering undergraduates were found to excel in personal skills whereas females in social skills. The disparity between gender in engineering and the underrepresentation of female engineering undergraduates in educational research have called for extensive research to identify motives, barriers (Lord et al., 2011; Olmedo-Torre et al., 2018) and factors influencing gender stereotyping in the engineering profession especially in the undergraduate level (Zhou, 2010).

2.3. Traits Emotional Intelligence

It is commonly known that there are two main methods of measuring a persons' EI; trait or ability. Traits EI is a method that measures EI based on self-perception whereas ability is based on cognitive testing (Petrides, 2011). However, Boyatzis et al., (2017) claims that there are currently two more additional methods. The third method is a 'mix mode' because it combines the first two methods and is based on general abilities than a perceptual one. The fourth method introduced is based on the non-self-assessment method on the perception of behaviour by supervisors, peers, and subordinates. In this study, traits EI is used to measure students EI levels and according to Maguire et al., (2016) this method has been successfully applied in the educational context. Traits EI is also able to suggest the right academic or vocational line in the higher education setting (Sanchez-Ruiz et al., 2013). Trait EI is defined by four factors; well-being, self-control, sociability and emotionality and are described in Table 01.

Table 01. Emotional intelligence factors

EI Factors	***Key terms***	***Description (Petrides, 2009)***
Well-Being	Trait happiness and optimism, self-esteem	**High-level** of well-being describes a person that is happy, positive and content. **Low level** of well-being describes a person with low self-regard and is dissatisfied with their life.
Self-Control	Stress management, emotion regulation	**High level** of self-control describes a person that is able to control their urges, desires, pressure, and stress. They are not very expressive however also not suppressed. **Low level** of self-control describes a person that is impulsive and unable to manage stress.
Emotionality	Emotion expression, relationships, empathy, emotion	**High level** of emotionality describes a person that is highly aware of their own emotions and others. Their perception and expression of emotions are used to build good relationships. **Low levels** of

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	perception	emotionality describe a person with challenges in identifying and expressing their emotional states. Therefore, unable to sustain healthy relationships.
Sociability	Emotion management, social awareness	**High levels** of sociability in an individual portray a person that is confident socially thus excellent in communicating clearly and confidently in a multicultural background. **Low levels** of sociability portray an individual that is socially awkward and would appear as reserved. They are most likely not good in networking and diplomatic relationships.

3. Purpose of the Study

The purpose of this study is to explore levels of EI among engineering undergraduates in Malaysia and to determine how EI and its factors (well-being, self-control, sociability, and emotionality) is associated with gender differences among the respondents. Thus, this study will enhance the relevant literature relating to EI, engineering education and gender differences in Malaysia.

4. Research Methods

4.1. Participants

218 respondents from four different polytechnics in Malaysia took part in this study. All were enrolled as undergraduates for the diploma in electronic engineering course. The undergraduates were in their final year of their course.

4.2. Instrument

The Traits Emotional Intelligence Questionnaire – Short Form (TEIQue-SF) by Petrides and Furnham (2006) was used to measure students EI. The original version was not utilised due to a high number of items (153 item) and Deutskens, de Ruyter, Wetzels, and Oosterveld (2004) claims that this may cause dishonesty in feedback. The TEIQue-SF is a shorter version with 30-item that measures emotionality, self-control, sociability, and well-being which totals up as global trait EI value. TEIQue-SF can be applied for rapid assessment and has shown excellent psychometric properties through Item Response Theory (Cooper & Petrides, 2010). It was reported to have alpha Cronbach value of .890 (Cooper & Petrides, 2010). Each item is graded based on a seven-point Likert scale ranging from 1(completely disagree) through 7(complete agree). The scores could be either classified as Above Average (70%-99%), Average (30%-69%) or Below Average (1%-29%)(Petrides, 2009).

4.3. Procedure

Prior to the actual study, pre-testing was done on five respondents to ensure comprehension of the items and instructions. The respondents were encouraged to give feedback on items or words that they found were unclear (Radhakrishna, 2007). Items such as "*I tend to get involved in things I later wish I could get out of*" were changed to "*I have a habit of getting involved in things I later wish I did not*". The

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respondents were given 20 minutes to complete the questionnaire. The TEIQue-SF was also supplemented with an explanatory statement on the objective of the study and with this, the respondents were asked to give feedback relating to their demographic profile such as age, gender, course, student ID. The analysis was done by SPSS in which the mean score was calculated for the overall score and the factors. Next, correlation analyses were done between the total trait EI value and other factors to analyse the association. Next, gender differences were examined using independent t-test and lastly, the correlation between the factors and towards total EI was explored.

5. Results

A total of 218 respondents participated in this study, 134 students were male (62.6%) and 80 students were female (37.4%). Based on the age group, 152 students (71.0%) were between the ages of 18 to 20 years old and 62 students (29.0%) were between the ages of 21 to 25 years old. Prior to the analyses, the data were checked for outliers and four respondents were removed based on Z-score that were above ±3.0 (Osborne & Overbay, 2004). Therefore the remaining sample was 214 respondents. The alpha Cronbach's value obtained was 0.797 and indicated that the TEIque-SF is reliable. Based on the Shapiro-Wilk analysis it was found that the data were normally distributed ($p>.05$) with skewness and kurtosis (Skewness = -.306, S.E. = .166, Kurtosis =-.290, S.E. = .331) indicating values between ±2.0 (George & Mallery, 2010). The mean value for each EI factors (emotionality, self-control, sociability, and well-being) and the total EI (global EI) is presented in Table 02. The differences between the mean values of total EI and its' factors are graphically illustrated in Figure 1. The highest mean value obtained was for *self-control* and the lowest for *emotionality*.

Table 02. Overall mean value and categories of EI and its' factors

Factors	***Min***	***Max***	***Mean***	***s.d.***	***Category***
Wellbeing	3.00	6.50	4.741	.664	Average (67.73%)
Self-Control	2.83	6.17	4.873	.674	Average (69.61%)
Emotionality	2.63	6.38	4.609	.717	Average (65.84%)
Sociability	3.00	6.33	4.782	.593	Average (68.31%)
Total	3.50	6.20	4.753	.522	Average (67.90%)

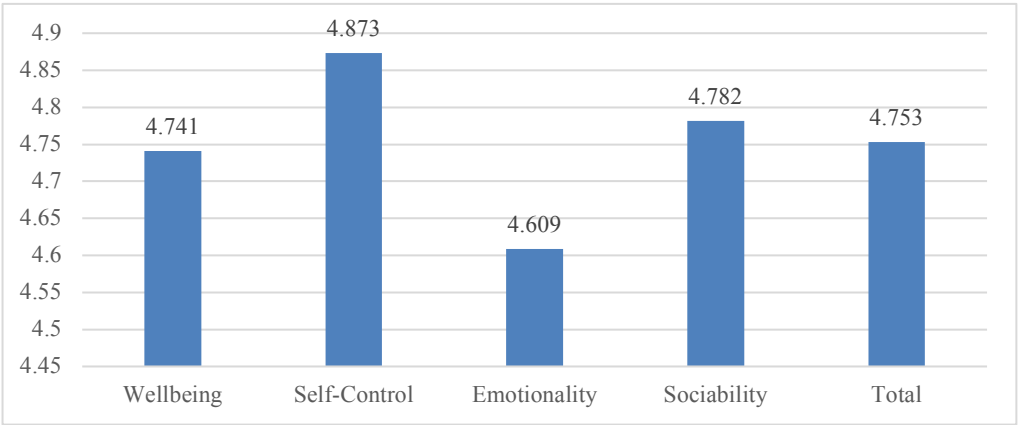

Figure 01. Mean difference between total EI and its' factor.

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Based on the Pearson Correlation analysis performed, it was found that all factors had significant, positive correlation with the total EI (global EI). According to Fallis (2013), association between 0 to .4 is categorised as weak, .4 to .8 is categorised as moderate and above .8 as strong. Thus, based on Table 03, it was found that only emotionality (r =.834, p <.05) had a strong correlation with total EI, whereas others factors had moderate correlations. It was also noted that the inter-correlation between the factors was moderate which showed better results compared to Petrides (2009) psychometric analysis of the instrument. The strongest correlation was observed between emotionality and sociability (r=.536, p <.05) and the weakest is between well-being and self-control (r =.440, p <.05).

Table 03. Overall mean value and categories of EI and its' factors

Factors	***2***	***3***	***4***	***5***
1. Wellbeing	.440**	.462**	.523**	.741**
2. Self-Control	-	.441**	.465**	.718**
3. Emotionality		-	.536**	.834**
4. Sociability			-	.767**
5. Total EI				-

**. Correlation is significant at the 0.01 level (2-tailed)

In regards to gender, the mean value was compared and the findings are presented in Table 04 and illustrated in Figure 2. Overall, male respondents (M= 4.765, s.d. =.528) had slightly higher mean value than female respondents (M=4.735, s.d.= .514). The same trend was observed for well-being and sociability. However, female respondents showed the higher mean score for self-control and emotionality.

Table 04. EI Mean values based on gender

EI Factors	**Male**		**Female**	
Factors	Mean	s.d.	Mean	s.d.
Wellbeing	4.781	.681	4.673	.634
Self-control	4.856	.690	4.902	.649
Emotionality	4.596	.748	4.630	.666
Sociability	4.821	.607	4.716	.566
Total	4.765	.528	4.735	.514

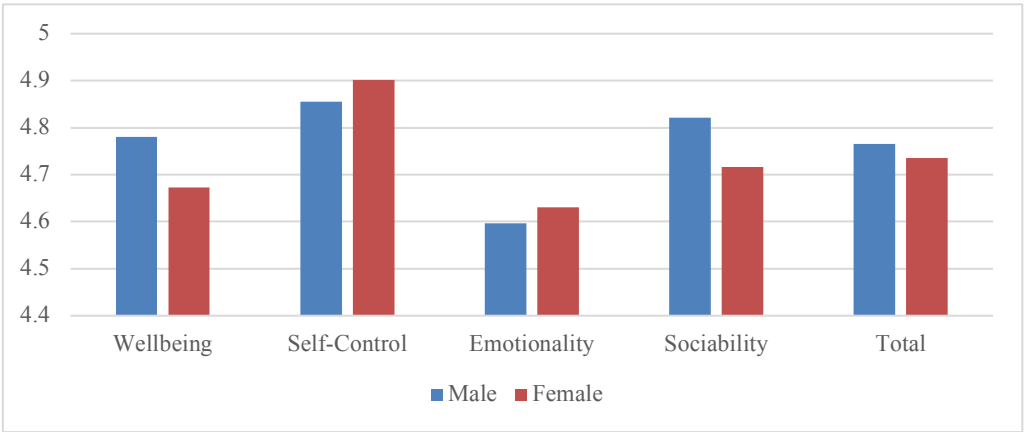

Figure 02. Mean difference between total EI and factors based on gender.

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To identify if the differences were significant, independent t-test analyses were performed on total EI and its' factors. Based on the findings, no significant difference were found between gender based on the total EI and its' factors. The difference for total EI were non-significant at t (212) =.407, p >.05, d =.06. Male respondents scored higher in wellbeing and sociability at t (212) =1.145, p >.05, d =.16 and at t (212) =1.253, p >.05, d =.18 respectively, however, the difference was also not significant. As for self-control and emotionality factors, female respondents scored higher than the male respondents and the difference was also non-significant at t (212) =.479, p >.05, d =.07 and at t (212) =.337, p >.05, d =.05 respectively. The effect size (Cohen d) in regard to gender and EI and its' factors were small thus indicating low practical effect (Cohen, 1988). Lastly, based on the correlation analyses performed to explore the difference in association between EI and its factors (Table 05), it was found that the strongest association was for the emotionality factor. Other factors had moderate positive correlation that were statistically significant. The findings were similar for both male and female respondents.

Table 05. Correlation between EI and factors between gender

Gender	Correlation with total EI			
	Well-being	**Self-control**	**Emotionality**	**Sociability**
Male N=134	.742**	.720**	.826**	.760**
Female N=80	.741**	.720**	.855**	.781**

**. Correlation is significant at the 0.01 level (2-tailed).

6. Discussion and conclusion

The focus of this study was to explore the level of traits emotional intelligence among engineering undergraduates and secondly to explore the differences of gender for these outcomes. In addition, differences and level of association between EI and its' factors were also investigated. First, from the results of the mean value, all the factors and total EI value were classified as *Average*. The average scores for EI (M=4.753, s.d. = .522) were also observed by (Sanchez-Ruiz et al., 2013) on engineering undergraduates from a university in Cyprus. It indicates a normal level of perceiving and managing emotions. According to (Zhou, 2010), an average EI score suggests that the respondents are overall awareness of their behaviours however there is still room for improvement. Based on the findings, the highest mean value obtained was for *self-control* and *sociability,* and the lowest for *emotionality*. Based on the description provided by (Petrides, 2009) in Table 1 and the findings in Table 02, self-control (69.61%) had a tendency towards high levels, thus indicating high abilities to control their emotions which are related to emotional regulation. Both these aspects are influential in determining how a person adopts in a social context (Paschke et al., 2016). However, these factors also may negatively influence emotional expression. According to (Nur Hafizah, 2015), undergraduates who suppress their expression may have a problem in socialising and getting academic support. Yet, in this study, average scores in sociability proved otherwise. The finding also showed lower scores in *emotionality* (65.84%) which reflects challenges in expressing emotions. According to Ibrahim, Johnson, and Gilligan (2014), expressing emotions in Malaysia are perceived negatively and should be avoided to show professionalism. High levels of self-control and emotional regulation are positively correlated to behavioural control and trait self-control (Paschke et al., 2016). Therefore, in the Malaysian context

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where culture, values and religion plays an important role, exhibiting traits of self-control and emotionality is as per dictated by societies requirements.

Secondly, the inter-correlations between total EI and its' factors are slightly higher than those reported by Petrides (2009). The strength of the associations was medium. Sociability and emotionality had the strongest relationship (r = .536) even higher than reported by Petrides (2009) (r = .395) for respondents in United Kingdom. The same was also observed between wellbeing and sociability (r = .523), where the study by Petrides (2009) reported r = .447. The inter-correlation between factors as reported by Petrides (2009) has an average score of r =.42 and in this study, the average is reported to be r = .38. Thirdly, the difference between genders in regards to total EI and its factors were analysed based on mean value and standard deviation. Cooper and Petrides (2010) reported male respondents (M = 5.02, s.d. = .73) having lower EI scores compared to female respondents (M = 5.18, s.d. = .68). However in this study, as male undergraduates were found to have higher scores but non-significant. A similar finding was also reported by Lappalainen (2014). Goleman (1998) explained that each gender only varies based on individual personality thus emotional sensitivity, expression and adaptability are not predetermined by gender but other factors such as culture and environment. As for other EI factors, female respondents were found to have higher mean scores for self-control and emotionality whereas male respondents had higher scores for wellbeing and sociability. These findings contradicted Zhou (2010) findings on engineering undergraduates where female students were found to have higher sociability skills than male students whereas male students had better personal skills. Based on the description Table 01 and the outcomes of this study, the researcher perceives that factors such as self-control and emotionality are aspects of emotional expression that are 'viewed' by the society that should be controlled or regulated for women. Portraying emotions and sociability are viewed negativa ely in some Asian cultures.

Nevertheless, as the difference were not significant thus these findings could not be used to describe the emotional characteristics of the respondents. According to Ismatullina and Voronin (2017), females usually emphasis more on emotionality and values thus scoring higher in self-control and emotionality. In addition, female engineering undergraduates were found to be inclined towards emotion-focused strategies to manage stress whereas male students are inclined towards problem-focused strategies such as adaptability (Sharmila, 2016). Male and female students had similar dispersions in their responses based on the standard deviation outcomes. Based on the correlation, similar relationship (positive and significant) was observed for both the genders and there were not much variations in all the relationships. The strongest relationship was observed for emotionality, where both genders indicated that 68.2% for male and 73.1% for females' emotionality can be determined by their EI scores.

Overall, the findings of this study concludes that engineering undergraduates have 'normal' levels of emotional intelligence. The term average is not used as it may indicate that the respondents' levels of EI to be misinterpreted negatively. All other factors such as well-being, self-control, sociability, and emotionality also had normal levels. Recently there has been a growing body of research relating to the negative side of having high levels of EI. According to Davis and Nichols (2016), high levels of EI have been linked to narcissism that may be associated with antisocial behaviour. They also discussed how empirical research relating to very high levels of self-efficacy (self-belief), self-esteem and emotional manipulation which are related to high levels of EI might have a negative effect on a person's emotional

well-being such as creating stress. Therefore, high levels of EI as mentioned by Davis and Nichols (2016) may have negative intrapersonal effect towards the individual and also towards others. Thus, having normal levels of EI is not bad after all and it also leaves room for growth. In regards to gender differences, there were not much difference in regards to EI and its factors for engineering undergraduate. Nevertheless, this is indeed a positive outcome if we hope to use higher education to improve EI. If there was significant difference, it would indicate the need to develop different methods of training based on gender characteristics. Even if prior studies have found disparity in regards to self-confidence and emotional factors of female engineering undergraduates, the outcome of this study shows similarity in this aspect for both genders. This supports the finding by Hartman and Hartman (2009) where women in engineering have been found to have healthy self-confidence. In addition, EI training in engineering curriculum has been found to reduce the drop-out rates in engineering courses (Riemer, 2003), thus by acknowledging that there is no disparity of EI levels between genders, similar training could be provided to both genders. Marcos-Jorquera et al., (2017) also suggested integrating interdisciplinary perspectives to compliment the needs of the engineering profession. This new competency training in engineering education will enable engineering undergraduates to become morally responsible engineers for the future (Roeser, 2012) irrelevant of which gender.

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References

Azlina, M. K., & Lee, L. H. (2012). Ability emotional intelligence versus trait emotional intelligence. In *Seminar Kebangsaan Majlis Dekan 2012*. Johor Bahru, Malaysia.

Barth, D. (2012). *Designing the Gender- Neutral User Experience*. Worcester Polytechnic Institute. Retrieved from https://www.wpi.edu/Pubs/E-project/Available/E-project-042612-150925/unrestricted/Designing_the_Gender-Neutral_User_Experience.pdf

Blosser, E. (2017). Gender Segregation Across Engineering Majors: How Engineering Professors Understand Women's Underrepresentation in Undergraduate Engineering. *Engineering Studies*, *9*(1), 24–44. https://doi.org/10.1080/19378629.2017.1311902

Boyatzis, R., Rochford, K., & Cavanagh, K. V. (2017). Emotional intelligence competencies in engineer's effectiveness and engagement. *Career Development International*, *22*(1), 70–86. https://doi.org/10.1108/CDI-08-2016-0136

Chin, S. T. S., Raman, K., Yeow, J. A., & Eze, U. C. (2014). The influence of emotional intelligence and spiritual intelligence in engineering entrepreneurial creativity and innovation. *2013 IEEE 5th International Conference on Engineering Education: Aligning Engineering Education with Industrial Needs for Nation Development, ICEED 2013*, 109–113. https://doi.org/10.1109/ICEED.2013.6908313

Chisholm, C. U. (2010). The formation of engineers through the development of Emotional Intelligence and Emotional Competence for global practice. *Global Journal of Engineering Education*, *12*(1), 6–11.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). New Jersey: Lawrence Erlbaum Associates, Inc.

Cooper, A., & Petrides, K. V. (2010). A psychometric analysis of the Trait Emotional Intelligence

Questionnaire-Short Form (TEIQue-SF) using item response theory. *Journal of Personality Assessment*, *92*(5), 449–57. Retrieved from https://doi.org/10.1080/00223891.2010.497426

Davis, S. K., & Nichols, R. (2016). Does emotional intelligence have a "dark" side? A review of the literature. *Frontiers in Psychology*, *7*(AUG). https://doi.org/10.3389/fpsyg.2016.01316

Deutskens, E., de Ruyter, K., Wetzels, M., & Oosterveld, P. (2004). Response Rate and Response Quality of Internet-Based Surveys: An Experimental Study. *Marketing Letters*, *15*(1), 21–36. https://doi.org/10.1023/B:MARK.0000021968.86465.00

Fallis, A. (2013). *Doing Data Analysis with SPSS Version 18*. *Journal of Chemical Information and Modeling* (Vol. 53). Retrieved from https://doi.org/10.1017/CBO9781107415324.004

Fei-Zhou, X., Wen-Chen, Y., Hui-Xie, & Hong-Xie. (2014). The associations between emotional intelligence and academic achievement: Mediator or moderator effect of learning adaptability. *IEEE International Conference on Industrial Engineering and Engineering Management*, 1671–1674. Retrieved from https://doi.org/10.1109/IEEM.2013.6962694

George, D., & Mallery, M. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference* (10th ed.). Boston, MA: Pearson Education Inc.

Goleman, D. (1998). *Working with emotional intelligence*. *Intelligence*. New York: Bantam. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Working+with+emotional+intelligence#0

Hartman, H., & Hartman, M. (2009). Do Gender Differences in Undergraduate Engineering Orientations Persist when Major is Controlled? *International Journal of Gender, Science and Technology*, *1*, 61–82. Retrieved from http://genderandset.open.ac.uk/index.php/genderandset/article/viewArticle/56

Ibrahim, H., Johnson, S., & Gilligan, P. (2014). The Perception of Emotion: A Case Study in Child and Family Social Workers in Malaysia. In *Seminar Kebangsaan Integriti Keluarga 2014* (pp. 1–8).

Ismatullina, V., & Voronin, I. (2017). Gender differences in the relationships between Big Five personality traits and intelligence. *Procedia - Social and Behavioral Sciences*, *237*(June 2016), 638–642. https://doi.org/10.1016/j.sbspro.2017.02.031

Kashani, F. L., Azimi, A. L., & Vaziri, S. (2012). Relationship between Emotional Intelligence and Educational Achievement. *Procedia - Social and Behavioral Sciences*, *69*, 1270–1275. https://doi.org/10.1016/j.sbspro.2012.12.061

Kruger, J. (2008). *Linkages Between Emotional Intelligence and Coping Strategies in Mastering New Educational Technologies*. *Review Literature And Arts Of The Americas*. University of Pretoria. Retrieved from http://upetd.up.ac.za/thesis/available/etd-09252008-165228/

Lappalainen, P. (2014). Predictors of effective leadership in industry – should engineering education focus on traditional intelligence, personality, or emotional intelligence? *European Journal of Engineering Education*, *40*(2), 222–233. https://doi.org/10.1080/03043797.2014.944102

Lawson, C. (2002). The Connections between Emotions and Learning. Retrieved from http://www.cdl.org/resource-library/articles/connect_emotions.php

Lord, S. M., Layton, R. A., & Ohland, M. W. (2011). Trajectories of Electrical Engineering and Computer Engineering Students by Race and Gender. *IEEE Transactions on Education*, *54*(4), 610–618. https://doi.org/10.1109/TE.2010.2100398

Maguire, R., Egan, A., Hyland, P., & Maguire, P. (2016). Engaging students emotionally: The role of emotional intelligence in predicting cognitive and affective engagement in higher education. *Higher Education Research & Development*, *4360*(February), 1–15. https://doi.org/10.1080/07294360.2016.1185396

Marcos-Jorquera, D., Pertegal-Felices, M. L., Jimeno-Morenilla, A., & Gilar-Corbí, R. (2017). An Interdisciplinary Practical for Multimedia Engineering Students. *IEEE Transactions on Education*, *60*(1), 8–15. https://doi.org/10.1109/TE.2016.2566606

Mayer, J. D., & Salovey, P. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, *9*(3), 185–211. https://doi.org/10.1016/S0962-1849(05)80058-7

McNulty, J. P., Mackay, S. J., Lewis, S. J., Lane, S., & White, P. (2015). An international study of emotional intelligence in first year radiography students: The relationship to age, gender and

culture. *Radiography*, *22*(2), 6–11. https://doi.org/10.1016/j.radi.2015.10.008

Muhamad Saiful Bahri, Y., Ahmad Fuad, A. R., Mohamad Najib, M. P., See, C. M., Rogayah, J., & Ab Rahman, E. (2011). The validity and reliability of USM Emotional Quotient Inventory (USMEQ-i): Its use to measure Emotional Quotient (EQ) of future medical students. *International Medical Journal*, *18*(1), 293–299.

Murphy, a., & Janeke, H. C. (2009). The Relationship between Thinking Styles and Emotional Intelligence: An Exploratory Study. *South African Journal of Psychology*, *39*(3), 357–375. https://doi.org/10.1177/008124630903900310

Ng, L., Tay, C., Law, C., & Goh, W. (2012). Examining the Influence of Emotional Intelligence on Students ' Study Approaches and Academic Performance. In *Proceedings of 2012 International Conference on Social Science and Humanity (ICSSH 2012)* (pp. 146–150).

Nizaroyani, S., Norhamidi, M., Dzuraidah, A. W., & Ja'afar, S. (2011). Level of emotional intelligence (EQ) scores among engineering students during course enrollment. In *Seminar Pendidikan Kejuruteraan & Alam Bina (PeKA'11)*. Universiti Kebangsaan Malaysia.

Noriah, M. I., Siti Rahayah, A., Izham, H., & Salleh, A. (2009). The Roles of Emotional Intelligence and Emotion-focused Solution: Developing Leadership Qualities among College Students. *International Journal of Interdisciplinary Social Sciences*, *4*(6), 187–199.

Nur Hafizah, A. H. H. (2015). Emotion Regulation and Academic Performance Among Iium Students: a Preliminary Study. *Jurnal Psikologi Malaysia*, *29*(2), 81–92.

Olatoye, R. A., Akintunde, S. O., & Yakasai, M. I. (2010). Emotional Intelligence , Creativity and Academic Achievement of Business Administration Students. *Electronic Journal of Research in Educational Psychology*, *8*(2), 763–786.

Olmedo-Torre, N., Carracedo, F. S., Salan Ballesteros, M. N., Lopez, D., Perez-Poch, A., & Lopez-Beltran, M. (2018). Do Female Motives for Enrolling Vary According to STEM Profile? *IEEE Transactions on Education*, 1–9. Retrieved from https://doi.org/10.1109/TE.2018.2820643

Osborne, J. W., & Overbay, A. (2004). The power of outliers (and why researchers should always check for them). *Practical Assessment, Research & Evaluation*, *9*(6). Retrieved from http://pareonline.net/getvn.asp?v=9&n=6

Oyewunmi, A. E., Osibanjo, A. O., & Adeniji, A. A. (2016). Emotional Intelligence and Academic Performance of Undergraduates: Correlations, Implications and Interventions. *Mediterranean Journal of Social Sciences MCSER Publishing*, *7*(1), 2039–9340. https://doi.org/10.5901/mjss.2016.v7n1p509

Paschke, L. M., Dorfel, D., Steimke, R., Trempler, I., Magrabi, A., Ludwig, V. U., … Walter, H. (2016). Individual differences in self-reported self-control predict successful emotion regulation. *Social Cognitive and Affective Neuroscience*, *11*(8), 1193–1204. https://doi.org/10.1093/scan/nsw036

Petrides, K. V. (2009). Psychometric Properties of the Trait Emotional Intelligence Questionnaire (TEIQue). In J. D. A. Parker, D. H. Saklofske, & C. Stough (Eds.), *Assessing Emotional Intelligence,*. Boston, MA: Springer US. https://doi.org/10.1007/978-0-387-88370-0

Petrides, K. V., & Furnham, A. (2006). The Role of Trait Emotional Intelligence in a Gender-Specific Model of Organizational Variables. *Journal of Applied Social Psychology, 35*, 552–569.

Petrides, K. V. (2011). Ability and Trait Emotional Intelligence. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *The Wiley-Blackwell Handbook of Individual Differences* (1st ed., pp. 656–678). Blackwell Publishing Ltd.

Price, L., Svensson, I., Borell, J., & Richardson, J. T. E. (2017). The Role of Gender in Students' Ratings of Teaching Quality in Computer Science and Environmental Engineering. *IEEE Transactions on Education*, *60*(4), 281–287. Retrieved from https://doi.org/10.1109/TE.2017.2696904

Radhakrishna, R. B. (2007). Tips for Developing and Testing Questionnaires/Instruments. *Journal of Extension*, *45*(1). Retrieved from http://www.joe.org/joe/2007february/tt2.php

Riemer, M. J. (2003). Integrating Emotional Intelligence into Engineering Education. *World Transaction on Engineering and Technology Education*, *2*(2), 189–194.

Roeser, S. (2012). Emotional Engineers: Toward Morally Responsible Design. *Science and Engineering Ethics*, *18*(1), 103–115. https://doi.org/10.1007/s11948-010-9236-0

Sanchez-Ruiz, M. J., Mavroveli, S., & Poullis, J. (2013). Trait emotional intelligence and its links to

university performance: An examination. *Personality and Individual Differences*, *54*(5), 658–662. https://doi.org/10.1016/j.paid.2012.11.013

Serrat, B. O. (2009). Understanding and Developing Emotional Intelligence. *Knowledge Solutions:Asian Development Bank*, (June), 49. Retrieved from http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1209&context=intl

Sharmila, S. (2016). Emotion and Problem Focused Coping Strategies : A Comparative Study of Male and Female Engineering Students in Chennai City. *International Journal of Advance Research in Computer Science and Management Studies*, *4*(8), 222–224.

Stamatopoulou, M., Kargakou, E., Konstantarogianni, E., & Prezerakos, P. (2015). Research on the Association between Emotional Intelligence and Educational Achievement : A Case Study of the Pupils in the Senior High Schools of Sparta. *International Journal of Caring Sciences*, *8*(1), 9–18.

Thadhani, J. (2016). Emotional intelligence of four different academic disciplines students. *Indian Journal of Health and Wellbeing*, *7*(6), 674–677. Retrieved from www.iahrw.com

Zeidner, M., Matthews, G., & Roberts, R. D. (2009). *What We Know about Emotional Intelligence : How it Affects Learning, Work, Relationship and our Mental Health. Health (San Francisco)*. Cambridge, Massachusetts: The MIT Press.

Zhou, X. (2010). *Assessment and Analysis of Emotional Intelligence in Engineering Students*. Clemson University.