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IZA DP No. 10709

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ABSTRACT

Do Higher Achievers Cheat Less? An Experiment of Self-Revealing Individual Cheating*

The extensive body of survey-based research correlating between students' cheating and their academic grade point average (GPA) consistently finds a significant negative relationship between cheating and the GPA. The present paper reports the results of a two-round experiment designed to expose student cheating at the individual level and correlate it with three intellectual achievement measures: the GPA, the high-school matriculation average grade (MAG) and the psychometric exam score (PES). The experiment involved two classes of third-year economics students incentivized by a competitive reward to answer a multiple-choice trivia quiz without consulting their electronic devices. While this forbiddance was deliberately overlooked in the first round, providing an opportunity to cheat, it was strictly enforced in the second, conducted two months later in the same classes with the same quiz. A comparison of subjects' performance in the two rounds, self-revealed a considerable extent of cheating in the first one. Regressing the individual cheating levels on subjects' gender and their intellectual achievement measures exhibited no significant differences in cheating between males and females. However, cheating of both genders was found to significantly increase with each achievement measure, implying, in sharp contrast with the direct-question surveys, that higher achievers are bigger cheaters.

JEL Classification: A22, C91, C92, K42

Keywords: experimental data, cheating behavior, intellectual achievement

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I. Introduction

Over the past two decades, behavioral economists and social psychologists have been designing numerous lab and field experiments with the purpose of deriving insights on people's tendency to cheat, incentivizing subjects with monetary payoffs. While there is a wide variety of cheating experiments reported in the literature,[1] the most prominent genre involves a simple task performed by subjects in privacy, such as flipping a coin (e.g., Bucciol and Piovesan, 2011; Houser *et al*, 2014), rolling a die (e.g., Fischbacher and Foellmi-Heusi, 2013; Arbel *et al*, 2014) or solving as many as possible simple math exercises in a few-minute time pressure (e.g., Mazar *et al*, 2008; Grolleau *et al*, 2014), the outcome of which they are requested to honestly self-report. Being informed about the payoffs associated with each possible outcome, subjects may opt to cheat on their report in favor of the better rewarded outcomes. While experimenters are unable to identify *individual* cheaters beyond reasonable doubt, they can elucidate the aggregate level of cheating among subjects as a group. In the coin-flipping and die-rolling experiments, this is done by comparing the reported outcomes to the statistical distribution of the possible outcomes (50% for heads or tails of a fair coin; 16.7% for each side of a fair die). In the math task experiment, the average outcome reported is compared to that of a control group where subjects' performance is verified by the experimenters rather than self-reported.

There is an extensive body of economic and psychological research correlating between students' cheating and their academic grade point average (GPA). This literature, which is based on students' responses to direct questions regarding whether they have ever cheated on their academic assignments, consistently finds a significant negative relationship between cheating and the GPA (e.g., Bunn *et al*, 1992; Nowell and Laufer, 1997; Crown and Spiller, 1998; Roig and Caso, 2005; Teixeira and Rocha, 2010). As Bushway and Nash (1977) conclude, "the majority of studies indicate that students who are lower in school achievement may cheat more frequently" (p. 624). To the best of our knowledge, there is no *experimental* study that has attempted to examine the relationship between cheating and the GPA. To do so, one must be able to identify cheating at the *individual* level. We know of only two

[1] For a detailed review of the experimental literature on cheating see Rosenblum *et al* (2014).

studies that have done this. Ward and Beck (1990) informed 128 students who took a multiple-choice midterm exam a few days earlier that due to time pressures examiners had not been able to grade their exams, therefore returning the exams to them for self-grading. Subjects' self-grading was then compared with their actual scores to reveal cheating. Schwieren and Weichselbaumer (2010) asked 65 students to solve, under competitive and non-competitive settings, as many mazes as they could in a maze game offered on Yahoo's website and record their achievements in a table. Subjects' records were then compared with the number of mazes actually solved using a spy-ware program that secretly monitored subjects' performance.

The present paper reports the results of a two-round experiment designed to expose student cheating at the individual level and correlate it with three intellectual achievement measures: the GPA, the high-school matriculation average grade (MAG) and the psychometric exam score (PES). The experiment involved two classes of third-year economics students incentivized by a competitive reward to answer a multiple-choice trivia quiz without consulting with their electronic devices. While this forbiddance was deliberately overlooked in a first round, providing an opportunity to cheat, it was strictly enforced in the second, conducted two months later in the same classes with the same quiz. A comparison of subjects' performance in the two rounds, self-revealed a considerable extent of cheating in the first one. Regressing the individual cheating levels on administrative data of subjects' gender and their intellectual achievement measures exhibited no significant differences in cheating between males and females. However, cheating of both genders was found to significantly increase with each achievement measure, implying, in sharp contrast with the direct-question surveys, that higher achievers are bigger cheaters.

II. The experiment

The experiment involved two (treatment and control) rounds. In the first (treatment) round, we asked two classes of third-year economics students at COMAS (Israel) to answer a trivia quiz of 16 multiple-choice questions. More specifically, each question of the quiz introduced the name of a certain country followed by the names of four cities, one of which was the capital city of that country. The students' task was simply to circle, in each question, the name of the appropriate capital city. The task was not trivial as it may sound, as most of the countries included in the quiz were relatively newly founded, the names of which (not to say the names of their capital cities) subjects had possibly never heard before (see Appendix A).

We asked subjects to write their student identification number at the top of the answer sheet and announced that the 10 subjects to do best in the quiz would be rewarded with a bonus of 5 points to their course grade.[2] We made it clear that the reward reflected our appreciation for personal knowledge, hence subjects were to avoid using their electronic devices (i.e., smart-phones and laptops) in search for the correct answers. We gave subjects 10 minutes to answer the quiz and left them with a research assistant who deliberately appeared to be deeply engaged with his own smart-phone rather than paying attention to others, thereby providing an opportunity for cheating. In particular, subjects who happened to click "capitals of the world" in Google, rather than searching for one country at a time, got several links to lists of capital cities by country's alphabetical order and could easily end up answering correctly all 16 questions in just a few minutes.

In the second (control) round, conducted two months later, we gave the *same* two classes the *same* quiz (though in a different order of questions and answers to blur possible visual memory of their order in the first round), promising the same reward. Only this time, two of us stayed in each class to carefully watch subjects, one in front and one in the back, thereby disabling them from activating their electronic devices. Using student identification numbers to compare their performance in the two rounds, we were able to expose their extent of cheating in the first round on an individual level without identifying them by name or face.[3] Finally, providing our secretariat

[2] It is quite common in the Israeli academia to grant a small number of credit points for fulfilling tasks that do not necessarily reflect academic achievements, e.g., for merely attending the class or for submitting home exercises even though it is well known that most students copy them from the few who bother to do the work. In the present case, one of us who taught two classes of an elective third-year course, Labor Economics, announced at the beginning of the course that at two randomly selected dates during the semester attending students would get the opportunity to gain a bonus to their grades in return for answering a trivia quiz, the results of which were needed for his research. This generated an incentive to attend the class.

[3] While the true purpose of the two-round experiment was not disclosed to students in real time, it was revealed to them a few weeks after the second round, when efficiency wages and the related issues of shirking and cheating at the workplace were discussed. The experiment served to demonstrate that in the absence of effective monitoring, motivated employees might not hesitate to cheat extensively.

with a list of identification numbers of students who participated in both rounds, we asked them to write down aside each number the student's gender as well as his/her GPA, MAG and (if available) PES.[4,5] We were then able to match the experimental data on individual cheating with the administrative data on their gender and intellectual achievements.

III. Results

We collected a total of 145 answer sheets in the first round and 135 in the second round. Comparing student identification numbers, we sorted out 125 pairs of answer sheets corresponding to 125 students who participated in both rounds. Tables 1 and Figures 1a and 1b display their performance in the two rounds. As is easily seen, performance fell dramatically in the second round with subjects' failure to activate their electronic devices: the average number of correct answers dropped by 50 percent

Table 1: Distribution of Correct Answers

	Treatment Round (no supervision)		Control Round (strict supervision)	
Correct Answers	**Frequency**	**Percent**	**Frequency**	**Percent**
0	0	0	0	0
1	0	0	0	0
2	7	5.6	16	12.8
3	8	6.4	19	15.2
4	11	8.8	24	21.6
5	14	11.2	24	19.2
6	6	4.8	15	12.0
7	4	3.2	10	8.0
8	2	1.6	4	3.2
9	7	5.6	6	4.8
10	10	8.0	2	1.6
11	1	0.8	1	0.8
12	8	6.4	1	0.8
13	2	1.6	0	0
14	8	6.4	0	0
15	14	11.2	0	0
16	23	18.4	0	0
Total	125	100	125	100
Mean*	**9.74**		**4.85**	

* *t test = 11.51; p-value < 0.0001*

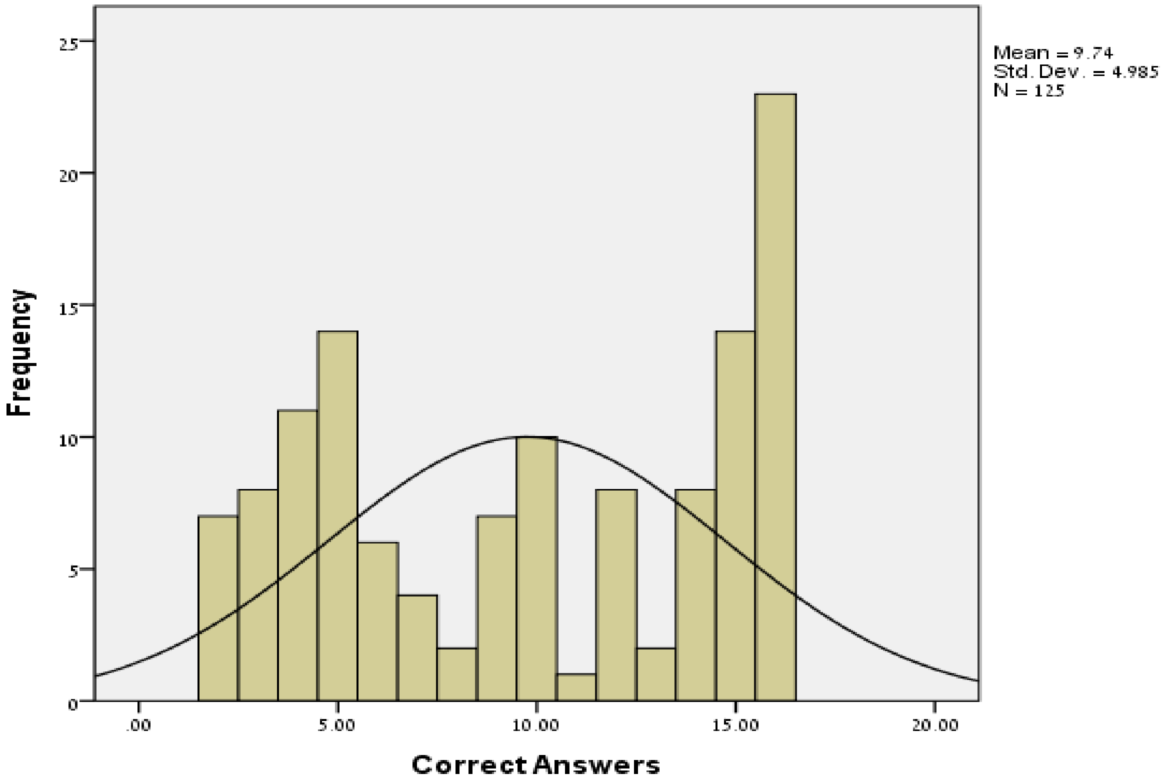

Figure 1a: Distribution of Correct Answers in First Round

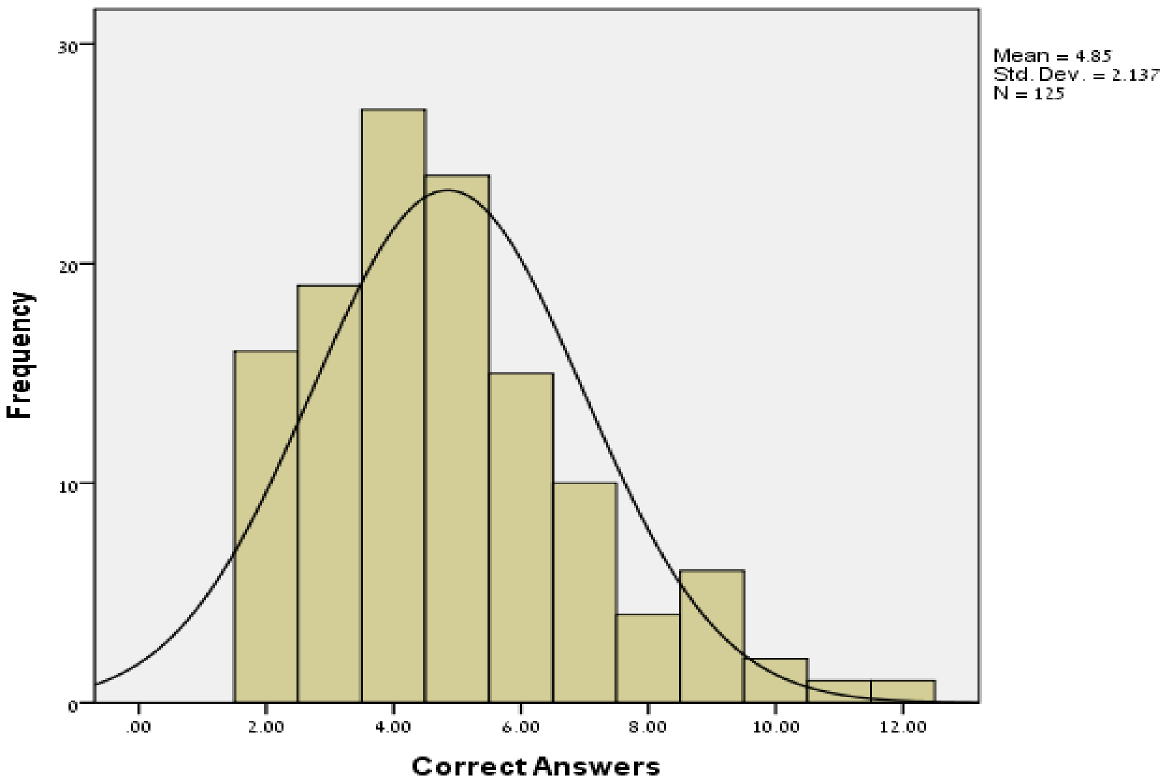

Figure 1b: Distribution of Correct Answers in Second Round

from 9.74 to 4.85, the difference in averages being statistically significant (t =11.51, p-value < 0.0001). Of particular interest is the finding that 66 subjects (46.4 percent) answered correctly 10 and more questions in the first round, whereas only 4 subjects (3.2 percent) succeeded in doing so in the second. Furthermore, 23 subjects (18.4 percent) cheated to the maximum level possible (answered correctly all 16 questions), leaving us no choice but to award them all with the promised 5-point bonus. Table 2 and Figure 2 reveal that 36 subjects (28.8 percent) exhibited a difference of *at least* 10

Table 2: Distribution of Differences in Correct Answers (Treatment Minus Control Round)*

Difference in Correct Answers	Frequency	Percent
-2	2	1.6
-1	2	1.6
0	35	28.0
1	18	14.4
2	3	2.4
3	1	0.8
4	1	0.8
5	3	2.4
6	5	4.0
7	5	4.0
8	8	6.4
9	6	4.8
10	19	15.2
11	7	5.6
12	8	6.4
13	2	1.6
14	0	0
15	0	0
16	0	0
Total	125	100
Mean	**4.89**	

** K-S test: D = 0.250, p-value = 0.000*
** S-W test: t = 0.844, p-value = 0.000*

[4] The admission criterion for the Economics program at COMAS is either a MAG of at least 85 (in which case a PES is not required) or a lower MAG with a PES of at least 500. The psychometric exam is conducted countrywide several times a year by a central body established by Israeli universities. Candidates who take the exam usually invest a considerable amount of effort in preparation courses. About 70 percent of COMAS Economics students report a PES, not necessarily because of having a low MAG: a sufficiently high PES may guarantee a scholarship as well as acceptance to the highly-demanded Accounting program.

[5] We also used the list of identification numbers to inform our subjects, after each round, about the number of questions they answered correctly, highlighting those who won the 5-point bonus. The list was photographed and forwarded to subjects via WhatsApp Messenger.

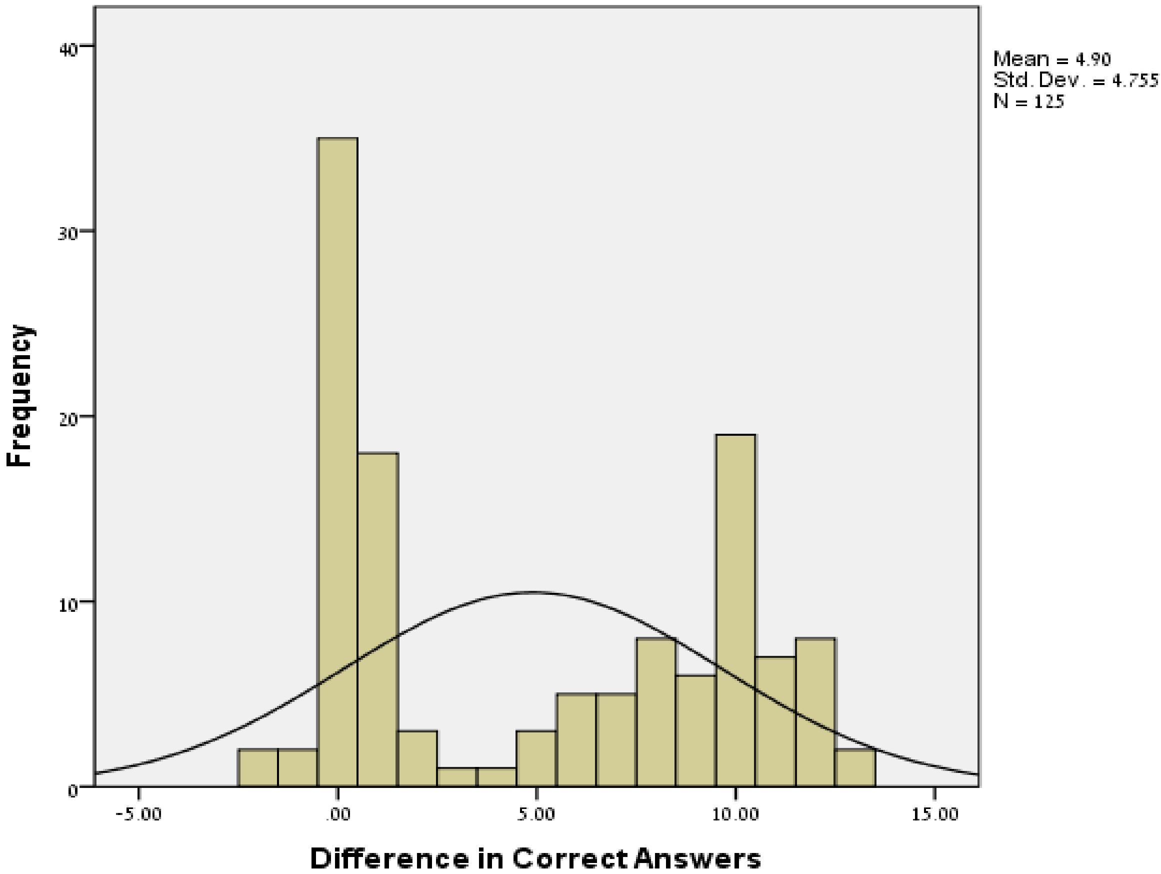

Figure 2: Distribution of Differences in Correct Answers

correct answers, and 60 subjects (51.2 percent) of at least 3 correct answers, between their performances in the two rounds.[6]

Table 3 presents the results of regressing subjects' cheating levels, as manifested by the difference in correct answers between the two rounds, on their gender and achievement measures (descriptive statistics for the achievement measures are provided in Appendix B). While the effect of gender on cheating is not statistically significant, all three achievement measures exhibit a statistically-significant positive effect on cheating. Specifically, regressing subjects' cheating levels on gender and GPA alone (column I) yields a positive and statistically-significant GPA coefficient of

[6] Applying the Kolmagorov-Smirnov (K-S) and Shapriro-Wilk (S-W) tests for the difference in correct answers between the treatment and control rounds confirms that they are differently and non-normally distributed (K-S test: $D = 0.250$, p-value = 0.000; S-W test: $t = 0.844$, p-value = 0.000).

Table 3: Regression of Individual Cheating levels on Gender and Achievement Measures

	I	II	III
Intercept	-29.079* (2.949)	-39.772* (2.771)	-29.025* (2.694)
Gender	-0.149 (0.588)	-0.577 (0.484)	-0.050 (0.404)
GPA	0.418* (0.035)	0.302* (0.033)	0.242* (0.028)
MAG	-	0.238* (0.30)	0.142* (0.029)
PES 601+	-	-	5.141* (0.719)
PES 551-600	-	-	3.857* (0.612)
No PES	-	-	1.442* (0.510)
R^2	0.539	0.694	0.799
N	125	125	125

** Statistically significant variables at 0.01 level*
Note: Standard errors appear in parentheses

0.418, implying that an increase of 10 points in the GPA would increase cheating by 4.18 (fraudulently obtained) correct answers. This sharply contradicts the negative relationship between cheating and the GPA reported in the survey-based literature. When the MAG is added to the regression (column II), its statistically-significant coefficient captures part of the GPA's which falls to 0.302, and when both the MAG and PES are added (column III, with PES 500-550 serving as a reference category), the effect of GPA on cheating is cut by half, being partly contained in the effects of the added measures. The R^2 value is the highest in column III, implying that each one of the three achievement measures included in the regression contributes to the explanation of cheating. The conclusion is somewhat frustrating but unequivocal: higher achievers are bigger cheaters. Appendices C and D confirm, respectively, that this conclusion also holds within each gender,[7] as well as within the smaller group of (87) subjects who reported a PES.

[7] Three regressions, each run with an additional independent variable of gender multiplied by one of the achievement measures, reveal that the coefficients of these variables are statistically insignificant (*t* values being –0.189, –0.114, and 1.058 for [gender][GPA], [gender][MAG] and [gender][PES], respectively), implying that they do not affect gender cheating behavior (i.e., both genders behave similarly).

IV. Discussion

We have reported the results of a two-round experiment designed to expose cheaters individually, although without identifying them by name or face. Both rounds, conducted in a two-month time difference from each other, involved the same group of students incentivized to answer the same trivia quiz. While cheating opportunities by means of electronic devices were available in the first (treatment) round, they were unworkable in the second (control) round. Comparing subjects' performance in the two rounds self-revealed their cheating levels in the first one. In fact, our estimation of cheating is a *lower bound* on the actual levels of cheating which were perhaps higher. This is so because students who in the first round looked up capital cities in their electronic devices possibly remembered some of them in the second round. This means that scores in the second round, which we use as a proxy for personal knowledge in the first one, could in fact be higher compared to an absent-cheating first round, resulting in underestimation of actual cheating. Had we started with the control round, the better performance revealed in the treatment round could have partly been the result of efforts taken by subjects, feeling ashamed with the poor knowledge they exhibited, to get acquainted with the newly founded countries. Our estimation of cheating would have then constituted an *upper bound* on the actual levels of cheating. The order of the two rounds, with the treatment round first and the control round second, was thus crucial in obtaining meaningful results.

While almost half of our subjects seem to have acted honestly, exhibiting a difference of no more than two correct answers between the two rounds, more than one third of them answered correctly 14-16 questions in the first round, suggesting that they cheated to the maximal extent possible or very close to it (presumably, those who answered correctly 14-15 questions managed to track down an alphabetical list of world capitals in the web but avoided circling 16 correct answers to maintain some credibility). These results challenge the literature's findings, made famous by Dan Ariely in his bestselling book *The (Honest) Truth about Dishonesty* (2012), that people usually cheat by just a little bit, even with seemingly no risk of getting caught and punished, as well as Azar *et al's* (2013) observance that a larger amount of excessive change was returned by restaurant customers much more often compared to a smaller amount despite the economic incentive for dishonestly walking away being four times higher in the former case. The modest level of cheating reported in the literature has been attributed to people's moral feelings which restrict their cheating to a level that enables them to preserve their personal image as honest and decent people. It may be argued that the competitive reward structure of our experiment is to blame for driving a large number of subjects to overcome their moral feelings and cheat maximally. However, Schwieren and Weichselbaumer (2010), who used a web maze game to test the hypothesis that competition enhances cheating, did not find a significant difference between the number of mazes falsely reported to have been solved by the competitive and non-competitive treatment. Still, in the computerized maze game subjects could not tell whether or not their competitors were cheating, whereas in our experiment cheaters could easily be seen using their smartphones. It is therefore possible that some students would not cheat if they were by themselves, but once they saw their classmates cheating they decided it was fair for them to cheat as well otherwise they would be left behind. But it is also possible that competition had a *restraining* effect on lagged-behind cheaters who could have done better had they not divided their attention between secretly searching the web while trying to avoid angry looks from honest classmates with whom they were competing and watching the proctor for possible signs of interest in their misdemeanor. Intrigued by how subjects would behave if left by themselves, we ran a side experiment which allowed 118 randomly selected students to answer the trivia quiz in the privacy of their own cars, offering a modest monetary reward per each correct answer. While in this one-round experiment we were unable to verify cheating at the individual level nor to correlate it with subjects' achievement measures, we did witness the number of maximal cheaters (with 14-16 correct answers) boost to almost *two thirds* of all respondents even in the absence of competition.

Our regression analysis suggests that students' cheating increases with their intellectual achievement measures, overall and by gender, in contrast with the extensive literature that has examined the relationship between cheating and a single achievement measure (the GPA) based on direct-question surveys. The widely-used method of gathering data through direct questioning does not account for the problems inherent in asking threatening questions, and is likely to lead to biased estimates of cheating. Our experimental approach, in contrast, has exposed students' cheating through *observing* their performance in answering the same trivia quiz twice, under loose and strict supervision. Against the common wisdom that low achievers tend to cheat more to keep up with the others, we suggest that the higher is one's achievement the stronger is his or her motivation to maintain it, thus the less likely he or she is to overlook the temptation to cheat if an opportunity presents itself.

One might speculate that the higher propensity to cheat among high achievers revealed in our study is due to the competitive reward structure which may only generate incentives for them to cheat, as low achievers may figure out that they have no chance of ending up in the top 10 performers and not even try to cheat. However, low achievers must not be less exposed to trivial information nor less competent in searching the web. Most importantly, they need not be less motivated to fraudulently fight for a 5-point bonus to the course grade which could make the difference between passing and failing the course. Yet our study reveals that high achievers fought harder. Discussants of the cheating epidemic on the web agree that students nowadays value grades more than education and that good students, who feel pressure to excel at any cost, are as likely to cheat as struggling students who cheat just to get by. An interesting question for future research is to what extent cheating contributes to grades, not just to what extent grades contribute to cheating.

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APPENDIX A: The Trivia Quiz

The purpose of this quiz is to check your knowledge in political geography of modern time. Each question introduces the name of a certain country followed by the names of four cities, one of which is the capital city of that country. In each question, please circle the name of the appropriate capital city. The 10 students to do best in the quiz will be rewarded with a bonus of 5 points to their course grade. The reward reflects our appreciation of your personal knowledge, therefore you cannot use your smart-phone or laptop in search for the correct answers. You have 10 minutes to answer the quiz.

1. **Country**: Belarus
   Capital city: Chisinau / Minsk / Bratislava / Kharkiv

2. **Country**: Montenegro
   Capital city: Podgorica / Sarajevo / Dubrovnik / Zagreb

3. **Country**: Gambia
   Capital city: Serrekunda / Brikama / Farafenni / Banjul

4. **Country**: Honduras
   Capital city: Honduras City / Tegucigalpa / Funchal / San Pedro

5. **Country**: Laos
   Capital city: Sainyabuli / Luang-Prabang / Thakhek / Vientiane

6. **Country**: Armenia
   Capital city: Vardenis / Gyumri / Yerevan / Edjmiadzin

7. **Country**: Turkmenistan
   Capital city: Ashgabat / Turkmenbashi / Abadan / Dashoguz

8. **Country**: Myanmar
   Capital city: Mandalay / Rangoon / Naypyidan / Bagan

9. **Country**: Eritrea
   Capital city: Burco / Djibouti / Khartoum / Asmara

10. **Country**: Madagascar
    Capital city: Antananarivo / Mahajanga / Antsiranana / Manakara

11. **Country**: Tajikistan
    Capital city: Fergana / Dushanbe / Konibodom / Khorugh

12. **Country**: Kosovo
    Capital city: Peje / Prishtine / Mitrovica / Sarajevo

13. **Country**: Seychelles
    Capital city: Elizabeth / Herbert / Victoria / Wellington

14. **Country**: Sierra Leone
    Capital city: Freetown / Georgetown / Lunsar / Kabala

15. **Country**: Haiti
    Capital city: Santo-Domingo / La-Vega / Port-au-Prince / San-Pedro

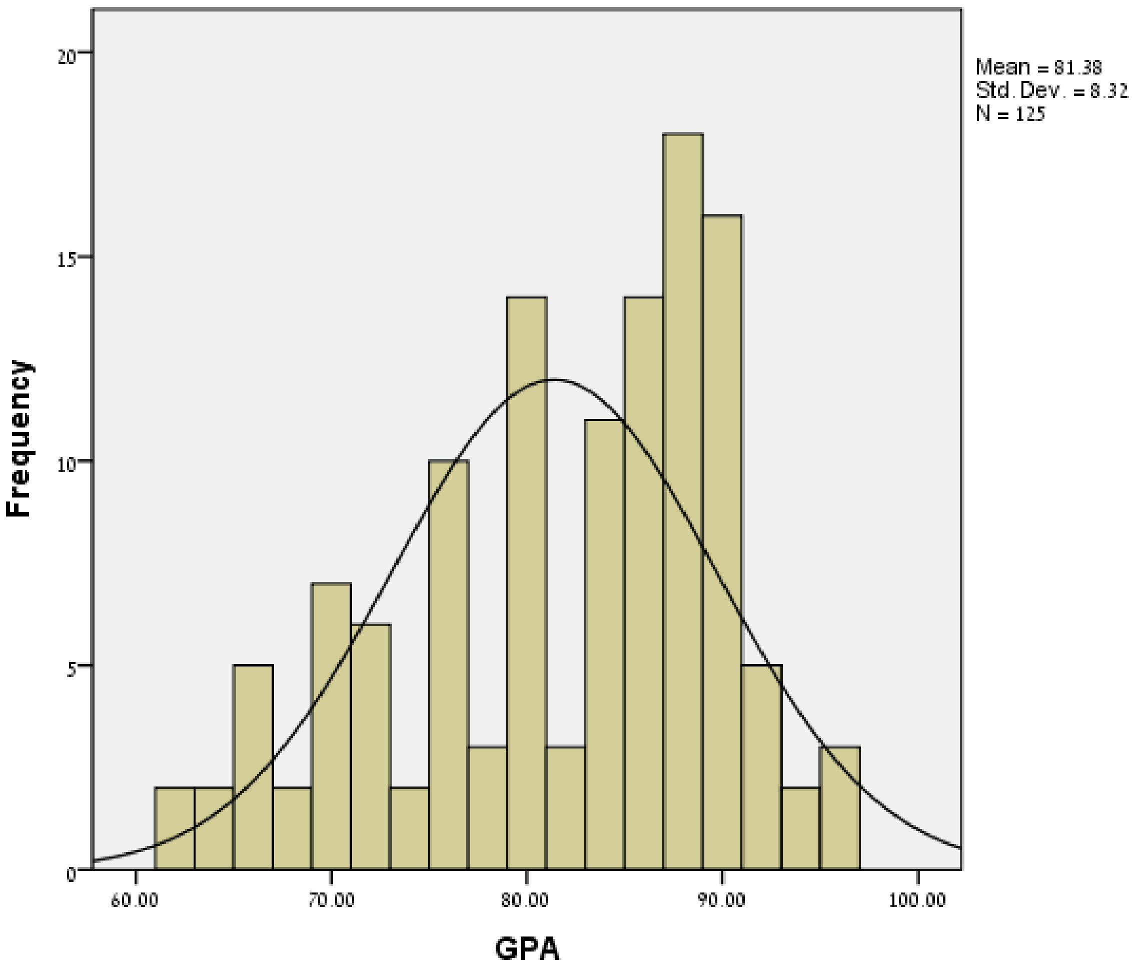
16. **Country**: Macedonia
    Capital city: Zenica / Baja-Luka / Split / Skopje

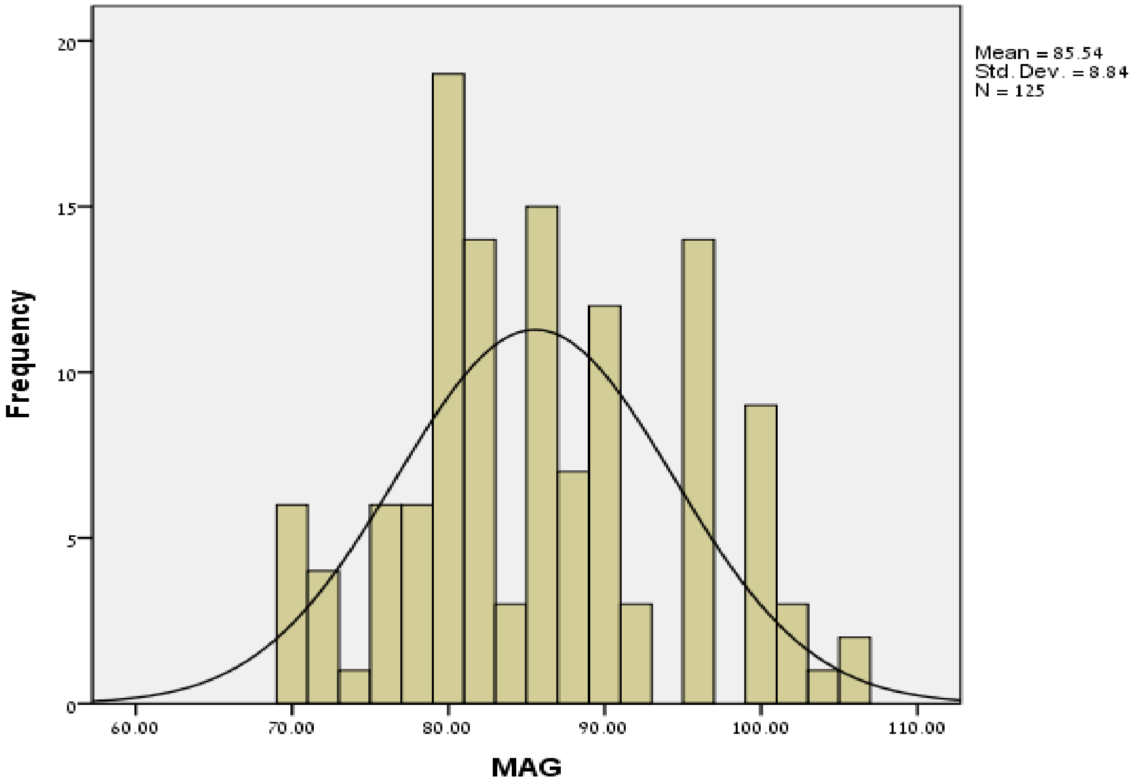
Answers: 1. Minsk; 2. Podgorica; 3. Banjul; 4.Tegucigalpa; 5. Vientiane; 6. Yerevan; 7. Ashgabat; 8. Naypyidan; 9. Asmara; 10. Antananarivo; 11. Dushanbe; 12. Prishtine; 13. Victoria; 14. Freetown; 15. Port-au-Prince; 16. Skopje.

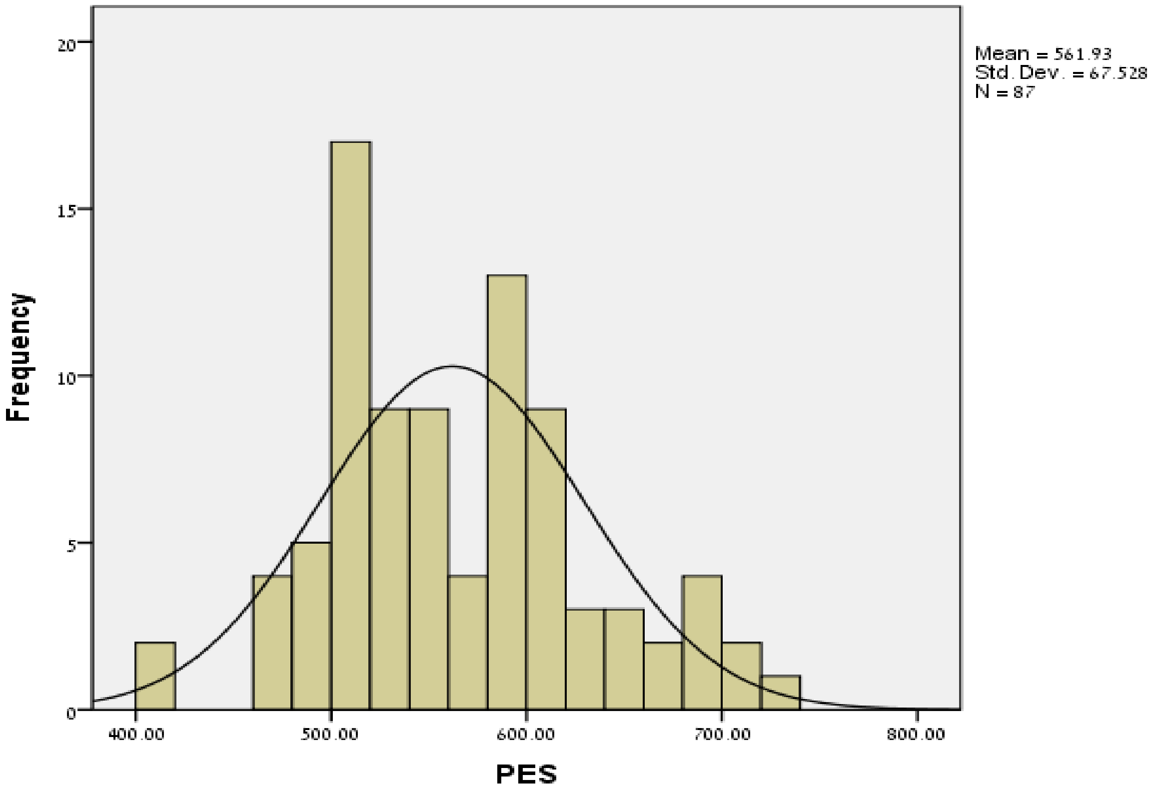
APPENDIX B: Descriptive Statistics for the Achievement Measures

	Mean*	Standard Deviation	N
GPA	81.38	8.32	125
MAG	85.54	8.84	125
PES	561.93	67.53	87

* *The means of the three achievement measures are similar to those of all students at COMAS School of Economics: GPA = 82.4, MAG = 86.7, PES =*567.2




Mean = 85.54
Std. Dev. = 8.84
N = 125
Frequency
MAG
0
5
10
15
20
60.00
70.00
80.00
90.00
100.00
110.00


Mean = 561.93
Std. Dev. = 67.528
N = 87
Frequency
PES
0
5
10
15
20
400.00
500.00
600.00
700.00
800.00

APPENDIX C: Regression of Cheating on Achievement Measures by Gender

Male

	I	II	III
Intercept	-28.084* (4.030)	-38.230* (3.875)	-25.473* (3.488)
GPA	0.404* (0.050)	0.288* (0.047)	0.209* (0.038)
MAG	-	0.227* (0.043)	0.126* (0.037)
PES 601+	-	-	6,077* (0.948)
PES 551-600	-	-	4.659* (0.846)
No PES	-	-	1.910* (0.623)
R^2	0.507	0.660	0.816
N	66	66	66

** Statistically significant variables at 0.01 level*
Note: Standard errors appear in parentheses

Female

	I	II	III
Intercept	-30.262* (4.196)	-42.101* (3.937)	-33.062* (4.232)
GPA	0.433* (0.051)	0.316* (0.045)	0.275* (0.043)
MAG	-	0.252* (0.044)	0.165* (0.045)
PES 601+	-	-	3.968* (1.122)
PES 551-600	-	-	3.011* (0.931)
No PES	-	-	0.753* (0.862)
R^2	0.562	0.725	0.790
N	59	59	59

** Statistically significant variables at 0.01 level*
Note: Standard errors appear in parentheses

APPENDIX D: Students Who Reported a PES

	All			Male			Female		
	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N
GPA	81.48	8.75	87	80.50	8.61	44	82.49	8.88	43
MAG	86.94	9.47	87	87.34	9.61	44	86.53	9.41	43
PES	561.93	67.53	87	548.18	67.77	44	576.00	65.08	43

Regression of Individual Cheating levels on Gender and Achievement Measures

	All	Male	Female
Intercept	-44.003* (2.832)	-44.226* (3.710)	-43.681* (4.220)
Gender	0.030 (0.553)	-	-
GPA	0.236* (0.035)	0.220* (0.046)	0.264* (0.054)
MAG	0.133* (0.036)	0.105** (0.048)	0.166* (0.054)
PES	0.033* (0.005)	0.040* (0.007)	0.024* (0.008)
R^2	0.802	0.826	0.783
N	87	44	43

** Statistically significant variables at 0.01 level*
Note: Standard errors appear in parentheses