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The Relationship between Social Intelligence, Age, and Education

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Abstract

Social intelligence, or emotional intelligence, are terms sprinkled in everyday life which refer to the art of social interaction amongst communities and individuals. Many tests aim to measure social intelligence due to its importance in interacting with fellow human beings: one such test is the Reading the Mind in the Eyes Test (RMET). In this study, we investigate the relations between various variables such as age, education, and gender and social intelligence. We surveyed 437 individuals from a diverse set of backgrounds and countries. Survey participants were recruited via social media and other communities. The Pearson product-moment correlation coefficient (PMCC) test was used to examine the correlation between age and RMET score, the Chi-square test for association was used to test for the association between education and RMET score. The statistical analyses showed a negative statistically highly significant medium correlation between age and RMET score and no association between education and RMET score. Through the tests conducted in this study, we conclude that RMET score decreases with age. No correlation was detected between the individual's education and RMET score.

Keywords
Social intelligence, RMET, Pearson product-moment correlation coefficient, Chi-square test for association

1. Introduction
Performance on the RMET gives insight into one's abilities to read facial cues and thus their social intelligence. This ability is ever so coveted in current society, with many studies depicting the positive correlation between one's social intelligence and career success (Urquijo et al. 2019) and how social intelligence is a critical quality for leadership. The importance of social emotional intelligence leads to the question of how one develops these abilities, and what we can do to improve them.

1.1 Objectives
Experience and time improve most skills, so perhaps age makes us better at reading emotions such that older individuals perform better on the RMET. Education is often connected with the idea of learning or developing a skill, so we preliminarily hypothesize that a higher education makes an individual better at reading emotions and therefore score higher on the RMET. This paper attempts to uncover aspects of how social intelligence is developed and improved through statistical analysis.

2. Literature Review
Social intelligence is defined as an individual's ability to comprehend situations and adapt to them accordingly. Referred to as the ability to get along with others (Moss and Hunt 1927), social intelligence encompasses all skills required to manage social communications and relationships. Facial emotion recognition, the ability to interpret the emotional states and expressions of others through facial cues, is a prominent subcomponent of social intelligence. The Reading the Mind in the Eyes Test (Baron-Cohen et al. 1997), or the RMET, tests facial emotion recognition through 36 multiple questions that ask the participant to determine the emotion of the subject through only a pair of eyes. 4 adjectival selections such as "playful, suspicious, alarmed, anticipating" are given for each pair of eyes, and performance is based on the total number of emotions correctly identified.

3. Methods

Surveys were created with Airtable and Typeform. Google Sheets was used to organize and filter data. A total of n = 437 individuals participated in this study. Each filled out an anonymous survey that asked for age, gender, education in terms of highest level of education completed or currently in, and RMET score. The RMET document provided by Cambridge University was converted to a Typeform form that generated a score after completion.

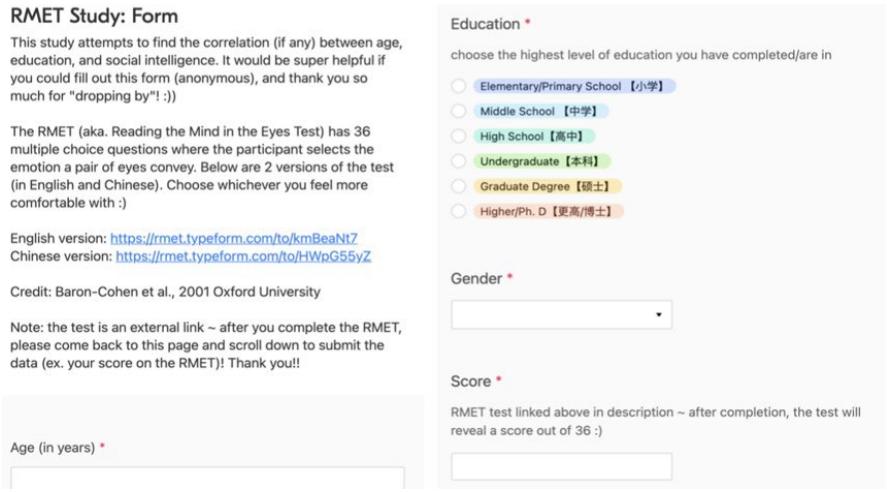

Figure 1. Screenshot of Airtable form.

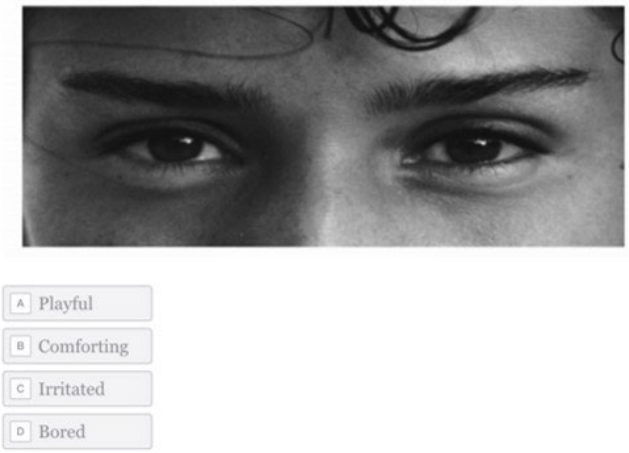

Figure 2. Example question on the RMET. The answer is ‘’playful’’

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4. Data Collection

The survey was sent to people of many ages and educations to increase variability and randomize the process. In addition to sending it to individuals within personal social circles, the survey was also posted onto various social media platforms and online sources such as Reddit and Linkedin to increase randomization in the individuals filling out the survey. Controlling every variable would be unrealistic, so to decrease the influence other variables may have on the sample, a large sample with all types of individuals was collected in hopes that the variety would neutralize the sample to some extent. By neutralize, we refer to the case where one student with a high GPA may be countered by another student with a low GPA such that the possible effects of GPA are canceled. The survey collects gender although the variable is not used in the later statistical analysis to ensure that there is somewhat of a balance amongst the sample.

The collected data was compiled into a datasheet, where filters were applied to organize the data. Data was displayed through graphs and charts created through Google Sheets, which aided in deciding on statistical tests. The PMCC was used to test for the correlation between age and RMET score; the Chi-square test for association was used to test for the association between education and RMET score. Statistical tests were done in Vassarstats, which supplied a P value and the test statistic. Section 5 of this paper includes more detailed information regarding the statistical analyses done.

5. Results and Discussion

The variables of interest were RMET score, age, and education. The RMET score and age are ratio scale data, as they both have an absolute zero and are quantifiable. Due to the way the education variable was collected in a ranking, e.g. high school, undergraduate, graduate, the variable is ordinal scale.

5.1 Numerical and Graphical Results

Figure 3 displays a frequency distribution of the RMET scores with a normal curve over the histogram to measure normality. As shown in the histogram, the data roughly matches the form of a normal distribution.

Mean: 25.962
Median: 26
Mode: 26

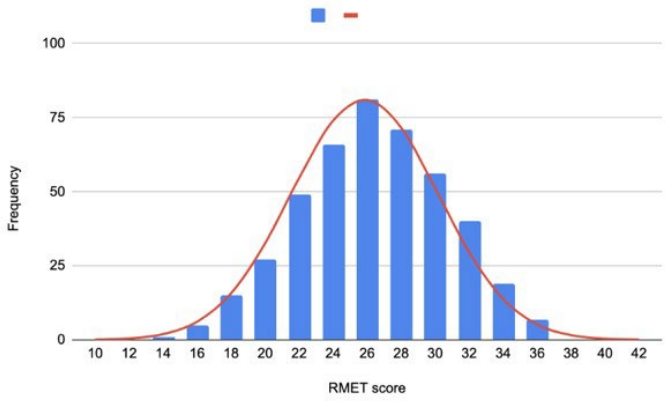

Figure 3. Frequency distribution of RMET scores.

The mean, median, and mode of the data are approximately equal, which matches the requirements of a normal distribution as well. There also is not much reason to suspect extreme skew because data was collected randomly, and the sample size is large. The sampling distribution of the variable RMET score will thus be considered as "approximately normal."

5.2 Statistical Analysis

5.2.1 Product Moment Correlation Coefficient

The scatter plot in Figure 4 displays a slight downward linear trend. To quantify the correlation, the Product Moment Correlation Coefficient (PMCC) was used. The PMCC is a parametric statistical test that measures linear correlation, and requires interval or ratio data and bivariate normality.

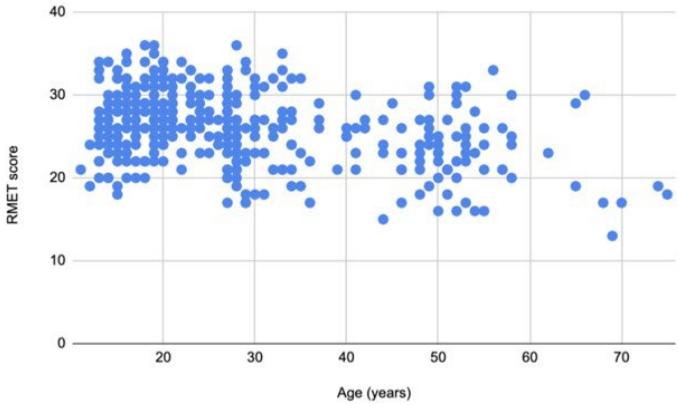

Figure 4. Scatterplot of RMET score vs. age.

The two variables measured, age and RMET score, are both ratio scale and display an approximately normal distribution. Thus, the data qualifies for analysis by PMCC. The mean RMET score was 25.962. The median was 26. The mode was 27. The mean age was 28.334; median age was 27, mode was 27.

RMET Mean: 25.962
RMET Median: 26
RMET Mode: 27
Age Mean: 28.334
Age Median: 27
Age Mode: 27

The mean, median, and mode of the data are approximately equal for both variables, so we will assume normality for both sampling distributions. There also is no reason to believe otherwise: the sampling methods were (or attempted to be) somewhat random, and the sample size is large.

The PMCC gives a r value of -0.3775. Level of significance of 0.01, or P99%, for sample size 437 is 0.128, and therefore r is statistically highly significant.

("Cohen's (1998)") conventions for PMCC effect size can be used to interpret the r value.

size of effect	ρ
small	0.1
medium	0.3
large	0.5

The coefficient r, in this case, displays a negative statistically highly significant medium correlation between age and RMET score.

5.2.2 Chi-square test for association: education & RMET score

To avoid having the medium negative correlation found between age and RMET score affect testing for the association between education and RMET score, two methods were used that took subgroups out of the entire sample. Using the entire sample would have muddled the variables of education and age, in that it may appear to be that graduate students have lower scores than high schoolers due to age instead of education.

Method 1 only measures the participants that had completed their highest level of education. By doing so, age is much more random (all current students would be restricted to a particular age, which takes away from the randomness of a sample), and thus will not have as much of a direct effect.

Table 1. Contigency table for method 1.

	MS-below	HS	Undergraduate	Graduate	Ph.D
below mean RMET score (26)	17	57	104	42	7
above mean	11	63	95	18	7

The null hypothesis, or H0, is that there is no association between education and RMET score. The alternative hypothesis, or H1, is that there is an association between education and RMET score.

The Chi-square result for this method is F equal to 9.06. The critical value for 0.05 level with degree of freedom value 4 is 9.49. Comparing F to the critical value, 9.06 is less than 9.49, and thus the Chi-square value is not statistically significant. Thus, we fail to reject the null hypothesis.

Method 2 only evaluates participants from ages 20 - 27. By restricting the age variable, education is isolated. The mean RMET score of participants aged 20 is 26.25; aged 27 is 27.56. Participants of age 27 actually had a higher mean score than age 20 participants, suggesting that the medium negative correlation between age and RMET score may not be fully in effect within a range of only 7 years. Therefore, any association found between education and RMET within this range is more likely to be accurate.

Table 2. Contigency table for method 2.

	HS	Undergraduate	Graduate
below mean RMET score (26)	5	44	3
above mean	8	54	10

Again, the null hypothesis, or H0, is that there is no association between education and RMET score. The alternative hypothesis, or H1, is that there is an association between education and RMET score.

The computed Chi-square value is F equal to 2.32. The critical value for 0.05 level with degree of freedom value 2 is 5.99, and thus the association is not statistically significant. We fail to reject H0, and thus preliminarily conclude that education and RMET score are not associated.

5.3 Discussion

While studies have shown that the ability to discriminate between emotional expressions develops as early as four to seven months of age ("Cohen's (1998)") and becomes somewhat comparable to those of adults at around age 12 (Fox, 2001), the idea that younger individuals may be more sensitive to emotions than their elders is puzzling. Perhaps, as one ages, their need to care for the emotions of others decreases overall, as they no longer need to heed and act on the expressions of others as they once did, in comparison to when they first entered the workforce. An intern at a company (i.e., of age around 21) will logically care more about the expressions of the individuals around them than a project manager who has been at the company for decades (i.e., age of around 50). Or, perhaps as one ages, they gradually care less for the opinions of others and train themselves to be less sensitive to the emotions and expressions of others. Another possibility is that younger individuals are more sensitive to the emotions of adults because they spend more time watching for the expressions of instructors and parents. In any case, more research should be done to investigate both the validity of the result that RMET score decreases with increasing age and if it always applies and the cause of the correlation.

The second finding regards the lack of association between education and RMET score. The initial idea of how education affects RMET score is shown to be false. According to the Chi-square tests, education and RMET score are not associated. Coupled with the previous notion of how RMET score decreases with increasing age, the development of the ability to read emotions seems to be innate more than learned. In context of the relationship between social intelligence and success, this result leads to the question of if a better education truly causes career success. A successive study that could be done is whether or not the prestige of a college is associated with RMET score, such as if Ivy League students score better on the RMET than community college students. The prestige of a college has been commonly linked to success as well, so it would be interesting to see how these two indicators of success are related.

The unpredictability of these results suggests the enigmatic nature of social intelligence. If neither education nor experience in the form of age improves the ability to read emotions, what does? Whether or not emotional intelligence can be trained comes into question, and further research is needed to investigate for an answer.

5.4 Proposed Improvements

Limitations of this study include the breadth of the subject and the non specificity. Many things could have been measured, and many variables exist within or outside of the ones listed in this paper. While a large sample size was used to balance out extremes and unrelated variables, possible pitfalls to this experimental setup include other unconsidered variables and the sampling methods. Although the data collection methods attempted to be as random as possible, most high school participants were from Stanford Online High School and a few other public schools within the Bay Area so the diversity of the sample could be improved. Ideally, factors such as environment and income should be controlled and measured, and the ages of participants should be less clumped in that most individuals were either between 14-30 or 50+ years of age. Improvements can also be made in the setup of the survey; having two surveys ultimately proved to be inefficient and many participants ended up confused. Optimally, both surveys should be compiled into one.

5. Conclusion

Two main findings can be derived from the statistical tests. In contrast with the initial hypothesis of how increasing age and increasing RMET score are correlated, RMET score is shown to have a statistically highly significant negative medium correlation with age. Moreover, the ability to read emotions as measured by the RMET decreases with increasing age. Such a result was unexpected from the hypotheses; logically, it seems as if one would gradually improve at reading emotions as they age and become more experienced. Further research should be done upon this finding to clarify and better quantify the validity and extent of this association.

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Biography

Kaitlyn Zhang is a student at Stanford Online High School. She has earned awards in robotics competitions, as well as computation and business challenges such as Technovation. Kaitlyn's research interests include psychology, philosophy, and neurodegenerative diseases.