

Decision-making of educational leaders: new insights from the Iowa gambling task

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Abstract

Purpose – Middle leadership in education is often considered one of the most challenging roles within educational leadership, and it is often under-conceptualised and theorised. A key role of a middle leader is making decisions. This paper presents some initial findings from a study of 22 middle leaders in England, exploring their decision-making ability.

Design/methodology/approach – This study uses the Iowa gambling task (IGT), a commonly used psychological tool designed to assess decision-making through risk-based activities. All participants were asked to complete the IGT online. They were asked to select one of four cards from a virtual deck. The decks yielded either a positive gain (a financial win) or a net (financial) loss. Participants repeated the selection of a card 100 times.

Findings – Participants quickly learned which decks provided a positive net gain. However, what was apparent was that between cards 40 and 60, there was a significant spike in their ability to gain net wins in the cards selected. This suggests that middle leaders are more risk-seeking when they are trying to minimise losses, as in blocks 1 to 3 in the experiment. However, once they have reached a self-determined threshold, they become risk-averse to maintaining the potential gains they have made.

Research limitations/implications – Understanding how leaders make decisions is particularly important if staff are to be encouraged to take responsibility and make decisions within their roles as middle leaders. However, this study has limitations, notably that only 22 participants participated.

Originality/value – This paper offers a contemporary review underpinned by a preliminary study of middle leaders' decision-making ability against a backdrop of the limited literature on this topic.

Keywords Middle leadership, Decision-making, Risk-averse, Risk-taking, Iowa gambling task, Education

Paper type Research paper

Introduction

Humans rarely make decisions with the full knowledge and understanding of the consequences of each possible outcome. When facing uncertainty, the risk becomes a component in option valuation as part of the decision-making process (Wang *et al.*, 2023). According to Hoque and Raya (2023), decisions made by educational leaders are overtly manifested by their behaviours. Gronn (2011) highlights the risks associated with educational leadership, particularly for head teachers and principals, particularly concerning accountability and reputational risk. However, the literature on decision-making is typically not nuanced enough to focus on a particular subset of leaders; instead, it adopts a broad brush approach to its examination. Indeed, there is almost no literature on decision-making by middle leaders in education. Given the gap in existing literature surrounding middle leaders as a discrete cohort of individuals who have a criteria role in an organisation (Lipscombe *et al.*, 2023; Skeritt *et al.*, 2023), this paper seeks to add to the discourse on this topic by highlighting the importance of understanding decision-making in this subset of leaders. Therefore, this paper examines how middle leaders in education make decisions through the Iowa gambling task (IGT) lens.



This idea of delineating leadership into subsets is noted by [De Nobile \(2018\)](#), who states that middle leadership in education is under-researched and conceptualised. However, [Harris et al. \(2019\)](#) have suggested that since 2003 there has been a marginal increase in the volume of literature focusing on the role of middle leadership. This study explores, albeit in a controlled environment, the decision-making of middle leaders who work in schools. For this study, middle leaders will be defined as those individuals who report to a member of the school's senior leadership team. This aligns with [Lipscombe et al.'s \(2023\)](#) systematic literature review of 250 papers in which they conclude that middle leaders are

formally appointed leaders, with accountable responsibilities, who operate between senior leaders and teachers and lead in order to positively impact teaching and student learning (p. 283).

Middle leaders in education have typically progressed from being subject teachers to lower levels of management where they have oversight for one course to being responsible for a department or group of departments depending on the size of the school. They often operate in an uncomfortable place, torn between the loyalty they afford towards their team and the demands of senior leaders ([Lipscombe et al., 2023](#)). They often are at the forefront of translating policy into feasible workplace practice ([Skerritt et al., 2023](#)). At the same time, they balance being leaders in some contexts but followers in others ([Busher et al., 2000](#)). While scholars are in general agreement that a middle leader is a teacher with formal leadership responsibilities, [Edward-Groves et al. \(2016\)](#) and [Lipscombe et al. \(2023\)](#) all state that there is little agreement on the significance of their teaching responsibilities relative to their leadership ones. For example, are they teachers with leadership responsibilities, or leaders who maintain a teaching commitment? However, [Li et al.'s \(2018\)](#) study of middle leaders in England does not include teaching as an aspect of the role. This opens up the concept of middle leadership as an individual with formal leadership responsibility situated between the school or college principal (or equivalent) and teachers. This approach could therefore include leaders with significant pastoral responsibility.

However, leadership is very different from teaching and, as such, requires a different set of skills. While this issue is subject to contestation, [Bush \(2009\)](#) argues that to expect individuals to take on leadership roles without any preparation is reckless and unfair to those who may accede to key positions in schools. During their early stages of leadership, new middle leaders rely on an analytical and theoretical method of reasoning. As they develop and become more experienced and confident, they will draw on previous experiences and use a non-analytical or pattern-making process of reasoning ([Carraccio et al., 2008](#)). Through experience with different situations, middle leaders add to their repertoire, enabling them to expand ever more complex patterns or mental maps, allowing them in turn to make swift, intuitive decisions ([Sergiovanni, 1985](#); [West Burnham and Koren, 2014](#); [Irvine and Brundrett, 2019](#)). [Gronn \(2011\)](#) notes that educational leaders typically face a range of decisions, from simple binary choices, like deciding whether to cross the road as a pedestrian, to significantly more complex ones.

Decision-making is a process of choosing a preferred option from a range of possible alternatives ([Wang and Ruhe, 2007](#)). [Müller et al. \(2021\)](#) discuss decision-making under two situations: decision-making with ambiguity or ambiguous risk and decisions with objective risk. In decisions under ambiguous risk, no explicit information is provided about the available options. Instead, decision-makers need to learn from feedback as to which options are more advantageous. In experimental studies such as this one, such decisions are assessed using the IGT ([Bechara et al., 1994, 2001](#)). In contrast, decisions made under objective risk offer explicit information about the possible consequences of the available options. This means that the outcomes, be they positive or negative, are calculable.

The decisions that middle leaders are expected to make can come in many guises ([Farchi and Tubin, 2019](#)), which straddle both decision-making with ambiguity, for instance in curriculum planning, and decision-making with objective risks, such as resource allocation or financial decisions. Problem-solving and decision-making are increasingly recognised as central to the work of leaders ([Graesser et al., 2018](#); [Kareem and Kin, 2019](#); [Mintrop and](#)

Zumpe, 2019; Robinson *et al.*, 2020). Problem-solving skills are intrinsically linked to efficiency, effectiveness and improvement. However, time, energy and resources are often wasted because of poor decision-making (Graesser *et al.*, 2018; Mintrop and Zumpe, 2019; Robinson *et al.*, 2020). Research on decision-making has primarily focused on broad areas such as decisions made using data-driven, shared and contingent approaches (Tarter and Hoy, 1998; Wang, 2021). While these approaches to decision-making are valuable, they do not explain how decisions are made.

It is important to recognise that many of the existing studies on decision-making focus on individuals who have impaired decision-making, most notably in those associated with traumatic brain injury, mainly to the ventromedial prefrontal cortex (vmPFC), neurodegenerative diseases, such as Parkinson's or Alzheimer's disease or neurodevelopmental conditions such as autism. However, little research exists on decision-making in those who are not impaired. This paper adds to the growing body of literature, focusing on developing a greater understanding of middle leadership within education (Wang, 2021).

The Iowa gambling task

In order to provide a framework to explore decision-making in middle leaders, the IGT (Bechara *et al.*, 1994) was employed. It was originally developed by researchers at Iowa University in 1994 to address the lack of an effective way to assess the decision-making, risk and impulsivity of individuals by modelling the development of everyday life long-term profitability strategies against satisfying a need – in this case, earning money. It was initially applied to those with traumatic brain injury but has since been used to explore constructs of complexity and uncertainty in healthy participants. This has resulted in the IGT becoming the *de facto* standard for decision-making research (Bull *et al.*, 2015; Dunn *et al.*, 2006), not only in those with injury to the vmPFC but also in participants with poor impulse control. By 2006, it had been cited in over 400 different research papers (Dunn *et al.*, 2006), and by 2017, this had increased to over 800 papers (Chiu *et al.*, 2018). However, the IGT is not without its critics; Lin *et al.* (2007) argue that individuals often gravitate towards the same option rather than trying an alternative option. To mitigate this perceived bias, Toplak *et al.* (2005) suggest that a summative of the negative and positive outcomes are applied to avoid potential problems associated with repeatedly selecting the same option.

The IGT involved showing participants four virtual decks of cards on a computer screen. They have to develop a long-term profitable monetary scenario under conditions of uncertainty. They are told the decks contain cards that offer a financial reward (either 50 or 100 GBP) or a penalty (–250 GBP).

Participants are instructed to try and maximise their winnings by choosing a card from one of four decks of playing cards. Participants do not know *a priori* how many cards they have to select. The standard number of card turns, which was what was used in this version of the IGT, was 100 (Dunn *et al.*, 2006). The selection of a card was repeated 100 times, with each card yielding a win (either £50 or £100) in two winning decks C and D or a loss (–£250) in decks A and B (Figure 1). Contingencies of the wins and losses from the cards are counterintuitive, with cards yielding a £100 win resulting in a longer-term net loss, whereas those cards yielding a £50 win result in a net gain. Research by Bechara *et al.* (1994) and Bull *et al.* (2015) indicated that healthy individuals, those without impairment, seek to try and maximise net rewards over time.

To maximise the net rewards, an individual must learn the possibilities through trial and error. When there are only two options, A and B, this learning is often rapid and preferences quickly develop. However, as the complexity of the choices increases, as shown in Figure 1, with four options (A–D), then the speed of learning is slower and the level of uncertainty increases. This results in preferences changing depending on an individual's level of certainty, based on the decisions they have previously made. Yet, the boundaries between certainty and uncertainty are blurred, and Bull *et al.* (2015) argue that it is more helpful to conceptualise this as a continuum from uncertainty to certainty. As an individual selects a card (A–D), they start to

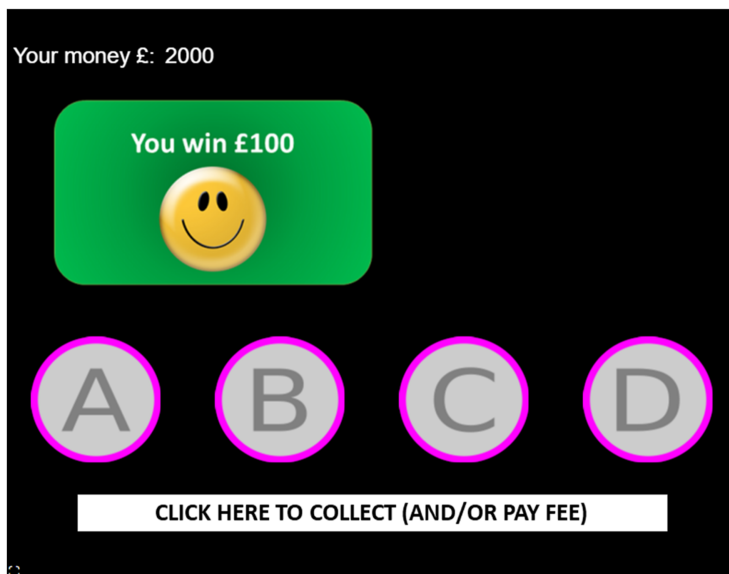


Figure 1. Image of the four decks of cards (Stoet, 2010, 2016)

move from uncertainty to certainty as they gradually learn over the 100 turns involved in the study. This leads to, in healthy participants, an increased net score (an index of relative performance for good decks, [Cosenza et al., 2014](#)).

The sensitivity an individual has towards the reward or the loss of money in the IGT is relative. For example, [Davis and Fox \(2008\)](#) suggested that individuals with “high reward sensitivity” (p. 43) are prone to detect the signs of reward in the physical environment, thus approaching with a greater sense of alacrity. However, the notion of reward sensitivity in the IGT test is not so simple. Reward sensitivity cannot be simply measured by the number of times an individual selects a particular option, as each one offers a reward and loss. An individual selecting a large number of cards from deck B, which frequently offered a large reward and an infrequent large loss, may indicate that the individual has a large sensitivity to reward or a low sensitivity to the loss. This may appear abstract; however, in practice, these tendencies may manifest in individuals making constant high-stakes decisions rather than safer, more conservative ones. In practice, for example, overestimating in which failure to meet targets could jeopardise employees’ jobs within the organisation. [Gonzales et al. \(2017\)](#) state that this tendency to prefer choices that lead to higher levels of reward as lower levels of reward, despite being more consistent in their yield, does not meet the perceived requirements of the situation. Their study was based on risk sensitivity theory (RST), which posits that individuals are generally risk-averse. However, RST proposes that individuals should move from risk aversion to risk preference. This is supported by [Hargreaves et al. \(2015\)](#), who argue that leaders generally avoid risk unless there is an organisational culture where staff are encouraged to take risks because real-time monitoring permits swift interventions to correct ill-judged decisions. In education, there is no such real-time monitoring and the resulting choices leaders make directly impact people. It is believed by [Mirshra \(2014\)](#) that decision-makers are considered to be primarily focused on meeting immediate needs, not maximising outcomes independent of context. The recent work of [Espinoza Oyarte et al. \(2024\)](#) suggests that an individual’s behaviour towards a decision can be traced to the functioning and interaction of three neural systems and the individual sensitivities of these systems:

- (1) The fight-flight-freeze system (FFFS) regulates movement away from threatening or undesirable stimuli.
- (2) The second is the behavioural approach/activation system (BAS), which regulates movement towards appetitive stimuli and accounts for individual differences in sensitivity to approach rewards.
- (3) The third system is the behavioural inhibition system (BIS). Unlike the other two systems, the BIS helps to resolve conflicts between the need to approach a reward, as per the BAS, and the need to escape a life-threatening encounter (FFFS).

What has been demonstrated thus far is the natural tendency to be risk-adverse and that this tendency is underpinned by various neural systems. Even in a situation that calls for a higher level of risk to be exercised, individuals find it challenging. The question raised by this study is whether middle leaders in education seek to maximise their decision-making reward through the IGT or whether their tendency to be risk-averse prohibits this from happening.

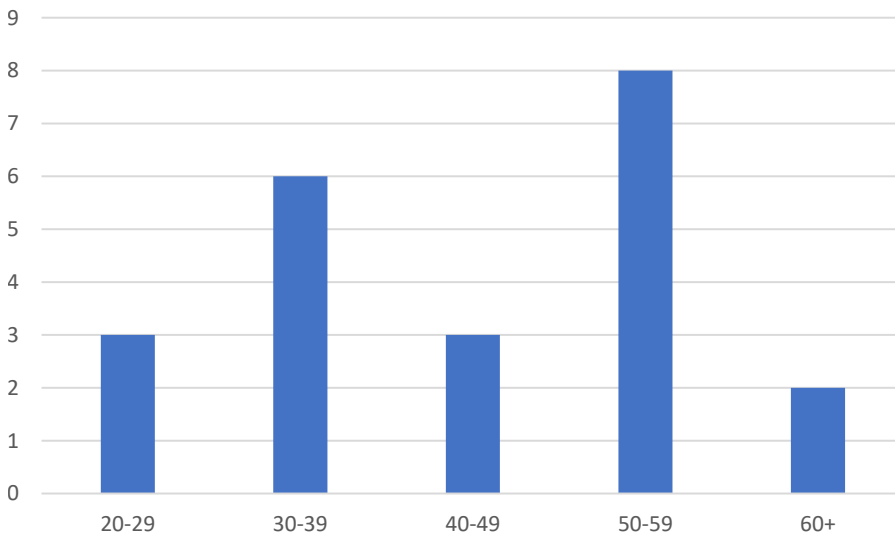
Methods

The objective of this paper was to examine middle leaders in education decision-making abilities. The sampling units were schools in England. To achieve the aim of this paper, a comparative study was used. This was chosen over an interpretive study, which could have provided the necessary detail on individuals’ decision-making abilities. However, in addition to this, we are interested in the insight that techniques and tools such as the IGT can provide. Typically, these technologies are used in clinical or laboratory-based settings but less so in applied settings such as education. Prior to commencing the study, approval had been granted from the University of Chester’s ethics committee.

Participants were self-selecting through emails to existing head teacher contacts in schools based on a convenience sample (Plowright, 2011), asking that they pass on the email to middle leaders within their school. The inclusion criteria were defined as individuals who report to a member of the school’s senior leadership team. The email to head teachers and, subsequently, participants outlined the purpose of the study, stating that the study focused on the decision-making of middle leaders and a link to access the IGT test. Typically, the IGT test takes approximately 10 min to complete online. Participants were free to complete the test at any point during the prescribed one-month timeframe.

No payment was made to the participants; they were free to decide whether they wished to participate in the study. In total, 22 individuals ($n = 22$), 14 females and 8 males, from a range of schools (primary and secondary) were asked to complete the IGT. The IGT test was slightly adapted from Bechara *et al.*’s (1994) version to contextualise it for a United Kingdom (UK) audience. The only change made to the original survey was changing the currency from dollars to UK pounds. The age range of individuals participating in the study is illustrated in Figure 2, allowing us to determine whether there is any determinable difference in decision-making based on age and gender.

It is also worth noting that the findings of this study, at this stage, are not generalisable due to the limitations of sample size. However, existing literature on the use of the IGT demonstrates considerable variation in the number of participants involved in studies. At the upper end of the scale, Barnhart and Buelow’s (2022) study on American undergraduate college students’ performance in the IGT involved a sample of 1953 participants. At the other end of the spectrum, research that targets specific groups of individuals, such as Salvatore *et al.*’s (2021) meta-analysis to explore decision-making in individuals with Parkinson’s disease using the IGT, reviewed 16 published studies where the number of participants ranged from 15 to 35. Garrido-Chaves *et al.*’s (2021) study of gender differences in decision-making involved 23 male and 17 female participants.



Source(s): Author's own work

Figure 2. Age range of participants

At the same time, the data provide us with details of individuals' responses in a decontextualised task, where the response was either a gain or loss.

All participants who completed the IGT test were asked to select a card from one of the four virtual decks (A-D). This was repeated a hundred times to reduce the chances of a consistency motif, whereby a consistency propensity between participants is sought (Podsakoff *et al.*, 2003). After the hundredth card selection, participants were thanked for their participation in the survey.

To gain a more detailed understanding of how individuals respond to decisions, each of the 100 turns is divided into 5 blocks, each with 20 turns. Each of the 5 blocks can then be reported on as a separate subset of the 100 turns that participants completed. A repeated-measures ANOVA test was used to see where there was a statistical difference between each of the blocks. In addition, a mean net score was calculated to determine whether participants were learning over the 5 blocks of 20 turns.

Findings

This paper aims to explore how middle leaders in education make decisions through the lens of the IGT. So that some comparisons can be made with previous IGT studies (Bechara *et al.*, 1994, 2001; Bull *et al.*, 2015); two summary statistics were made: mean number of selections from each deck of cards for each of the 100 turns for each participant and the mean net score (the number of choices from what is commonly referred to as the "good" decks C and D minus the number of choices from the "bad" decks A and B) over the course of the 100 turns.

The data on the mean number of cards selected from each deck show that deck C (a good deck) was the most common card selected, 34% of cards were from deck C, closely followed by deck D, 24% also a good deck, after which deck B (bad deck) with 23% followed by deck A, 19%. Therefore, participants selected one of the good cards (C or D) – 57% of the time. To compare whether an individual's learning continued to improve over time as posited by Bechara *et al.* (1994) and Bull *et al.* (2015), the net mean scores of 20 turn blocks were

calculated. The mean net score was calculated by subtracting disadvantageous selections from advantageous selections.

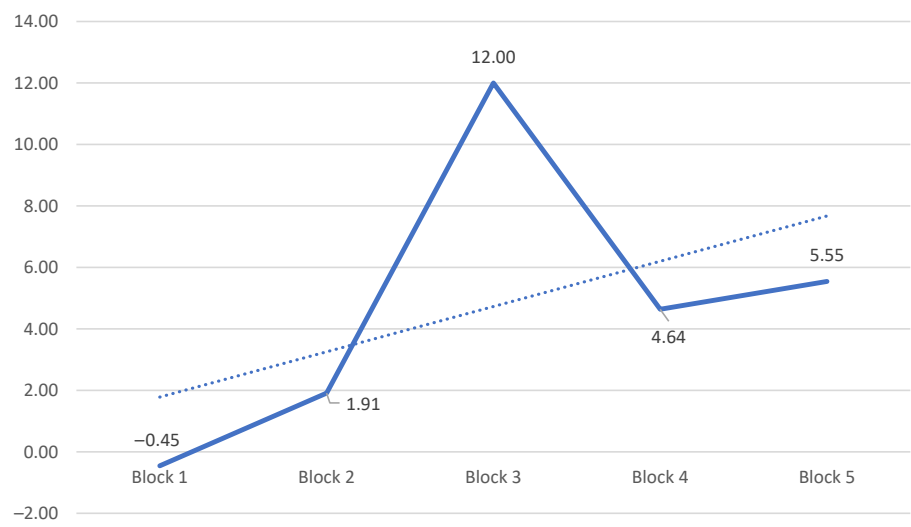
$$[(C + D) - (A + B)]$$

A net score above zero is indicative of advantageous selections, while a net score below zero implies disadvantageous selections.

Figure 3 demonstrates that learning continues through each of the blocks of 20 turns. Block 1 shows that more cards incurring a loss were selected than those offering rewards. However, unlike the studies of Bechara *et al.* (1994) and Bull *et al.* (2015), where learning is linear, middle leaders' learning peaks in Block 3, card turns 40 to 60 and then drops back to the more linear approach to decision-making. While the trend lines show that learning is broadly linear, it is difficult to ascertain exactly why there is such a spike. Further analysis of the individual results showed that 73% of participants ($n = 16$) ended with a lower value than the maximum that they achieved during the test. For example, a participant may have finished the test with a balance of £1,950, but at their highest, they achieved £2,900 (van den Bos *et al.*, 2013, p. 184). The maximum values achieved by participants were in block 3, which may account for the more moderate values achieved in blocks 4 and 5 as individuals try to maintain the amount achieved after block 3.

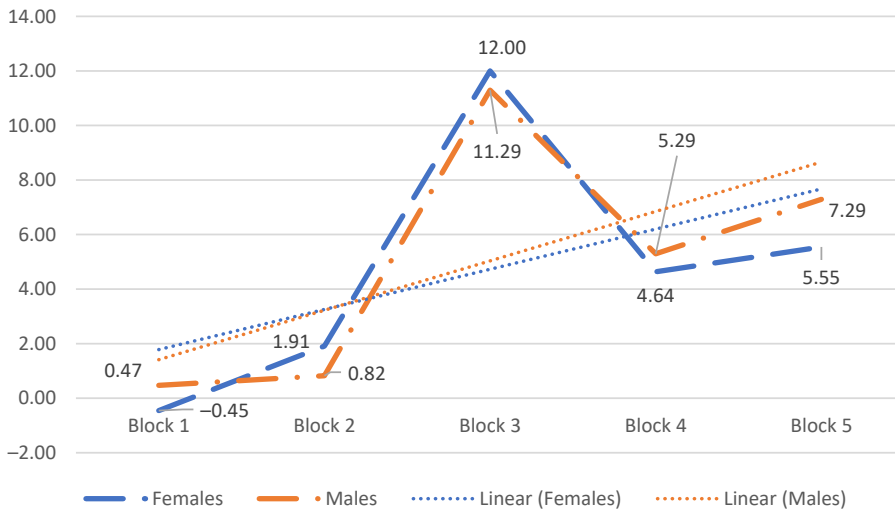
Hameiri *et al.* (2014) suggest that as schools operate within institutional or state regulation boundaries, and thus, they do not experience risk, as the regulations that bound them often constrain the options available to decision-makers. This does not account for decisions made by middle leaders who, while working within the organisational boundaries, are often further away from the limits of what is acceptable when it comes to decisions that they make.

Figure 4 demonstrates that gender appears to play no role in an individual's ability to make decisions, which is broadly linear with the same spike in Block 3. This is in complete contrast to Garrido-Chaves *et al.*'s (2021) study, which focused on gender differences and saw that participants scored highest in Block 1 and lowest in Block 3, returning to a slightly higher score in Block 5. Barnhart and Buelow's (2022) study of undergraduate students in America found that scores across the blocks were linear without any spike, as shown within this study.



Source(s): Author's own work

Figure 3. Net mean score (NMS) of each of the 5 × 20-turn blocks of the 22 participants



Source(s): Author's own work

Figure 4. Net mean score (NMS) by gender against each 5 × 20-trial block

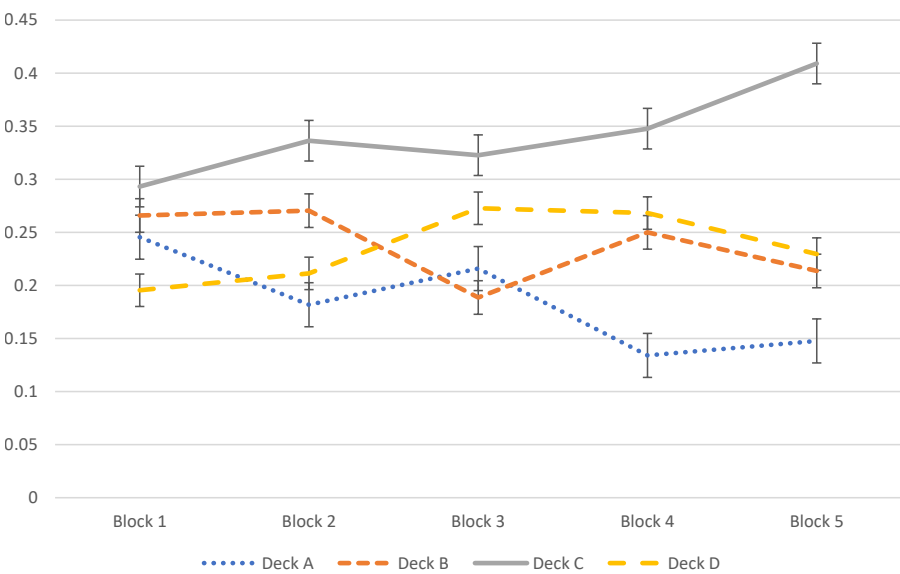
Existing literature currently provides no insight into why this might be the case, as most studies focus only on reporting the findings of their own participant group rather than between different groups of individuals across studies. A repeated-measures ANOVA (sphericity assumed) was carried out on the net scores, which showed that there was no significant overall effect across blocks 1 to 5 [$F(4, 84) = 8.568, p < 0.001$]. Post-hoc tests using the Bonferroni correction revealed that there was a significant difference of 12.455 in the mean net score across all 22 participants between block 1 (cards 1–19) and block 3 (cards 40–60).

Figure 5 shows that participants increasingly were able to select a good card (Deck C) over the five blocks, with an expected decline in the number of bad cards (Decks A and B) over the same period. However, unlike Bull *et al.*'s (2015) study that saw an increase in the selection of both good (Decks C and D), in this study it was found that there was only an increase in the selection of one of the Decks (C) rather than both. This might go some way to explain why the learning was not a purely linear process, with the spike around Block 3 being attributed to a decline in the selection of bad cards (Decks A and B). However, Bull *et al.* (2015) argue that the approach taken in Figure 5 is a preferred method of presenting the data as not only does it illustrate a downward trend over time but also a preference for the decks.

This is confirmed in Table 1, where the standard deviation of Blocks 1 and 2 was high (4.71 and 5.30, respectively), suggesting a large variation from the mean. As previously mentioned during the early blocks, participants were still learning which were the good and bad decks of cards. The standard deviation was at its lowest in Block 3, which corresponds to the spike in performance during this block, while then reducing slightly in the final two blocks (4 and 5).

Figure 6 demonstrates the confidence intervals, at 95% for each of the blocks of card turns. What can be seen is that there is a level of confidence that the scores for each of the blocks are reliable; however, it is worth noting that Blocks 4 and 5 are at the lower end of the acceptable range of confidence and that Block 3 has a very large range.

The data provide some interesting findings that show participants learning throughout the task. However, decisions that middle leaders make are not always as simple as wins or losses; however, at times, they do require individuals to make decisions based on limited information without fully understanding the consequences of their actions. In an ideal world, all decisions would be based on collaboration and exploration of the likely consequences; however,



Source(s): Author’s own work

Figure 5. Participant card selected across blocks

Table 1. Individual block data

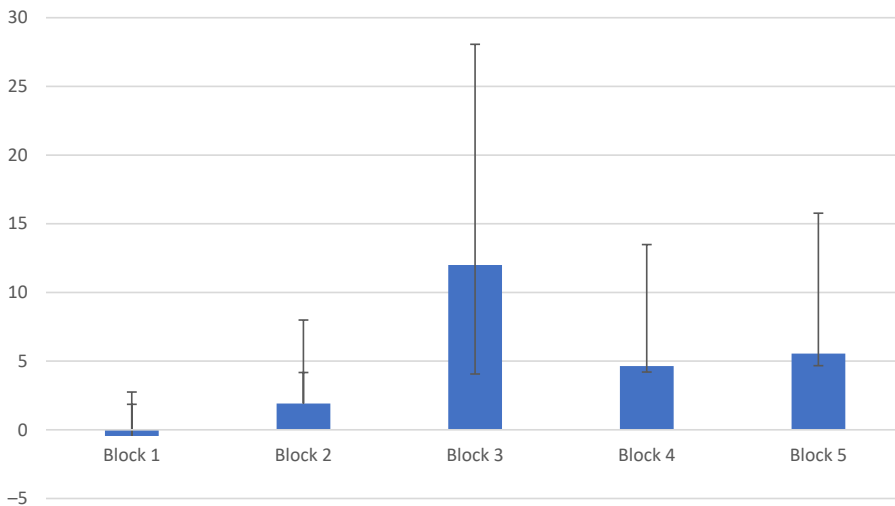
Blocks	Net scores		Min	Max	Range
	Mean	Standard deviation			
1 (1–20)	–0.45	4.71	–10	14	24
2 (21–40)	1.91	5.30	–14	20	34
3 (41–60)	12.00	2.00	–10	20	30
4 (61–80)	4.64	3.43	–8	20	28
5 (81–100)	5.55	3.52	–18	20	38

Source(s): Author’s own work

frequently this is not possible and decisions about who is covering a particular class due to staff absence are often made in the moment. Kourti and Potari (2024) stated that making a decision requires the decision-maker to engage in the many phases of the decision-making process: definition, planning, data, weighing impact, making and justifying a decision. Brown (2005) saw a decision as “the broader process within which a choice among specific options will be made” (p. 1), not unlike the task that participants were asked to complete in this study. Brown (2005) goes on to state that through this process, the decision-maker is ultimately able to determine what action to take. In the moment, decision-making is often triggered by situations that are often unexpected by the teacher.

Conclusion

This paper seeks to better understand decision-making in middle leaders in education. This is because the decision-making of middle leaders is under-researched, given the important role they have in implementing an organisation’s strategy. The paper proposes that middle leaders are more risk-seeking when they are trying to minimise losses, as in Blocks 1 to 3 in the



Source(s): Author's own work

Figure 6. Confidence intervals for each block of card turns

experiment. However, once they have reached a self-determined threshold, they become risk-averse to maintaining the potential gains they have made. This could explain the spike in Block 3, after which the values reduce but maintain a positive trajectory (Figure 3). De Martino *et al.* (2006) and Wang (2021) both suggest that the artificial threshold that an individual sets is based primarily on emotions rather than on a rational objective quotient. As Frith and Frith (2006) noted, “When deciding what to do, we are not totally ‘rational’ in our choice of action; our choice is colored by emotions” (p. 533). While organisations have boundaries in which they operate when making decisions, middle leaders are further away from those than senior leaders, thus allowing middle leaders greater freedom to make decisions away from organisational boundaries. While this study is not going to revolutionise how decisions are made, for practitioners, it is important to recognise the emotional burden that individuals face when making decisions. Therefore, if there is an emotional burden associated with decision-making, then individuals need to consider when it is the most appropriate to make decisions, particularly when they are associated with ambiguity risk (as described by Müller *et al.*, 2021). Moreover, decision-making transcends an individual’s professional and personal life, meaning that regardless of the context in which the decision is being made, it has an emotional burden.

In addition, based on the findings, one should be aware that the final decision may not always be the best. Indeed, the evidence from this small study suggests that decisions made at the 60% mark in the decision-making process are more likely to yield more favourable outcomes.

This raises further questions, such as the relationship between decision-making and emotions in educational leaders. If this is the case, then there is a need to reinforce the development of emotions in middle leaders, something that both Wang (2021) and Lambert (2022) identify. In addition, exploring how middle leaders make decisions in a real-life situation would be worthwhile rather than a decontextualised approach seen here to see where any inferences can be made with the findings presented in this study. This suggests the need for an extended scope of leaders’ decision-making that takes into account the role of emotions. In doing so, it is important to go beyond the sole focus on leaders’ cognitive capacity to make decisions, such as data-driven, evidence-based decision-making that derives from rational choice theory and utilitarianism and embrace the emotional aspect of decision-making as well.

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