Happiness and Students' Performance in Quantitative Subjects – A Preliminary Study

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Abstract

This preliminary study examines undergraduates' perceptions of happiness and quantitative subjects, as well as the relationship between the two. University students tend to be happier when they are satisfied with their studies, have good relationships with family and friends, possess good time management, active in extra-curricular activities, have good balance between work and play and are in good health. Despite the perceived difficulty, most students do not find quantitative courses as boring and tend to develop interest in those subjects depending on the teaching styles of their course instructors. While correlation analysis gave expected results on students' insights, the regression estimates reveal a negative relationship between happiness and achievements in quantitative subjects.

Key words: Happiness, quantitative courses, correlation, OLS regression

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1. Introduction

For a long time, the empirical study of happiness has been a central theme of psychology. There have also been contributions by sociologists and political scientists. Only recently has happiness research been linked to economics. The early contributions of Easterlin (1974) and Scitovsky (1976) have sparked interest among economists to measure and identify the determinants of reported subjective well-being. Economics is about individual happiness. Conventionally, economics has taken income as a suitable though incomplete proxy for human welfare. "Reported subjective well-being" is a term used in psychology for an individual's evaluation of the extent to which he or she experiences happiness or satisfaction with life. They are separable but it is common to use the terms "happiness", "well-being" and "life satisfaction" interchangeably.

The rest of this paper is organized as follows. Section 2 and 3 briefly describes the background and objectives of the study. Section 4 describes the data, variables as well as the methods used in this study. This is followed by Section 5 with the results of the analyses. Section 6 concludes the paper, followed by Section 7 with the future plan for the research. Review of past literature will be included as the discussion develops throughout the paper.

2. Background

Happiness is not easy to define as there exists multiple meanings in the literature and they also change over time (McMahon 2006). Happiness corresponds to how good or bad we feel (Layard, 2003) or whether we are satisfied with life or not (Diener *et al.*, 1997). Happiness is particularly important for welfare economics as it can be used as a guide for policy. For example, once the determinants of happiness have been measured, it is feasible to construct happiness schedules for every conceivable type of person. Economically, it is interesting because happy people tend to work harder and are healthier (Veenhoven, 1988). Societies therefore flourish to a greater extent with happy citizens than with unhappy ones (Helliwell, 2002).

Happiness can be divided into objective and subjective happiness. The distinction is important as each requires different types of measurements. Objective happiness involves measuring one's brain waves (physiological approach) – this approach directly measures cardinal utility (Frey and Stutzer, 2002). Subjective happiness is preferred by most social scientists. It can be captured by surveys where questionnaires are used to get individuals' evaluations of their satisfaction with life or happiness. Studies on happiness and academic success have grown profusely over the years. The areas of coverage are mainly in identifying the determinants of happiness as well as understanding the nature of happiness.

Several papers have looked into the relationship between education and happiness. Although we cannot define happiness, we can ask people whether they feel happy or not (Frey and Stutzer, 2002). In their review, Lyubomirsky, King and Diener (2005) mentioned that happiness also plays a role in health through its effects on social relationships, healthy behaviour, stress, accident and suicide rates, and coping, as well as possible effects on immune function. In terms of its link with academic success, happiness seems to be mutually reinforcing one's success, particularly in academics.

3. Objectives

Studies on happiness and academic success, especially among students in tertiary education, have grown profusely over the years. While many empirical studies have demonstrated a positive link between the two, for example Quinn and Duckworth (2007) and Tuntiwarodom and Potipiti (2008), evidence in Malaysia is still very limited due to the unavailability of data.

To partially fill this lacuna in literature, this study attempts to use Malaysian data to explore undergraduates' perception of happiness as well as their views on learning quantitative subjects while in university. In addition, this study seeks to examine whether or not happiness has any impact on the undergraduates' performance in quantitative subjects. Focus is given to quantitative subjects, such as mathematics and statistics, for two reasons. Firstly, quantitative courses are important pre-requisites in practically all degree programs. Among the social sciences, quantitative subjects are particularly important in economics, accounting, finance and business-related fields (Fisher, 1930). Secondly, quantitative subjects are believed to encourage analytical thinking or reasoning, which is desirable for students wanting to be marketable upon graduation.

4. Methodology

Using a survey questionnaire, data was collected from 76 undergraduates who took the course 'Statistical Methods' during the last semester. Collection of data using survey questionnaires is a standard practice in happiness-related research. Since this is a preliminary study, a small sample is sufficient and this was obtained by convenience sampling. The sample in this study consists of mainly first year students from the Kulliyyah of Economics and Management Sciences, International Islamic University Malaysia (IIUM). The course Statistical Methods is selected to represent all other quantitative subjects that the students may take during the semester for ease of analysis. In future studies, however, it is more ideal to examine the different kinds of quantitative subjects separately. Tables 1 and 2 below show the descriptive statistics and profile of the respondents, respectively.

Table-1. Descriptive statistics

Variables	N	Mean	Std. Deviation	Min/Max
Age	76	20.34	1.195	18/26
Score in 'Statistical Methods'	75	69.19	11.952	38/94
CGPA	74	2.9034	0.468764	1.738/3.786
IQ score	76	103.43	12.133	23/130
Monthly allowance	75	607.93	482.011	152/4000
Monthly spending	76	477.50	347.940	100/3000
Happiness2	76	0.81	0.205	0.3/1
Happiness3	76	4.52	0.592	3.21/5.64

Source: Own survey questionnaire

Table-2. Profile of respondents

Variable		N	*%*
Gender	Male	33	*43.4*
	Female	43	*56.6*
Year	1st	66	*86.8*
	2nd	7	*9.2*
	3rd	2	*2.6*
	4th	1	*1.3*
Nationality	Malaysian	65	*85.5*
	International	11	*14.5*
Financial aid	On scholarship	5	*6.6*
	On sponsorship (loan)	38	*50.0*
	Self-sponsored	33	*43.4*
Residence	On-campus	74	*97.4*
	Off-campus	2	*2.6*

Source: Own survey questionnaire

On average, the students are 20 years old and in their first year, which is reasonable since Statistical Methods is a typical first year course. This may also explain why majority of the sample resides on-campus (97%). The gender distribution of the sample is somewhat even with 56.6% female while close to 86% of the sample are locals. In terms of financial assistance, only 6% of the students are on scholarship while those on study loans and self-sponsored are 38% and 33%, respectively.[1] The students are relatively well-off during their study period as they receive a monthly allowance of RM 600 and spend over three quarter of the amount, on average.

Apart from the variables above, information on student happiness and their views on quantitative subjects were also collected through the survey questionnaire. These are discussed in more detail in the subsequent section.

5. Findings

5.1. Students' Perception of Happiness

To gain a preliminary understanding of how undergraduates perceive happiness, the respondents were asked to give their opinions on a series of 15 statements. These statements cover different aspects of happiness such as satisfaction in studies, in relationships, in time management and in health. Following Nunnally and Bernstein (1994), McIver and Carmines (1981) and Spector (1992), a multiple-item measure of happiness is preferred over a single item measure for several reasons. Firstly, individual items are unreliable as they have considerable random measurement errors. Secondly, individual items lack precision as they cannot discriminate among fine degrees of an attribute, and

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[1] The tuition fees at IIUM are relatively low so it is uncommon for undergraduates to be involved in part-time work while registered as a full-time student.

thirdly, individual items lack scope. Together these 15 statements form the happiness variable in the study. The number and fraction of students who responded positively to each of the statements are shown in Table 3.

Students are mostly consistent with their answers as the percentage answering yes is high for almost all of the statements. In other words, if undergraduates are happy in one aspect they tend to be happy in other aspects as well. To assess the reliability of students' responses, a series of Spearman rank-order correlations were conducted and the result is shown in Table 4.

Table-3. Positive responses to the happiness-related statements

Statements	N (%)
Overall I am happy with my life (happy)	71 (93.4)
Life has been good to me in general (life)	72 (94.7)
I am satisfied with my academic achievements so far (academic)	44 (57.9)
I enjoy studying and learning new things (study)	76 (100)
I manage to cope well with my workload and assignments (cope)	68 (89.5)
For all my courses, I meet the deadlines as specified by the instructors (deadlines)	69 (90.8)
I am satisfied with the resources, facilities and environment at my university (environment)	68 (89.5)
I have a good relationship with my family and friends (relationship)	73 (96.1)
I like to be around positive people, things and atmosphere (positive)	75 (98.7)
I can manage my time properly in university (time)	57 (75)
I am involved in other activities outside of coursework (active)	59 (77.6)
I have a good balance between my studies, entertainment and personal life (balance)	56 (73.7)
I am in a good health condition (health)	69 (90.8)
I exercise regularly and eat healthily as much as possible (exercise)	60 (78.9)
I usually get enough sleep, around 6 to 8 hours, every night (sleep)	41 (53.9)

Note: [1]Total number of respondents is 76. [2]The initial response for the above statements isa6-category Likert scale (1: Strongly Disagree; 2: Moderately Disagree; 3: Slightly Disagree; 4: Slightly Agree; 5: Moderately Agree; 6: Strongly Agree) but for the purpose of reporting, the responses are grouped into a simple Yes (scales 4-6) or No (scales 1-3) replies.
Source: Own survey questionnaire.

Table-4. Correlation of overall happiness and other aspects of happiness

	Happy	Life	Academic	Study	Cope	Deadlines	Environ	Relation	Positive	Time	Active	Balance	Health	Exercise	Sleep
Happy	1.000														
Life	0.551**	1.000													
Academic	0.292*	0.280*	1.000												
Study	0.324**	0.497**	0.199	1.000											
Cope	0.252*	0.353**	0.326**	0.480**	1.000										
Deadlines	0.285*	0.440**	0.329**	0.372**	0.506**	1.000									
Environ	0.093	0.236*	-0.018	0.288**	0.196	0.216	1.000								
Relation	0.540**	0.409**	0.295**	0.210	0.250*	0.312**	-0.015	1.000							
Positive	0.198	0.277*	0.010	0.470**	0.422**	0.324**	0.314**	0.078	1.000						
Time	0.290*	0.408**	0.424**	0.446**	0.543**	0.393**	0.297*	0.285*	0.175	1.000					
Active	0.247*	0.234*	0.082	0.222	0.055	0.111	-0.045	0.148	-0.003	0.123	1.000				
Balance	0.397**	0.399**	0.401**	0.320**	0.369**	0.380**	0.022	0.292*	0.146	0.502**	0.314**	1.000			
Health	0.308**	0.436**	0.055	0.237*	0.199	0.278*	0.176	0.422**	0.154	0.130	0.216	0.332**	1.000		
Exercise	0.301**	0.394**	0.215	0.280	0.270*	0.166	0.228*	0.407**	0.095	0.332**	0.293*	0.313	0.470**	1.000	
Sleep	0.128	0.097	0.234*	0.155	0.253*	0.289*	-0.099	0.169	0.043	0.293*	0.160	0.196	-0.008	0.245*	1.000

* Correlation is significant at the .05 level
**Correlation is significant at the .01 level

Source: Own survey questionnaire

Generally the statements are significantly correlated with one another although the strength of the relationship is only moderate to weak. Nonetheless, these imply that the responses of the students

are reliable and genuine. As expected, students who are satisfied with their studies tend to be happier. In particular, this refers to students who actually enjoy learning, who are able to cope with their course work and who meet the assignment deadlines as specified. A similar positive association is found for those who have good relationships with family and friends. Additionally, students are also happier when they are able to manage their time properly, are active in extracurricular activities, have good balance between work and play and have a healthy lifestyle.

As with other pilot studies that utilize Likert-type questionnaires, further check on the degree of internal consistency among the multiple-item statements reveal a Cronbach's alpha of 0.832. This high alpha indicates a strong internal consistency among the 15 happiness-related items and, thus, the statements are reliable as a measurement of happiness in this study.

5.2. Students' Perception of Quantitative Subjects

Besides happiness, the undergraduates' views on quantitative subjects are also of interest. While numerical measures such as exam scores, CGPA and IQ scores are often seen as a better and more objective indicator of students' academic performance, an equally important aspect that should also be considered is the students' experience in learning those subjects. These subjective indicators are essential to provide a more holistic understanding as to why some students perform while others do not in quantitative courses. Table 5 summarizes the students' perception on quantitative courses as well as their preferences in learning the subject.

More than half of the students find quantitative subjects as difficult (59.2%) though only a handful believe the subject to be boring (14.5%). One interesting finding is that students tend to develop their interest in quantitative subjects based on the teaching styles of the course instructors. This is true for almost 87% of the sample. It is also heartening to see that students generally recognize the importance of quantitative subjects since 95% of the sample believed that knowledge and skills learnt from these subjects will be useful in their future line of work no matter how diverse. They are also aware of the importance of repeated exercises and tutorials in learning quantitative subjects. Between the course instructors and student themselves, the latter is believed to be more responsible should the students fail to do well in quantitative subjects. In terms of study preferences, there are more students who favour learning quantitative subjects in the morning periods rather than afternoons. Majority of the sample are good students as they attend classes at all times and regardless of their performance in the subjects, 68% of the students enjoy doing problem sets without much persuasion from the instructors.

Table-5. Students' response to statements related to quantitative subjects

Views on quantitative courses	N (%)
Quantitative subjects are difficult to understand	45 (59.2)
Quantitative subjects are boring and uninteresting	11 (14.5)
My interest in quantitative subjects depends greatly on how the instructors teach the courses.	66 (86.8)
Students should blame themselves if they do not do well in quantitative subjects	66 (86.8)
Instructors should be blamed if students do not do well in quantitative subjects	26 (34.2)
Tutorials are very important in learning quantitative subjects	74 (97.4)
Doing a lot of topic exercises on my own is very important in learning quantitative subjects.	76 (100)
The knowledge and skills that I learnt from quantitative subjects will be useful in future regardless of my line of work	72 (94.7)
Preferences in learning quantitative subjects	
I prefer morning classes for quantitative subjects.	51 (67.1)
I prefer morning classes for quantitative subjects.	40 (52.6)
I attend my classes all the time.	72 (94.7)
I enjoy doing problem sets without much persuasion from the instructors.	52 (68.4)

 Note: [1]Total number of respondents is 76.
 Source: Own survey questionnaire

5.3.   Do Happy Students Perform Better in Quantitative Subjects?

To investigate whether happiness has any impact on students' performance in quantitative subjects, three multiple linear regressions are estimated.[2] This method is appropriate since the dependant variable i.e. scores obtained by the students in Statistical Methods during the end-of-semester final examination, is continuous in nature. The explanatory variables are chosen based on theoretical justifications and after considering two issues. Firstly, due to the small sample size of the current study ($n = 76$), there is a need to limit the number of independent variables to preserve the

degrees of freedom so as to improve the generalizability of the model (Hair *et al.*, 2005). For linear multiple regressions, the preferred ratio of observations to independent variables is 15 to 1. Secondly, given the lack of similar studies, a stepwise method was initially employed to narrow down the possible factors that may affect students' performance in quantitative subjects. According to Field (2005), the stepwise regression is the best method for exploratory purposes. Under this method, variables are selected in the order in which they maximize the statistically significant contribution to the model, as measured by the adjusted R^2. But as this method relies purely on statistical criteria, the final choice of variables was informed by theory and discretion.

The age of students (*AGE*) is measured in years while the students' gender (*GENDER*)is a binary variable with value1ifmale and 0 if female. The variable *INCOME* refers to the average monthly allowance that the students receive from their respective sponsors and expressed in natural log form. For the current sample, income has a significant and positive correlation with spending ($0.819, p < 0.00$), suggesting that with more allowance, students tend to spend more each month.

With this information it makes sense to include only one of the variables into the model to avoid multicollinearity.

To measure students' general academic performance, their cumulative grade point average (*CGPA*) is used as a proxy. This variable is included in the model following the assumption that smart students will usually have the capacity to withstand the challenges of quantitative courses and to do well in those subjects. For the sample data, female students have a higher CGPA than male students, on average, so it is assumed that the former may do better in quantitative subjects as well.[3]

The above variables reflect students' characteristics and are included in all three models. In contrast, the variable happiness is measured differently in each of the models for robustness. In Model 1, happiness is a binary measure (*HAPPINESS*) with value 1if the student is happy and 0 if otherwise. This variable is derived from the statement "Overall I am happy with my life" in the survey questionnaire. In the other two models, happiness is treated as a continuous variable where it is measured by the average score from the 15 happiness-related statements (see Table 3). The difference is that in Model 2, the responses are on a binary, or yes/no, scale whereas in Model 3, the average score of happiness is derived from a Likert scale of 1 to 6.As shown in Table 1, the mean score for *HAPPINESS2* is 0.81 while the mean score for *HAPPINESS3*is 4.52. Since literature on this subject is minimal, the current study relies on the findings of Tuntiwarodom and Potipiti (2008) as a guideline, where they showed either a weak positive relationship or no relationship between happiness and academic performance.

The regression results are presented in Table 6. All three OLS models have a good fit since they predict close to 65 per cent of the variations in the dependant variable, as shown by the adjusted R^2.[4]

In addition, the F-statistics for the three models are also statistically significant, indicating that the joint test of all slope coefficients equalling zero is rejected. Diagnostics on all three estimations confirm that the White's test failed to reject homoscedasticity at conventional confidence levels, no

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[2] The small sample size does not permit the use of a more sophisticated method of analysis. Nonetheless, the results obtained in this preliminary study are important as a base for future studies.

[3]IQ scores were also used as a proxy of students' intelligence and cognitive skills. The results, however, were very similar to CGPA so IQ scores were dropped from the final model.

[4] As recommended by Greene (2008), it is a good practice to find the adjusted R^2 value because it explicitly takes into account the number of variables included in the model.

multicollinearity problems exist since VIF measures of 1 is generally acceptable and the normality assumption of the error term is met.

Turning to the model coefficients, as expected, the negative signs for age indicate that slightly younger students tend to perform better in quantitative subjects compared to older students. This finding is consistent with Tuntiwarodom and Potipiti (2008). Similarly, students with good standing CGPAs tend to get better grades in quantitative subjects, which is consistent with the reviews made by Benford and Gess-Newsome (2005). In particular, an additional 10 per cent increase in grade point average is associated with a 16 per cent increase in the scores of a quantitative subject. Both of these variables are significant at the .01 level in all three models. Female students were often found to perform better academically in the past (Tuntiwarodom and Potipiti, 2008), thus, in a similar vein, they are hypothesized to obtain better grades than their male counterparts in quantitative subjects. Interestingly for the current sample, it was found that male students outperform the female students in quantitative subjects. However, this relationship is not significant. Another insignificant but interesting result is the negative impact of students' income on their performance in quantitative subjects. Following Tuntiwarodom and Potipiti, (2008), this may be explained by the notion that education is perceived differently by richer and poorer students. The former may still be able to find jobs despite mediocre qualifications through their parents' social connections but the latter's opportunities in the job market crucially depend on their grades. As a result, poorer students tend to work harder and subsequently, do better in their course work, which may include quantitative subjects.

Table-6. Regression result
Dependent variable: Score obtained in 'Statistical Methods'

	Model 1	Model 2	Model 3
CONSTANT	98.268***	90.963***	97.227***
	(17.775)	(18.694)	(18.289)
AGE	-2.728***	-2.575***	-2.540***
	(0.649)	(0.663)	(0.630)
GENDER	1.810	2.054	1.790
	(1.715)	(1.749)	(1.763)
INCOME	-2.558	-2.644	-2.502
	(1.576)	(1.629)	(1.599)
CGPA	16.368***	16.750***	16.806***
	(1.807)	(1.882)	(1.802)
HAPPINESS (binary)	-5.930*** (1.384)		
HAPPINESS2 (continuous on a yes/no scale)		-2.478 (3.656)	
HAPPINESS3 (continuous on 1-6 scale)			-2.196* (1.271)
N	74	74	74
R^2	0.669	0.654	0.665
Adjusted R^2	0.645	0.629	0.641
F-statistic	27.502***	25.730***	27.013***
D-W	1.765	1.728	1.757

Note: n = 76; robust standard errors in parentheses;***statistically significant at the .01 level; **significant at the .05 level; *significant at the .1 level

While all the variables above adhere to the expected signs, happiness was found to have a negative impact on students' performance in quantitative subjects for the current sample data. This link is apparent in all three models although the relationship is only significant in Models 1 and 3. A possible explanation for this is that students who are unhappy or dissatisfied with their current academic progress may alter those negative emotions into one that motivates them to do better in future. Since the survey questionnaires were distributed to the students in the middle of the semester when midterm results have just been released and assignment deadlines are on full swing, students

may not be in their happiest state of mind at that period of time. Furthermore, students often know their carry marks a few weeks prior to the final exams; hence, those feeling down with low carry marks would have the necessary motivation to do their best in finals.

6. Conclusion

This study utilized data from 76 undergraduates via a survey questionnaire to explore their perceptions of happiness and quantitative courses as well as to investigate the relationship between the two. Generally, students tend to be happier when they are satisfied with their studies, have good relationships with family and friends, keep good time management, are active in extracurricular activities and are healthy. Despite the perceived difficulty of quantitative subjects, most students do not find the subject boring. In fact, they tend to develop their interest in quantitative subjects based on the teaching styles of the course instructors. Most students also recognize the importance of quantitative subjects as they believe the knowledge and skills learnt will be useful in their future careers no matter how diverse. As for the regression estimates, while most variables adhere to the expected signs, happiness has a negative impact on students' performance in quantitative subjects for the current sample data. A possible explanation for this is that students who are unhappy or dissatisfied with their current academic progress may alter those negative emotions into one that motivates them to do better in the near future.

7. Future Plan of the Research

Following the initial results of this study, it is hoped that a similar study can be undertaken at a larger scale in the near future. Specifically, the actual field study should consider all, if not the majority of undergraduate students who take quantitative subjects. The type of quantitative courses would also be widened and will include those offered at all levels of study.

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