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The Dunning-Kruger Effect in Emirati College Students: Evidence for Generalizability Across Cultures

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Abstract

Past research reports higher levels of overconfidence for low performers compared to more proficient performers. This finding has been attributed to low performers' lack of insight into their cognitive processes, and it is referred as the Dunning-Kruger effect. This effect has been replicated across various tasks and domains. To date, however, there have been very limited explorations of the Dunning-Kruger effect in individuals from Non-Western, collectivist countries, where self-enhancing biases might be less prevalent. The aim of this study is to explore whether the Dunning-Kruger effect is also demonstrated among Arab, college students in the United Arab Emirates. Emirati, female college students completed a matrix reasoning task and subsequently assessed their own performance on it by estimating their raw score. The results replicated the Dunning-Kruger effect. Participants scoring in the lowest quartile significantly overestimated their performance and demonstrated levels of overconfidence significantly higher than that of more proficient peers. This study extends our understanding of overconfidence and the Dunning-Kruger effect to the Arab world. The results are discussed with reference to proposed underlying mechanisms.

Key words: Dunning-Kruger effect, metacognition, cross-cultural, self-insight, overconfidence, reasoning, collectivist society.

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Novelty and Significance

What is already known about the topic?

- Low performers make inflated assessments about their performance compared to their more proficient peers.
- This finding is attributed to low performers' lack of insight into their cognitive processes, and it is referred to as the Dunning-Kruger (DK) effect.
- The DK pattern has been demonstrated across various tasks but there have been very limited explorations of the effect in individuals from Non-Western cultures.

What this paper adds?

- This paper shows that the DK effect is not restricted to Western culture since Emirati college students at different levels of performance showed overconfidence patterns consistent with the DK effect.
- The results point to the universality of the DK effect.

Overconfidence is a human tendency. We overestimate our level of skill, knowledge and performance across a wide array of contexts (e.g. for a review see Johnson & Fowler, 2011). Our tendency for overestimation has led to the assertion that overconfidence is a pervasive cognitive bias (Harvey, 1997). Over the past three decades, psychological research has begun to explore factors associated with overconfidence (Burson, Larrick, & Klayman, 2006; Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008; Kruger & Dunning, 1999; Mata, Ferreira, & Sherman, 2013; Moore & Healy, 2008; Pennycook, Ross, Koehler, & Fugelsang, 2017). A common finding in this literature is that low performers, in many social and academic domains, make inflated assessments about their performance compared to high performers, who slightly underestimate their performance. This finding has been attributed to failings in metacognitive abilities among

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low-performing individuals, and it is known as the Dunning-Kruger effect (Kruger & Dunning, 1999). This effect has been demonstrated across various tasks and contexts but there have been very limited explorations of the phenomenon cross-culturally. The current study examines the universality of the Dunning-Kruger effect by exploring whether it is observed among an Arabic-speaking Middle Eastern population, specifically female college students in the United Arab Emirates.

Previous studies in psychology and economic sciences report the tendency for individuals to overrate their skills, knowledge, and performance (Malmendier & Tate, 2005, 2008; Taylor & Brown, 1988; Yates, Lee, Shinotsuka, Patalano, & Sieck, 1988). Beyond this general tendency towards overconfidence, Kruger and Dunning (1999) posited that this self-aggrandizing bias is more prominent among those who actually perform poorly on the task in question. They tested this idea by assessing individuals' abilities on humor, grammar, and logic and then comparing actual test scores against estimated scores for participants at different objective performance levels (in the bottom, second, third, and top quartile). They found that across the three tests, participants with the lowest scores in the test (or bottom quartile performers) were the ones with the greatest discrepancy between actual and self-estimated scores. In the case of poor performers, their predictions surpassed their performance by a greater extent than that of second and third quartile performers. Interestingly, top performers showed a tendency to underestimate their performance. But the degree of error between their estimation and performance was far lower than that of low performers pointing to a difference in metacognitive abilities between individuals at different skill levels.

Since Kruger and Dunning (1999) demonstrated the association between poor performance and unawareness, many researchers have replicated this finding across various contexts. For instance, Sheldon, Ames and Dunning (2014) investigated whether the Dunning-Kruger effect extended to appraisals of emotional intelligence (EI). The study found that the least emotionally intelligent participants had the most limited insights into their EI-deficits. Similarly, Pavel, Robertson, and Harrison (2012) found that low performers on a grammar test overrated their abilities, while high performers underrated their abilities. The same pattern of findings has been observed for tests of reasoning (Pennycook *et alia*, 2017) and geography (Ehrlinger & Dunning, 2003), driving (Marottoli & Richardson, 1998), sports coaching (Sullivan, Ragogna, & Dithurbide, 2018), and card games skills (Simons, 2013). Concerning the latter; Simons showed that even in the presence of feedback, overestimation errors did not change. In this particular study, players first predicted their results on a game before playing, then they were provided with feedback on their performance on practice trials, and lastly, they estimated their performance after the actual game took place. Despite players knowing their own relative performance, they continued to make overconfident performance estimations consistent with the Dunning-Kruger effect.

An open question remains as to exactly why overconfidence is higher among poor performers. Is it the result of metacognitive failings caused by lack of task-relevant knowledge or skill that is inherent to low performers, or is it driven by motivational factors like self-enhancement bias? This latter proposition is likely to be context-dependent and therefore, the Dunning-Kruger effect may vary across cultures.

Ehrlinger *et alia* (2008) posited that overestimation observed in poor performers is caused by a deficit in metacognition -inability to accurately evaluate how well one has performed- which is the product of their own lack of knowledge or skill in a given task. They refer to this finding as the double-curse: in addition to lacking the knowledge

to perform well on a task, poor performers also lack the necessary knowledge to be able to evaluate the accuracy of their own responses. Kruger and Dunning's (1999) explains this phenomenon by stating that "The same skills that engender competency in a particular domain are often the very same skills necessary to evaluate competence in that domain" (p. 1121).

Self-enhancement motives -a preference for holding positive beliefs about the self- are also proposed as an important factor driving overconfidence (Blanton, Pelham, DeHart, & Carvallo, 2001; Krueger & Mueller, 2002), especially when the performance being evaluated is a reflection of traits deemed important to the individual (Brown, 2012). This type of bias is associated with the maintenance of positive feelings of self-worth (Baumeister, 1989). Krueger and Mueller (2002) argued that individuals at all skill levels are motivated to rate their performance high. Therefore, performance estimation error will differ across low and high performers. Low performers will appear to commit more metacognitive errors than high performers simply because their actual score is low.

Notably, individuals from collectivist societies have been found to exhibit less self-enhancement bias than those from more individualistic societies (Chang & Asakawa, 2003; Heine, Takata, & Lehman, 2000; Heine & Hamamura, 2007, Norasakkunkit & Kalick, 2002). One proposed reason for the lower levels of self-enhancement is that the interdependent self-system characteristic of collectivist cultures places less emphasis in the need to be unique or special, while stressing the importance of maintaining social harmony and fitting in. Such cultural values may also explain why higher levels of overconfidence are observed for individuals in Western countries than Eastern countries (Heine et alia, 2000; Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997).

To date we can find no studies examining whether the Dunning-Kruger effect is observed in a collectivist cultural context. Similarly, we can find no previously published studies exploring the Dunning-Kruger effect in a Middle Eastern nation. Given the previous cross-cultural differences observed in self-enhancement and overconfidence, the Dunning-Kruger effect merits further examination in collectivist cultural contexts.

In the current study, we used a methodology similar to Kruger and Dunning's (1999) to investigate whether Dunning-Kruger overestimation patterns among Emirati college students on a logical, reasoning task. Participants completed a reasoning task and subsequently estimated their raw score in the task. We chose to measure reasoning instead of a social ability because reasoning is an ability valued across cultures given its relevance to students' achievement.

Method

Participants

Ninety-four female undergraduates volunteered to participate in the study. Four students were excluded from the analysis for failure to fully complete all tasks. All participants were citizens of the United Arab Emirates with a mean age of 22.32 (*SD*= 4.33). The institutional language of tuition is English and all participants are bilingual in English and Arabic. The study received ethical approval from the institution's research ethics committee. All participants gave written informed consent prior to the study's commencement.

Materials

The materials consisted of 30 pictures of incomplete matrices taken from the Matrix Reasoning subtest of Wechsler Abbreviated Scale of Intelligence (WASI-II, Wechsler, 2011). Matrix Reasoning is a non-verbal measure of inductive reasoning. The average reliability coefficients for the subtest range from .83 to .94 for adult sample (McCrimmon & Smith, 2013).

Procedure

Upon arrival in the laboratory, participants were greeted by a research assistant and directed to a workstation with a computer. After giving informed consent to participate in the study, participants filled out a demographic questionnaire and subsequently received detailed instructions about how to complete the matrix reasoning task. The task began with two practice trials and was followed by 30 testing trials. In each trial, an incomplete series or matrices taken from Matrix reasoning subtest of (WASI-II) and five response options were presented to participants using E-prime software on a Dell laptop. Participants were instructed to choose the response option that best completed the series by pressing labeled keys on the computer keyboard. After making a response, participants advanced to the next trial. This procedure continued until participants viewed and responded to all 30 items. Participants had unlimited time to make a response. The task started easy and gradually became more difficult. After selecting the response for the last item in the test, participants were prompted to evaluate their performance by answering the following question: "how many of the 30 items do you think you answered correctly?".

Data Analysis

To investigate degree of overestimation (or underestimation), we calculated a difference score (estimated score-actual score) for each student. Positive values correspond to overestimation and negative to underestimation. The absolute value of the difference score was also calculated in order to examine the accuracy of the performance judgments. The absolute difference score was |estimated performance-actual performance|. The closer the value is to 0, the more accurate it is.

RESULTS

The mean number of correct responses on the matrix-reasoning task, across all participants, was 18.3 (*SD*= 3.97). The mean value for performance estimation was 18.4 (*SD*= 5.1). Performance estimation did not differ significantly from actual scores (t[89]= .189, p= .851), reflecting a general tendency not to overestimate one's own performance. Following Kruger and Dunning (1999), a quartile-split based on actual performance in the reasoning test was used to further explore the accuracy of performance estimation across different levels of objective performance (bottom, second, third, and top quartile). Size of quartiles ranged from 18 to 27 students. As a manipulation check, a quartile Analysis of Variance (ANOVA) on actual performance was performed. Actual scores differed significantly across quartiles, F(3,86)= 287.5, p= .001.

As Table 1 and Figure 1 show, participants in the bottom quartile overestimated their actual performance with a mean difference of 5.89 points (*SD*= 5.3), t(17)= 4.7, p=

Table 1. Mean Actual Score, Estimated Score and Difference per Quartile.

Quartile	Actual Score	Estimated Score	Difference
1	13.06 (1.39)	18.94 (4.9)	5.89 (5.3)
2	16.22 (1.15)	17.33(5.7)	1.11(5.3)
3	19.77(.81)	18.59(4.75)	-1.18(4.8)
4	23.48 (1.44)	19.17(4.98)	-4.3(5.0)

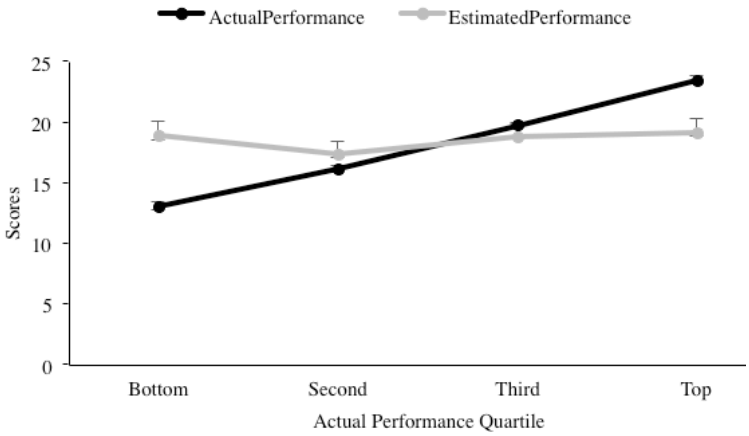

Figure 1. Shows estimated and actual performance for each performance quartile.

.001. And top performers underestimated their actual performance by 4.3 points (*SD*= 5.0), $t(22)= 4.13$, $p= .001$. Additionally, an ANOVA was performed with quartile as the independent variable and difference score and absolute difference as the dependent variable. The ANOVA showed that calibration significantly differed among quartiles, $F(3,86)= 10.83$, $p= .001$. Tukey Honestly Significant Difference (HSD) post-hoc test indicated that participants in the bottom quartile were significantly less calibrated (more overconfident) than participants in the second ($p= .015$), third ($p= .001$), and fourth quartiles ($p= .001$). Similar findings were observed for absolute differences, $F(3,86)= 3.39$, $p= .022$. The mean absolute difference was significantly higher for quartile 1 than quartiles 2 ($p= .036$) and 3 ($p= .035$), and quartile 1 was higher than quartile 4 on a descriptive level. Therefore, the results of this study replicated prior studies showing that low performers overestimate their score to a higher extent than their peers and that the degree of estimation error is higher for low performers than more proficient peers as well.

DISCUSSION

The present study replicated the Dunning-Kruger effect among Arab college students. The results showed that students in the bottom quartile overestimated their performance to a larger extent than their more proficient peers, whereas those in the top quartile actually underestimated their performance. This pattern is consistent with previous studies on the Dunning-Kruger effect (e.g., Kruger & Dunning, 1999; Sheldon, Ames, & Dunning, 2014) which points to the likelihood that performance misestimation across low and high performers is governed by different mechanisms. Dunning (2011) argues that whereas overestimation among less knowledgeable individuals is the result

of metacognitive failings, underestimation among top performers is probably due to false consensus bias -that is, the belief that peers are as skilled as they are.

The present findings complement the literature by demonstrating that overestimation among poor performers is not dependent to cultural context. However, what causes this metacognitive failing is less clear. Currently, two distinct hypotheses exist for the link between poor performers and overestimation. One hypothesis is that lack of knowledge or cognitive skills in a particular task or area prevents low performers from correctly evaluating their performance because, as Kruger and Dunning (1999) pointed out, often the same knowledge and skills necessary for completing a task are the ones necessary for evaluating one's performance. The other hypothesis is that it emerges from heavy reliance on intuitive thinking. Mata and colleagues proposed that intuitive thinkers have a metacognitive disadvantage over analytical thinkers because when solving problems they commit to the answer generated by the intuitive system too quickly, without further reflection. The problem with this is that under certain circumstances, intuitive answers are incorrect and without invoking the analytic system, there is no way for one to know that. This causes intuitive thinkers to commit errors that go undetected, which in turn contributes to performance estimation errors (Mata *et alia*, 2013). Future research should explore this possibility in greater detail by looking at whether intuitive thinking mediates the relationship between poor performance and overestimation. It is conceivable that these two hypotheses are complementary rather than mutually exclusive, and that analytical thinking is necessary for both effective task completion and for accurately evaluating one's performance.

One other factor that could also affect metacognitive failings is implicit theories of intelligence. Ehrlinger, Mitchum, and Dweck (2016) reported that individuals who view intelligence as fixed are more likely to overestimate their performance than those with incremental views of intelligence. The same authors also demonstrated that the link between fixed beliefs of intelligence and overconfidence is mediated by an attention allocation bias toward easy items. Students who view intelligence as static tend to pay more attention to easy items than difficult items while taking a test. Because of this bias, easy items are more salient which in turn influences students' predictions of performance. In summary, students display overconfidence, in part, because as they assess their performance they recall more easy items than difficult ones, creating an illusion that they performed better than they actually did.

It is important to point out that, in contrast to prior studies in Western countries, the sample as a whole did not display overconfidence. Estimated scores did not significantly differ from actual scores when compared across the entire sample. We think that various factors could have contributed to this finding. For instance, in collectivist cultures, people's behavior is less likely to be influenced by self-enhancement motives because of great emphasis placed on modesty and humility. Second, our sample consisted of only female students. Although findings in the literature are mixed for gender differences in overconfidence, some suggest that men display higher levels of overconfidence than women (e.g., Guzman, 2012; Jakobsson, 2012; Lundeberg, Fox, & Punccohar, 1994). It is then possible that the outcome of the study may have been different if the sample included males as well. Third, task difficulty progressively increased in the present study. This means that participants assessed their overall performance right after completing a difficult trial. It is possible that this recent experience with a difficult trial primed participants to lower their overall estimations which may explain overconfidence not being found across the whole sample. This is a hypothesis which is worth investigating

further. Future studies could test this hypothesis by manipulating the type of stimulus (easy or difficulty) presented at the end of the task.

The current study has some limitations. First, we did not measure participants' culture orientation. This could have been done by using Singelis Self Construal Scale (1994). Although the UAE is considered to be a collectivist country (Hofstede, 1980), variations in cultural orientation across individuals may be observed. Future studies should explore this further. It would be interesting to compare performance estimation error for participants with collectivist versus an individualistic cultural orientation. We predict that whereas overconfidence levels may vary between individualistic and collectivist individuals, Dunning-Kruger effect will be observed for both. Second, as stated earlier, the current study included only female participants. Considering this limitation, we do not know if the outcome of this study would generalize to males in the UAE. We hope that future research will complement the present study by exploring gender differences in overconfidence in the UAE.

The findings of the present study have applied implications. They suggest that students who are not performing well academically may be more susceptible to attribute their failure to external factors than internal ones and therefore be less susceptible to feedback and self-improvement. For example, if students strongly believe they know the material they were tested on but the test outcome shows otherwise, students may question the credibility of the evaluation or disregard it completely. This may also increase students' dissatisfaction with college and lead to withdraw from courses or diminished commitment to school assignments. To prevent this from happening, it is important to raise awareness about the Dunning-Kruger effect, especially among teachers so that they are better equipped to deal with it and minimize its consequences. It is also important that researchers develop interventions and strategies designed to improve insight, especially among poor performers.

In conclusion, this is the first study to the best of our knowledge to demonstrate the Dunning-Kruger effect in an Arab, and relatively collectivist population. While we cannot claim the particular mechanisms by which poor performance gives rise to overconfidence, systematic differences between performance levels points to the universality of the Dunning-Kruger effect. Future research should investigate the role that various sources of overconfidence have in mediating the relationship between poor performance and estimation error, as well as ways to modify this bias.

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