

How the Dunning-Kruger Effect Impairs Professional Judgement in High-risk Professions

Adan Rubin¹ and Ellen Froustis[#]

¹Winchester College, UK

[#]Advisor

ABSTRACT

The Dunning-Kruger effect is a cognitive bias whereby people with limited expertise in a given area overestimate their own competence and subsequently make poor decisions. In this paper, we review the bias in high-risk professions, within which overestimations of self-efficacy can lead to harmful and even fatal consequences. We explore the bias's effect on students (in medicine and aviation) whose inexperience assigns them a higher disposition to unmerited confidence. Moreover, we address the bias's effect in criminal investigations and emergency situations. This review finds that Dunning's dual burden account partnered with a self-serving bias is the best explanation for the Dunning-Kruger effect. The cognitive bias is ubiquitous and leads to insupportable degradations in professional performance. The bias was prevalent among medical and aviation students and also adversely affected the criminal investigation process: investigators ignored a self-evaluation process needed to improve interrogation skills. The principal correctives to the cognitive bias (Rahmani, 2020) are twofold. Firstly, management needs to be aware of the effect and understand that subordinates' projected self-confidence does not necessarily correlate to capability. Secondly, an organizational structure incorporating continual constructive criticism and evaluation from numerous sources is essential. Supervisors should not rely solely on self-assessment and should remember that self-doubt is critical to improvement.

Introduction

The Dunning-Kruger effect is a cognitive bias whereby people with limited expertise in a given area overestimate their own competence. Dunning's "dual burden" exposition declares that the same deficits in skill that lead to their own bad performances also prevent these individuals from recognising the correct course of action: lack of skill at a particular exercise has a causal relationship with weak metacognitive skills needed to evaluate one's ability. Consequently, the less abled assume themselves capable and their actions reasonable. That being said, McIntosh and Della Sala (2022) believe that the pattern of self-misjudgements is "driven by statistical artefacts and not by metacognitive differences between good and poor performers." Nevertheless, they do not dispute the presence of the effect, they simply disagree with the Dunning's explanation, which also does not elucidate the link between the ignorance of one's ability and the assumption of one's competence. A self-serving bias may provide the rationale for this with those low in self-esteem (as a result of their poor abilities) seeking to elevate their self-image.

This cognitive bias is not limited to the lower quartile of the population but also governs the actions of qualified individuals within the top quartile (those between the first and third quartile are the least affected). Believing themselves to be the norm because of the false consensus effect, the knowledgeable underestimate their relative ability, and allow their louder, unskilled peers an unearned voice in decision-making (The Decision Lab, n.d). The effect creates problems throughout everyday life: poor drivers take greater risks leading to accidents; those uneducated in political affairs are likely to spread misinformation; employees, believing they understand the job requirements, do not ask enough questions causing easily avoided mistakes. These complications are distributed across all professions, even amongst the highly skilled. For example, 42% of engineers working in a software development firm ranked their

proficiency as within the top 5% of their peers - an impossibility (Zenger, 1992). These misjudgements surface - along with the Dunning-Kruger effect in general - most frequently when individuals have little experience in the concerned field, putting developing operatives most at risk. Unfortunately, overestimations in self-efficacy can carry grave consequences to both patients and workers themselves in certain high-risk professions. Therefore, in this paper, we investigate the significance of the Dunning-Kruger effect - with a focus on those early in their career in the first half of the review - and seek to answer the question: "to what extent does the Dunning-Kruger Effect impair professional judgement in high-risk professions?" The second half of the review will then address the same effect in criminal investigations and emergency situations. The former will be used to detail the various features of the self-serving bias while the latter will illustrate the fatal consequences the cognitive bias can cause. We also cite the various methods that serve to minimise the effect.

Doctors

When considering high-risk professions, i.e., those which can directly affect people's well-being, the medical industry is at the forefront of our concern. In healthcare, the Dunning-Kruger effect can have harsh consequences. Poor communication, misdiagnosis and defective operations may follow as a direct result of aggrandized self-image (Dušan Surdilović et al., 2022). Regrettably, these ramifications do not cease at the treatment level. There is a direct correlation between underperforming and the refusal to accept feedback from supervisors. Physicians have a tendency to regard negative assessments as inaccurate or unhelpful, and while some are able to accept and utilise critique after rumination, others not only ignore it, but also dispute its rationality and approach (Sargeant J et al., 2008). These complications will continue to combine synergistically to damage patients' treatment should the appropriate coaching be spurned.

A study was done on final year dental undergraduates at a university in the UAE investigating the trend and consequences of the Dunning-Kruger effect amongst dental students (Dušan Surdilović et al., 2022). The students they studied could be designated the "competent" label as classed by the Dreyfus model (Dreyfus, 2004). Their results served to partly solidify the dual burden account. They found that at the beginning of the year, in September, confidence was high. However, by January, as the year progressed, confidence levels plummeted, but subsequently reached a peak at the end of the academic year in May (Surdilović et al., 2022). These findings are in accordance with Dunning's explanation: an individual's incompetency robs them of the metacognitive abilities necessary to accurately place their capability. Surdilovic quotes Confucius' statement, "real knowledge is to know the extent of one's ignorance." At the start of the year, the students' lack of knowledge renders them unable to identify areas wanting in knowledge, leaving them confident. As the year progresses, they learn of such areas and their confidence wanes. Eventually, having gained sufficient experience, competency renews their confidence (to its highest level), now somewhat substantiated.

Interestingly, this contradicts Rahmani (2020), who found that confidence levels never remount to that of their starting, unfounded magnitude. Rather, even though it augments as competency improves, it stops short of the immediate overestimation of self-efficacy. Another point of interest in Surdilovic's study is that student responses did not ever correlate with supervisors' appraisals, most particularly in September; indeed, the highest correlation was observed in January, when the students' confidence was at its lowest. The dental students' newly found confidence of May did not correspond to their supervisors' lower assessment. This facet of the study trends towards Rahmani's view, arguing that the students' confidence in May should have been lower, and so perhaps would not have surpassed their confidence in September.

Another study investigating the Dunning-Kruger effect in first year medical students in an Indian tertiary care hospital revealed the effects that different variables have on the prevalence of the cognitive bias (Novonil & Poulami, 2021). Overall, they found that the number of hours of study and sleep were correlated negatively with the frequency of the effect. Studying lowers one's propensity for disregarding topics in a field through ignorance. Sleeping improves brain functioning, naturally refining the metacognitive abilities needed to gauge expertise accurately. Increasing age is also negatively correlated with the bias: experience tends to be proportional to age. Intriguingly, those

planning to pursue higher education displayed more overconfidence than those unsure of their future plans. This may be explained by a self-serving bias, with these individuals seeking to affirm their further plans for education by convincing themselves that they have a predisposition for their field. Lastly, it was found in this study that females (80.28%) were more susceptible to the effect than males (75%). It must therefore be mentioned that some results within this study do contradict both each other and previous articles. The relatively small sample size of the study, 111 students, may explain these anomalies.

In fact, according to Reilly, Neumann and Andrews (2022) it is males, not females who tend to overestimate their value. Male hubris and female humility is a supposition to which the study gives credence. Reilly explored the divergences in estimations of IQ between the sexes and established that both biological and psychological gender were the best predictors of embellishing one's academic ability. Those born male with strongly masculine traits had the highest disposition for overestimation. This phenomenon occurs largely due to two reasons. Firstly, females frequently rate their self-esteem lower than males. Secondly, while most cultures around the world place both sexes on an equal intellectual footing, subliminal sexism seems to be present in all societies. Parents asked by researchers to rate the intelligence of their children tended to rank their sons significantly more highly than their daughters (Furnham & Gasson, 1998). Parental and wider social expectations are strong, implicit drivers and could explain females' proclivity towards self-underestimation.

Beyond the debate over which factors most drive this bias, we can agree on the necessity to diminish the prevalence of the Dunning-Kruger effect, especially in medicine. It is essential for leaders and trainees to recognise the effect as personal development relies fundamentally on the acknowledgement and identification of one's weaknesses. As a first step Rahmani (2020) recommends inducing self-doubt to enhance performance and by encouraging physicians to acknowledge their shortcomings to stimulate helpful self-examination. She has four areas of actionable advice for medical directors: Firstly, to be aware that projected self-confidence does not necessarily correlate with performance; Secondly, rather than rely on self-assessments, more reliance should be placed on feedback from a multiplicity of peers, patients and faculty to measure an individual's ability; Thirdly, individual improvement should be fostered through constructive, objective criticism from multiple sources along with clear measures of competence as well as automatic consequences should those expectations not be met; Lastly, for insecure students superficial reassurance is in fact unhelpful as periods of self-doubt must be endured to refine and improve individual performance. The efficacy of acknowledging the Dunning-Kruger effect in medicine is to help junior physicians to develop improved performance, thus ensuring superior health services for the community in the future.

Pilots

Although disasters within aviation are rare with crashes occurring in around 1 in 11 million flights, they do carry dire consequences. As such, over-estimations in ability bring about fatal repercussions. Problematic situations caused by the Dunning-Kruger effect can include "a pilot continuing Visual Flight Rules (VFR) flight into Instrument Meteorological Conditions (IMC) without adequate training or proficiency, a pilot transitioning to new aircraft or avionics without adequate training, an air traffic controller underestimating how close two aircraft will pass each other, or an A&P mechanic working on an unfamiliar aircraft or engine" (Pavel, Robertson and Harrison, 2012). These cases should necessarily be avoided and the study of Pavel, Robertson and Harrison (2012) indicates that the effect may be a problem for the safety of the National Airspace System (the study was done in the US). Therefore, navigating and reducing problems with overconfidence must be addressed within aviation schools.

Dan Grunloh (2011) also suggested that the Dunning-Kruger effect could pose problems in aviation, particularly in instances when novice pilots minimise prospective complications from maintenance issues. Casner (2008) surveyed 134 general aviation pilots interrogating their attitudes towards advanced cockpit systems and how the pilots evaluate the systems' effectiveness in reducing workload and affecting awareness while flying. While the pilots seemed generally cognisant of possible drawbacks with the systems, there was a high probability of their ascribing problems to other pilots rather than themselves. These results indicate that it is probable some pilots, and by extension

the entire flight's safety, would be affected by their complacent disposition towards potential problems with the advanced systems.

The studies justify the need for a purposive improvement in dealing with the Dunning-Kruger effect in aviation schools. Dealing with the problem in early-career pilots, when confidence is highest, would mark a significant enhancement to flight safety.

The self-serving bias helps create the better-than-average effect present throughout society, including aviation school. In the Pavel, Robertson and Harrison (2012) study, SIUC aviation students were given two tests - a grammar test and FAA exams. They were asked to gauge their relative ability and predict their scores on the test before taking it and once more after taking it. The lower quartile significantly overestimated their ability; on the grammar test, their average score was at the 10th percentile, whereas they estimated themselves to be at the 68th percentile. The bottom quartile also ranked their pilot skills more highly than the other quartiles. In both cases, the Dunning-Kruger effect is apparent.

Interestingly, after taking the test all quartiles reduced their predicted scores. Therefore, it can be seen that the top quartile, although generally secure in their abilities (one would assume), also suffered from a self-serving bias, though it was of a smaller relative degree than the bottom quartiles. It should be noted that rather than maintain their over-estimated scores and a delusive complacency, the students all reduced their estimates risking harm to their self-image. That being said, the results were anonymised and tests were torn up once surveyed. Therefore, there was no chance for their social standing to be blemished by their modest marks. Should the experiment have been made public, perhaps students would have been less disposed to lower their estimates and risk damage to their public profile potentially lowering others' evaluation of them.

As stated previously, adjustments to aviation training would reduce prospective difficulties. If the situation allows, training should be optimised to assist students differently depending on their capability. Pavel, Robertson and Harrison (2012) recommend two key solutions. Firstly, accomplished pilots should have their abilities stretched to more advanced levels while those struggling should be directed to focus on more basic flying skills. Although separating and accurately placing individuals into different ability groups would be costly, this would effectively diminish the robustness of the Dunning-Kruger effect. Secondly, by inculcating students with substantial awareness and knowledge of the effect, pilots (conscious of their possible bias) would be encouraged to seek additional training when transitioning to new aircraft. This should limit the high fatality rate observed when pilots are flying unfamiliar aircraft.

Education regarding the Dunning-Kruger effect, along with training programs encouraging individuals to be more introspective and candid in their self-evaluation are recurring themes that should not be limited to aviation schools but applied across all industries at both early and late career stages. In fact, knowledge of the effect and individuals' potential inclination to hyperbolize self-efficacy would be useful in everyday life, helping us all make better-informed decisions whether they be at work or at home. As seen in the Cornell study (Kruger and Dunning, 1999), even those at the most prestigious institutions are susceptible to this cognitive bias. As such, it is fundamental that we do not make the mistake of assuming ourselves to be immune.

Criminal Investigators

In criminal investigation, a detective's most common requirement is to conduct interviews. Differentiating between the innocent and guilty is a strenuous task of paramount importance, both for justice and occasionally the safety of other citizens. It is a job that undoubtedly requires competency though frequently finds it lacking (Walsh & Bull, 2010; 2015; Walsh & Milne, 2008). The Dunning-Kruger effect gives detectives, especially experienced ones, a sense of complacency, rendering any self-evaluation and desire for improvement an improbability. The absent aspirations for bettering interview techniques by no means indicate high levels of efficacy within the profession. Instead, Dave Walsh, Mick King & Andy Griffiths (2017) found that detectives rated themselves as most skilled with twice the frequency as the expert. Furthermore, Walsh and Bull (2011) note that investigators were only required to undergo

appraisals at the request of their superiors - this created a significant problem given that the least proficient tend to be the most overconfident, conveying an unwarranted self-assurance.

The concept that experience can breed incompetency is a continuing theme throughout the research of Walsh, King & Griffiths (2017). This differs from the widely held belief that it is actually inexperience that produces incompetence. In this case, the anomaly may be explained by the specific nature of the situation. Paradoxically, as a result of their experience, investigators develop high levels of self-confidence similar to those of beginners. As a result of their assuredness, they undergo evaluations less frequently, as foregrounded, and as a result seldom receive supervisory feedback. This, coupled with a lack of refresher training, is found by Griffiths (2008) to correspond with progressively deteriorating performance. Walsh and Bull (2010) and Walsh and Milne (2008) both found that such experienced investigators performed at a substandard level. This is in line with Dunning and Kruger (1999), who state that exclusion from criticism can lead to under-performance.

The second reason for the effect, asserted by Walsh, King & Griffiths (2017), not just for the experienced but all detectives, is self-protection. Numerous studies have found that we exaggerate our abilities, sometimes in the face of contradictory evidence. Taylor (2014) surveyed burglars, inquiring into their perceived self-efficacy. Participants classified themselves as skilled at both committing criminal acts and decision making - all had been caught at least once.

Self-serving bias is a preeminent driver of these incorrect evaluations and misattributions (Walsh, King & Griffiths, 2017). People's recollection is unavoidably biased to recollect the past in a way that flatters them (Campbell & Sedikides, 1999; Mezulis, Abramson, Hyde, & Hankin, 2004; Roesse & Olson, 2007). Successful outcomes are attributed to dispositional factors whereas negative outcomes are attributed to situational factors (the fundamental attribution error (Ross, 1977)). There are also numerous other cognitive biases humans employ in order to elevate self-image. Selective memory and confirmation bias rank as two of the most significant. Selectively recalling feedback, even when the negative feedback aligns with our own self-criticism, causes us to devalue such feedback both intentionally and unconsciously (Sedikides, Green, and Pinter, 2004). We place far more merit on positive feedback as protecting our self-image outweighs the possible benefits from self-criticism (Sedikides and Gregg, 2006).

Ironically, selective-memory, or selective-recall (which also occurs when considering our strengths) creates a self-fulfilling prophecy; we store more positive than critical self-evaluation. (Kihlström, Beer, & Klein, 2003; Prentice, 1990). Furthermore, positive stores of memory deteriorate more slowly than their displeasing parallel (Skowronski, Gibbons, Vogl, & Walker, 2004; Walker et al., 2003), leaving the gap in recollection yet larger and self-protection yet easier. Consequently, we are also heuristically driven to optimistic self-perception as flattering attributes and situations are less demanding to recall.

Moreover, this greater volume of favourable memories has a dual effect. It couples with confirmation bias - whereby we seek only to reaffirm our beliefs, in this case our honeyed self-concept, in order for self-protection. Any negative feedback (which we are already disinclined to attend to) is set against a large body of complementary information, and so often is invariably discarded. Objective self-assessment therefore becomes a challenging task. Those in the lower quartile of their skill set would be more inclined to these biases to make up for lapses in self-esteem (as a result of their inferior performance). For them, self-protection is far more important than to people in the higher quartiles who feel more secure about their ability.

Continual evaluation should be integral to working as a criminal investigator. The PEACE model (Walsh, King & Griffiths, 2017) incorporates such evaluation. Nevertheless, Shepherd and Griffiths (2013) argue that evaluation was perceived as too complex an undertaking in England and Wales and as such was largely ignored. Walsh, King & Griffiths, (2017) in the UK show that it is indeed still being disregarded, with assessments disorganised and unproductive. Nevertheless, should ameliorated investigations be desired, evaluation would form a key part of the improvement process. (Andrade & Boulay, 2003; Dunning & McElwee, 1995).

In order to combat neglect of negative feedback, Sedikides, Campbell, Reeder, & Elliot (2002) found that it is better received, and more likely to be acted upon, when it comes from a respected and trusted source. Furthermore, if those being appraised believe in the possibility of long-term betterment, they will be more prepared to accept and

act on criticism. While comparative judgements can be unhelpful if one only compares oneself favourably to those lower in skill, these can be beneficial more than absolute judgements when comparisons are made against better-skilled individuals. Such comparisons have been found to actuate self-development. Encouragement to act in accordance with these principles, along with education about the Dunning-Kruger effect will help detectives improve their interrogation skills.

Emergency situations

Disasters are chaotic, with individuals within them exposed to masses of specious information. Pair this with the Dunning-Kruger effect whereby these individuals have a propensity for overconfidence and the already grave situation worsens. Competent decision-making is essential in such circumstances as these may affect groups of people as well as the individual. Overestimations from the less able, in combination with their projection of assurance, can quite literally lead people to fatal consequences.

Unfortunately, before and during such disasters, there is a stronger likelihood that the less able seek advice from each other, namely unqualified sources to justify decisions and form a misguided groupthink mentality. These individuals, while providing mutual moral support and affirming the "correct" course of action, lack the metacognitive ability to find the optimal course. Therefore, in banding together for a belied sense of comfort, they in fact place their chances for survival at a detriment. Basing this review on the study by Siems (2016), we note the various effects of the Dunning-Kruger effect in a natural disaster – that of Hurricane Katrina.

Hurricane Katrina, one of the most lethal storms to strike the United States, caused 1,833 deaths along with an estimated \$135 billion in damage. The researcher investigating the presence of the Dunning-Kruger effect amidst this disaster examined thirty survivor transcripts. Of the thirty, 73% exhibited indicators of cognitive bias. However, this number is likely exaggerated as a result of the selection criteria for the individuals in the study set; all examined individuals had decided against evacuation in face of the storm, a mistake, and thus it follows that most of them were affected by the cognitive bias. The researcher hypothesised that a lower percentage of the effect would have been found had the dataset been more diverse.

That being said, they were not the only ones affected. A lawsuit after the storm accused hospital leadership of negligence. Not only did the hospital management choose not to evacuate the facility, but in addition they stationed the emergency power generators in the basement which had flooded multiple times previously. For all that, the hospital administrators had not intentionally committed these mistakes. Rather, they genuinely made consistently erroneous decisions as a result of their unwitting ignorance. When questioned, the administrator stated that "[he] didn't know it would fail" despite the fact that experts declared that the system design was clearly critically flawed and the generators were located in a known flooding area. While skilled in medical operations, the administrators, unaware of this information, lacked the necessary expertise and cognizance to act and plan for an emergency. As a result of their ignorance and overconfidence, an individual died, a distressing consequence of a widely prevalent cognitive bias.

Again, it was not just the hospital administrators; the majority of the people who suffered in the storm were affected by the effect. Many victims had normalised hurricanes, with statements such as: 'If you live down here, you measure time by hurricanes; Did you build it before or after Betsy?; Did you build it before or after Camile?' These comments reveal misjudgements of competency. Individuals relied on past experience rather than scientific analysis to arrive at a misconception about the danger of the situation. Each storm is unique and should be assessed independently; the rational decision would have been to listen to the expert recommendations to evacuate. Unfortunately, this was largely ignored. To worsen the problem, the aforementioned groupthink mentality was exposed by one of the respondents: "We did not have a plan, we may have thought we did, but if we did, we didn't use it."

To avoid these situations, Stephen Marsar (2013) suggests numerous solutions. His principal focus is on communication during emergencies. "Marsar established that the message matters; keeping messages simple, specific, and relevant to time, place, and person are important" (Siems, 2016). Messages should be circulated promptly and

offer practical, simple instructions easily understood in taxing situations. He cites Hurricane Sandy, whereby the recommendation to the public was simply to "be somewhere else when the storm struck (Ibid., 88)". This is a clear example whereby the public was not afforded sufficient counsel to make appropriate decisions and thus reinforces Marsar's viewpoint. It evidences the utility of following his advice.

The case study of Hurricane Katrina showcases the ramifications of the Dunning-Kruger effect in emergencies. This cognitive bias was present within multiple groups and exacerbated what was already a grim situation. The review done by Siems (2016) highlights the pressing need to implement measures to combat the effect, the basic initiatives being to improve education and to have experts corroborate possible courses of action in emergencies.

Discussion

The Dunning-Kruger effect detracts from performances in all professions and while this paper is focused on work, this cognitive bias is ubiquitous and influences us in everyday life as well. It is critical when grave consequences occur because of overestimations in self-efficacy, when harm can befall both ourselves and others. The first three cases of the review evidence the effect's presence within high-risk professions and the insupportable degradations in performance that follow while the latter case - emergency crisis management - is an illustrative example of its occasionally fatal consequences.

In general, inexperience leads to a higher propensity to succumb to the effect. The unknown unknowns left students in the Dušan Surdilović et al. (2022) dental study with insufficient information to judge their competence. There is a consequent presumption of ability and unmerited confidence. As the students grew in experience and were exposed to more information, they became better-able to evaluate their relative skill. Previously, as supposed in the dual burden account, their ignorance or incompetency stripped them of the required metacognitive ability for accurate self-appraisal.

Interestingly, in the criminal investigator study, there were instances where the opposite correlation was found. Experience had multiple drawbacks for the detectives. Seniority and occasionally unmerited confidence meant they received less critical feedback and assessment. This allowed them to grow complacent, and with no refresher training, Walsh and Bull (2010) and Walsh and Milne (2008) found their interrogation skills were substandard. Therefore, in situations where skill is not tested frequently, experience can be an unexpected handicap.

A second motivation for exaggerating capability is self-serving bias. Curiously, those seeking to pursue higher education more frequently display indicators of the Dunning-Kruger effect than those unsure of future plans (Novonil and Poulami, 2021). While it could be that their overconfidence enables them to believe they have a natural propensity for academia, it is more likely to be a self-protection mechanism serving to consolidate their possibly wavering belief that they have the necessary potential to continue studying. Self-protection as an incentive and explanation for self-overestimation is advocated by Walsh, King & Griffiths (2017).

As found by Novonil and Poulami (2021), factors such as living environment (rural or urban, home, hostel or rented house), relationship status, past mental history or medication had no significant effect on the bias. Interestingly, average hours of studying per day also held no real importance while those who participated in extracurricular activities were significantly more likely to be affected by the bias. The cause of the latter result bears further research as we would hypothesize the opposite. Those who participate in a wider array of activities would derive a smaller proportion of their self-esteem from academics and consequently feel less need to over-estimate their academic abilities.

The principal corrections to the cognitive bias (Rahmani, 2020) are twofold. Firstly, management needs to be aware of the effect and understand that subordinates' projected self-confidence does not necessarily correlate to capability. Secondly, a structure whereby constructive criticism and evaluation are continuously present from numerous sources is essential. Supervisors should not rely solely on self-assessment and should remember that self-doubt is critical to improvement in the long run. Therefore, short-term damage to self-esteem is sometimes necessary with superficial reassurance being detrimental. On the individual level, one should be cognisant of the effect and attempt

to avoid any conscious or subliminal methods one might apply to protect self-image. Furthermore, one should be aware that short-term damage to self-esteem is in fact constructive.

Conclusion

The Dunning-Kruger effect is ubiquitous and leads to unsupportable degradations in high-risk professional performance. The cognitive bias had a high prevalence in all groups of students as a result of their ignorance of gaps in their knowledge. Therefore, as listed by Rahmani (2020), professors need to be aware that students' projected self-confidence is not necessarily an indicator of proficiency. A continuous stream of constructive criticism, evaluation and assessment from numerous sources is essential. Furthermore, inducement of self-doubt is beneficial to progress in the long run with superficial reassurance a detriment to improvement. These techniques should be applied in all professions, especially criminal investigation and emergency crisis management whose failures can lead to inefficient interrogation and mortality.

Limitations

The notable limitation of the paper is the relatively small sample size of the reviewed medical studies. Furthermore, in the emergency management case, the extent to which the Dunning-Kruger effect influenced individuals was not measured. Rather, it was a binary measurement, present or not, that determined the researcher's evaluation of its effect and so not an accurate quantification of the cognitive bias. Lastly, as a consequence of the self-imposed limit to review specific professions, there was a small sample of studies to be reviewed. A review of other professions would be useful to consolidate data and conclusions.

Acknowledgements

Thank you to Ellen Froustis, Ph.D. student at Oxford University, for her support. Her help in constructing the researching question and finding topical articles was extraordinary and made it all the easier to write one of my first research papers.

References

- Andrade, H., & Boulay, B. (2003). Role of rubric-referenced self-assessment in learning to write. *Journal of Educational Research*, 97(1), 21–34. <https://doi.org/10.1080/00220670309596625>
- Campbell, K. W., & Sedikides, C. (1999). Self-threat magnifies the self-serving bias: A meta-analytic integration. *Review of General Psychology*, 3, 23–43. <https://doi.org/10.1037/1089-2680.3.1.23>
- Casner (2008) General aviation pilots' attitudes toward advanced cockpit systems, *International Journal of Applied Aviation Studies*, 8 (1), 88–112.
- Deb, N. & Roy, P. (2021). Prevalence of Dunning Kruger effect in first year medical students in a tertiary care hospital. *International Journal of Community Medicine and Public Health*. 8(11):5283-5287.
- Dreyfus. (2004). The Five-Stage Model of Adult Skill Acquisition. *Bulletin of Science, Technology & Society*, 24(3), 177–181. <https://doi.org/10.1177/0270467604264992>
- Dunning, D., & McElwee, R. O. (1995). Idiosyncratic trait definitions: Implications for self-description and social judgments. *Journal of Personality and Social Psychology*, 68, 936–946. <https://doi.org/10.1037/0022-3514.68.5.936>

- FURNHAM, & GASSON, L. (1998). Sex differences in parental estimates of their children's intelligence. *Sex Roles*, 38(1-2), 151–162. <https://doi.org/10.1023/a:1018772830511>
- Griffiths, A. (2008). An examination into the efficacy of police advanced investigative interview training? (Unpublished PhD thesis). University of Portsmouth, Portsmouth, UK
- Grunhol, D. (2011) The Dunning–Kruger Effect in Aviation. Blog. Retrieved from http://www.eaa.org/lightplaneworld/articles/1002_dunning_kruger.asp
- Kihlström, J. F., Beer, J. S., & Klein, S. B. (2003). Self and identity as memory. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 68–90).
- Kruger, & Dunning, D. (1999). Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments. *Journal of Personality and Social Psychology*, 77(6), 1121–1134. <https://doi.org/10.1037/0022-3514.77.6.1121>
- Marsar, S. (2013). “Why Some People Live and Some People Die in the Same Emergencies and Disasters: Can the General Public Be Taught to Save Themselves?”. Master's thesis, Naval Postgraduate School.
- McIntosh, R.D. and Della Sala, S. (2022). Overconfident defenders of the Dunning-Kruger effect. *The Psychologist*. The British Psychological Society. Blog. Retrieved from: <https://www.bps.org.uk/psychologist/overconfident-defenders-dunning-kruger-effect>
- Mezulis, A. H., Abramson, L. Y., Hyde, J. S., & Hankin, B. L. (2004). Is there a universal positivity bias in attributions? A meta-analytic review of individual, developmental, and cultural differences in the self-serving attributional bias. *Psychological Bulletin*, 130, 711–747. <https://doi.org/10.1037/0033-2909.130.5.711>
- Pavel, Robertson, M. F., & Harrison, B. T. (2012). The Dunning–Kruger Effect and SIUC University's Aviation Students. *Journal of Aviation Technology and Engineering*, 2(1), 125–129. <https://doi.org/10.5703/1288284314864>
- Prentice, D. A. (1990). Familiarity and differences in self- and other-representation. *Journal of Personality and Social Psychology*, 59, 369–383. <https://doi.org/10.1037/0022-3514.59.3.369>
- Rahmani, M. (2020). Medical Trainees and the Dunning–Kruger Effect: When They Don't Know What They Don't Know. *Journal of Graduate Medical Education*, pg.532-543.) <https://doi.org/10.4300/JGME-D-20-00134.1>
- Reilly, Neumann, D. L., & Andrews, G. (2022). Gender Differences in Self-Estimated Intelligence: Exploring the Male Hubris, Female Humility Problem. *Frontiers in Psychology*, 13, 812483–812483. <https://doi.org/10.3389/fpsyg.2022.812483>
- Roese, N. J., & Olson, J. M. (2007). Better, stronger, faster: Self-serving judgement, affect regulation, and the optimal vigilance hypothesis. *Perspectives on Psychological Science*, 2, 124–141. <https://doi.org/10.1111/j.1745-6916.2007.00033.x>
- Ross, L. (1977). The Intuitive Psychologist And His Shortcomings: Distortions in the Attribution Process1. In *Advances in experimental social psychology* (Vol. 10, pp. 173-220). Academic Press.
- Sargeant, Mann, K., Sinclair, D., Van der Vleuten, C., & Metsmakers, J. (2008). Understanding the influence of emotions and reflection upon multi-source feedback acceptance and use. *Advances in Health Sciences Education: Theory and Practice*, 13(3), 275–288. <https://doi.org/10.1007/s10459-006-9039-x>
- Sedikides, C., & Gregg, A. P. (2006). The self as a point of contact between social psychology and motivation. In P. A. M. Van Lange (Ed.), *Bridging social psychology*, pp. 233–238.
- Sedikides, C., Campbell, W. K., Reeder, G., & Elliot, A. J. (2002). The self in relationships: Whether, how, and when close others put the self “in its place.” In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 12, pp. 237–265). <https://doi.org/10.1080/14792772143000076>
- Sedikides, C., Green, J. D., & Pinter, B. (2004). Self-protective memory. In D. R. Beike, J. M. Lampinen, & D. A. Behrend (Eds.), *The self and memory* (pp. 161–179)
- Shepherd, E., & Griffiths, A. (2013). Investigative interviewing. Oxford: Oxford University Press.
- Siems. (2016). Disaster Threat and the Dunning–Kruger Effect. *Homeland Security Affairs*.

- Skowronski, J. J., Gibbons, J. A., Vogl, R. J., & Walker, W. R. (2004). The effect of social disclosure on the affective intensity provoked by autobiographical memories. *Self and Identity*, 3, 285–309.
<https://doi.org/10.1080/13576500444000065>
- Surdilovic et al (2022). Evaluation of the Dunning-Kruger Effects among Dental Students at an Academic Training Institution in UAE. *ACTA Stomatologica Croatia*, 56(3):299-310. <https://doi.org/10.15644/asc56/3/8>
- Taylor, E. (2014). Honour among thieves? How morality and rationality influence the decision-making processes of convicted domestic burglars. *Criminology and Criminal Justice; An International Journal*, 14, 487–502.
<https://doi.org/10.1177/1748895813505232>
- The Decision Lab, (n.d.). Why can we not perceive our own abilities? The Dunning–Kruger Effect explained. Blog. Accessed: from: <https://thedecisionlab.com/biases/dunning-kruger-effect>
- Walker, W. R., Skowronski, J. J., & Thompson, C. P. (2003). Life is pleasant – and memory helps to keep it that way. *Review of General Psychology*, 7, 203–210. <https://doi.org/10.1037/1089-2680.7.2.203>
- Walsh, & Bull, R. (2015). Interviewing suspects: examining the association between skills, questioning, evidence disclosure, and interview outcomes. *Psychology, Crime & Law*, 21(7), 661–680.
<https://doi.org/10.1080/1068316X.2015.1028544>
- Walsh, D., & Bull, R. (2010). What really is effective in interviews with suspects? A study comparing interviewing skills against interviewing outcomes. *Legal and Criminological Psychology*, 15, 305– 321.
<https://doi.org/10.1348/135532509X463356>
- Walsh, D., & Bull, R. (2011). Benefit fraud investigative interviewing: A self-report study of investigation professionals’ beliefs concerning practice. *Journal of Investigative Psychology and Offender Profiling*, 8, 131–148. <https://doi.org/10.1002/jip.137>
- Walsh, D., & Milne, R. (2008). Keeping the PEACE? A study of investigative interviewing practices in the public sector. *Legal and Criminological Psychology*, 13, 39–57. <https://doi.org/10.1348/135532506X157179>
- Walsh, King, M., & Griffiths, A. (2017). Evaluating interviews which search for the truth with suspects: but are investigators’ self-assessments of their own skills truthful ones? *Psychology, Crime & Law*, 23(7), 647–665.
<https://doi.org/10.1080/1068316X.2017.1296149>
- Zenger, T. R. (1992). Why do employers only reward extreme performance? Examining the relationships among performance, pay, and turnover. *Administrative Science Quarterly*, 37(2), 198–219.
<https://doi.org/10.2307/2393221>