Saving Cash:

A Quantitative Analysis of the Relationship between Loss Aversion and Payment Methods.

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Abstract

Background: The past decade has seen the rapid development of payment system technology which is central to this research. However, there has been little quantitative analysis of the relationship between payment mode and loss aversion. The purpose of this study was to probe any differences in the use of physical and digital money and to measure these differences on the scale of loss aversion. It was hypothesized that people would take higher financial risks, spend more, and therefore have a lower level of loss aversion when paying with digital money.

Methods: Eighty-one Irish participants volunteered for this experiment. The analysis was carried out through a commonly used loss aversion experiment: A decision-making task consisting of a series of low-stake, win-lose, 50-50 gambles, which participants were asked to accept or reject. Half of the participants used digital money and half-used physical money.

Results: A 2 x 3 ANOVA was conducted between subjects to test whether people were more loss-averse with physical or digital money. It was found that individuals, specifically males, accepted significantly more gambles in the digital condition than the participants in the physical condition. (F (2, 96) = 4.5, p = <0.05).

Conclusion: The results of this research suggest that digital payment becoming the primary payment system could have an impact on human behaviour. This behavioural difference can be seen by higher levels of risk being accepted when using digital money, particularly by the male portion of the sample population. Less awareness when spending digitally may lead people to worsen their financial positions. Therefore, the current move in society away from physical money should be carefully scrutinized and precaution should be taken as payment systems become cashless.

Introduction

Imagine someone offers you a bet based on the outcome from the toss of a coin; heads you win €7, tails you lose €6. Several researchers have reported that if you would reject such a low-stake gamble, you are acting in accordance with *loss aversion*, as this rejection is driven by the loss of €6, not the gain of €7 (Barkley-Levenson et al., 2013; Fehr & Goette, 2007; Gächter et al., 2007; Mrkva et al., 2020; Pammi et al., 2015; Sokol-Hessner et al., 2016; Tom et al., 2007; Wang et al., 2017). Loss aversion is a central tenet of *prospect theory* (Kahneman & Tversky, 2018). A theory of human behaviour stating that choices are evaluated against a reference point. Not wanting to drop below the reference point makes people seek risks when it comes to losses. It has been reported that the pain of loss looms twice as large as the pleasure derived from its relative gain (Kahneman & Tversky, 2018). In terms of the coin toss gamble, most people would accept the 50-50 chance to win €10 or lose €5 or less but would reject any losses of over €5. Traditionally, gambling, as well as any other forms of expenditure, were done via physical means only; cash or cheque being the main two options. However, money is now becoming less physical and more abstract. This may increase people's propensity to take risks and spend more. Paying with a debit card, credit card, and other mobile payment systems have become the norm when making a transaction today. This could have an impact on how people interpret the financial loss of a given payment.

The tendency to prefer the default or most popular option available is known as the *status quo bias* (Hartman et al., 1991; Samuelson & Zeckhauser, 1988). Loss aversion occurs with any negative deviation from an individual's status quo (Bateman et al., 1997). Digital payment is becoming the most frequently used payment method (Adrian & Mancini Griffoli, 2019). It is often assumed that transactions will be made using digital payment, setting the default to digital, and making it the most frequented payment option. Thus, digital payment is

becoming the transactional status quo and negative deviations from this may result in loss aversion.

Demonetization in India has created a massive push towards becoming a cashless society (Sivathanu, 2019) and COVID-19 has accelerated the move towards becoming cashless in the rest of the world (Taskinsoy, 2020). This has made payments faster and easier, but it is not without its downfalls. A number of researchers have reported that the amount people are willing to pay in return for goods and services increases when using digital money rather than physical money (Falk et al., 2016; Hirschman, 1979; Prelec & Simester, 2001). Feinberg even found that the mere presence of credit card cues was enough to increase people's willingness to pay (Feinberg, 1986). However, this finding has not been replicated (Shimp & Moody, 2000). What other studies have shown, which may support Feinberg's findings, is that priming people with a concept of a credit card as the payment method may lead them to interpret information more abstractly than priming them with cash (Chen et al., 2017). These findings suggest that people are less conscientious of their spending when using digital money. This may be due to the decreased physicality of the transaction softening the tactile feeling of loss.

Direct results of loss aversion can be found in transactional payment situations. For instance, it has been shown that some people endure discomfort in the process of paying for goods and services. This discomfort is described by Zellermayer (1997) in his concept, the pain of payment. Paying in physical cash has been found to increase the pain of payment (Falk et al., 2016; Gourville & Soman, 1998; Soman, 2001). Lower pain from paying increases customers' willingness to pay (Falk et al., 2016) and can lead to overspending with negated feelings of guilt (Raghubir & Srivastava, 2008). Additionally, people are more likely to use digital money when spending on frivolous luxuries and use cash for justifiable necessities (Raghubir & Srivastava, 2008). Furthermore, the pain of paying in cash can curb the impulsive urge to buy unhealthy foods, among other indulgences (Thomas et al., 2011). These findings

show that there are clear behavioural differences when using different payment methods. This may be due to the negative emotions associated with spending physical money producing higher levels of loss aversion. These negative emotions are somewhat avoided through using digital payment as the extent of the loss incurred may be less clear.

An important factor that may affect the pain of payment and loss aversion is the degree of *payment transparency* (Hirschman, 1979; Soman, 2003). The intensity of transparency positively correlates with the pain of paying and negatively correlates with consumption and spending (Soman, 2003). Using cards as a payment method lowers transparency, due to the digital payment being more abstract, with no clear forfeiture of anything physical (Khan, 2011). As a result, loss-averse consumers may pay digitally to alleviate the immediate pain of payment associated with the more transparent payment mode, cash. By doing so, they become less conscious of their spending and negatively impact their savings. Research has found that in the last financial crisis low earners and the liquidity-constrained preferred using cash as a budgeting tool (Hernandez et al., 2017). Showing that some people find the increased transparency useful when monitoring their spending. Higher payment transparency amplifies the pain of payment which in turn increases loss aversion. For this reason, more transparent payment methods may aid in the controlling and monitoring of expenditure.

Few behavioural, risk-taking experiments have focused specifically on payment methods when investigating an individual's loss aversion. This research project aimed to identify variance in loss aversion levels across payment methods in a risky decision-making task. Loss aversion was measured for two groups, one group completed the experiment with physical money and the other with digital money. Typically, individual loss aversion can be investigated by asking participants to accept or reject a series of low-stake gambles (Barkley-Levenson et al., 2013; Fehr & Goette, 2007; Gächter et al., 2007; Mrkva et al., 2020; Pammi et al., 2015; Sokol-Hessner et al., 2016; Tom et al., 2007; Wang et al., 2017). Rejection of low-

stake gambles with a positive expected value is a measure of loss aversion (Rabin, 2000). Risk attitude was measured using the DOSPERT questionnaire. This was then compared across groups and against individual's loss aversion scores to ensure that if there was any disparity between the two groups, it was caused by payment method and not by their risk attitudes.

Based on the literature, it was hypothesized that people take higher financial risks and spend more when paying with digital money. Due to the pain of paying in the more transparent method of cash, it was expected that levels of loss aversion will increase when using physical money. Consequently, subjects under the physical condition will take fewer risks than that of the participants in the digital payment group, thus saving them money.

Methods

Participants

For this study, ninety volunteers were recruited. Nine participants were excluded as they exceeded the exclusion criteria (see below). Of the eighty-one participants used in data analysis, thirty-one were female and fifty were male. Ages ranged from 12 to 63 (Age $M = 34$, $SD = 14.4$). Half of the participants completed the task with fake physical money (male $N = 25$, female $N = 15$, age $M = 35.05$, $SD = 15.9$) and the other half used fake digital money (male $N = 25$, female $N = 16$, age $M = 32.9$, $SD = 12.8$). All participants were Irish and were recruited via word of mouth. Participants were incentivized by means of a competitive game. Whoever had the highest amount of money at the end of the task won a €100 voucher for Ryanair. The experiment was held over the month of January 2021.

Exclusion criteria

To identify participants that were not paying attention catch trials were included which were present in each of the ten rounds. A catch trial had the same layout as the other seven trials in the round, except instead of a win-lose scenario in different colours, catch trials were win-win or lose-lose scenarios and their colours were the same, green for win-win, red for lose-

lose. As such, accepting win-win scenarios and rejecting lose-lose scenarios were the clear correct answers. Six participants chose the wrong answer on more than two of these catch trials, they were excluded from the data analysis.

Second, participants who employed a professional trading strategy were excluded. This is because the purpose of employing such a strategy is to mitigate the effects of loss aversion. Thinking like a trader and broadening your frame of reference from a singular transaction to a portfolio of transactions was described by Sokol-Hessner et al. (2009). It is an effective strategy for traders to reduce loss aversion in order to make better decisions, but it is not reliable when trying to measure participants' natural levels of loss aversion. Admittedly, this strategy was the most successful and the winner of the grand prize followed it strictly: he is a professional trader. Three participants executed this strategy. Participants who accepted all sixty trials with losses of between €1 - €6 but accepted less than half of the trials with a loss of €7 and no trials with a loss of €8 followed this strategy and were therefore excluded from data analysis.

Materials. This experiment was prepared and performed using Gorilla Experiment Builder (Anwyl-Irvine et al., 2020). It was sent as a link via email to each participant's email address. The email contained instructions and the experiment. The experiment consisted of two questionnaires and a risky decision-making task.

Identification Questionnaire. Firstly, participants were asked to fill out a short identification questionnaire. The demographics of age and sex of the participant were anonymously collected. Participants were also asked where they heard about the project and if they would be willing to part-take in future research for this project.

Decision-making task. After the participant gave their consent and finished the short identification questionnaire, they were asked to complete the risky decision-making task. This task was derived from the original design by Tom et al. (2007) in which a series of low-stake gambles with a 50% probability of winning the amount on one side of the image and a 50%

probability of losing the amount shown on the other side of the image were displayed (See Figure 1). Subjects were asked to accept or reject each of these gambles. An animation was displayed, and then the result of the decision was revealed to the participant (see Figure 4). The aim was to make the experiment feel like a competitive game.

Figure 1. The Gamble Images: In the experiment, for each trial of the decision-making task section, one of the above images was shown to the participant. They were presented one at a time, in a random order for a total of ten rounds. For each 50-50 win-lose scenario, they were asked to accept or reject the gamble. The value of a win was kept constant at €7, the loss values varied between €2 and €8. This clear loss variation showed the level of loss participants showed aversion to.

DOSPERT Questionnaire. Finally, participants were asked to complete the Domain-Specific Risk-Taking questionnaire. The DOSPERT scale is a verified questionnaire that measures the risk-seeking behaviour of participants. Thirty-eight of these questions were used, excluding two related to sexual activities with the adolescent participants in mind. These questions are rated on a 7-point Likert scale of how likely a participant would be to perform each action (from “Very unlikely” to “Very likely”).

Money. The two main conditions for this experiment were physical (N = 40) and digital money (N = 41). Differences between these payment methods were investigated by using the experiment which typically measures loss aversion, a series of accept or reject, 50-50, win-lose, low-stake gambles.

Half the participants were given fake physical money. These notes were adapted from US dollar bills - $1, $2, and $5, (See Figure 2). The money was referred to as Euros for consistency with the currency used in Ireland. The size of the notes measured 100 millimetres in width and 35 millimetres in length. Printed one-sided to white paper.

Figure 2. Physical money: The money, as shown here, was used by participants in the physical condition of this experiment. The decision-making task involved accepting or rejecting a series of low-stake gambles, this money was used in the physical condition to exchange winnings and losses after each accepted gamble. The faces were adapted to emulate the feeling of playing a game.

To ensure that people were not subject to the *denomination effect,* the smallest denominations of €1, €2, and €5 notes were used for the physical condition. The denomination effect posits that people are less likely to spend larger currency denominations than their equivalent value in smaller denominations (Mishra et al., 2006). Therefore, if larger denominations were used, this may have increased participants' loss aversion. The money was given to each of the twenty-five families in two envelopes with a combined total of twenty-seven €1 notes, sixty €2 notes, and fifty-one €5 notes. This amounted to one hundred and thirty-eight notes per family.

Design. The bulk of the experiment was made up of two questionnaires and a decision-making task, ordered as shown in Figure 3. Participants were introduced to the experiment and asked to give consent to the data they provided to be analysed. The identification questionnaire then gathered demographic information on the participants, this was added to get age and

gender information to assess any differences which may have arisen based on these demographics. The decision-making task had eight trials per round, with ten rounds. In each round, there were eight questions/trials, seven as shown in Figure 1, and one catch trial. The catch trial was a win-win or lose-lose scenario in which to accept or reject was the obvious correct answer. These ensured participants were paying attention. Amusing images and video clips were inserted between trials to keep participants entertained and to create the feeling of playing a game. Subtle reminders of the prize were constant throughout the experiment to keep participants incentivized such that they would not take shortcuts that they would not take when making decisions in their daily life (Cubitt et al., 1998). The experiment ended with the DOSPERT questionnaire which gauged participants' self-assessed risk attitudes.

Figure 3. Experiment Design: This was the order of the experiment, from left to right. The experiment started with a short welcome and introduction, they were then informed of how their information would be used and they were asked to consent to this data collection by ticking a box. Demographic details were collected in the identification questionnaire. Loss aversion was measured in the decision-making task and finally, risk attitudes were assessed using the Domain-Specific Risk-Taking questionnaire.

Procedure. Once the experiment was prepared, the names and email addresses of all the participants that volunteered to take part in the research study were gathered. The volunteers were all recruited via word of mouth. Once a sufficient number of participants was reached,

they were randomly assigned to each condition. Half were assigned to the digital condition and half were assigned to the physical condition.

The participants which were assigned to the physical condition received two envelopes filled with fake physical money. One had the word “Bank” printed on the envelope. This was where participants withdrew winnings and deposited losses after each accepted gamble. The other envelope had the word “Funds” printed on the envelope. The money in this envelope amounted to €150. This was the participant’s fund which they could gamble with and thus increased or decreased after each accepted gamble. Participants in the digital condition did not transfer anything physical for each accepted gamble. Instead, they used an online balance which increased and decreased throughout the experiment. Their balance was available to check after each gamble.

When all the participants had the money available to them, they received an email with instructions as to how to complete the experiment. Included in that email was a link to Gorilla with access to the experiment.

The experiment started with a brief introduction and an informed consent box to tick. A short identification questionnaire followed. The instructions to the risky decision-making task were then displayed, followed by the decision-making task. Finally, participants completed the DOSPERT questionnaire. Each participant completed the experiment alone and the duration was between 15-30 minutes.

Task. Loss aversion was measured through the risky decision-making task which is commonly used to measure individual-level loss aversion (Barkley-Levenson et al., 2013; Fehr & Goette, 2007; Gächter et al., 2007; Mrkva et al., 2020; Pammi et al., 2015; Sokol-Hessner et al., 2016; Tom et al., 2007; Wang et al., 2017). A task consisting of a series of low-stake gambles. Participants were first instructed as to how to complete the task. They were told to accept or reject the gambles in order to accumulate the greatest amount of money. The gambles

were to be thought of like a toss of a coin - 50% chance to win €7 and a 50% chance to lose between €2 and €8 (See Figure 1). If the gamble was accepted, the game was played, with chance deciding the win or loss of the amounts offered. If the gamble was rejected, the next question followed, with the balance remaining the same. The experiment had eight trials per round, presented in random order, for a total of ten rounds. The starting balance was €150 for each participant.

Following each decision on the gamble image (as displayed in Figure 1), an animation for the accept or reject decision was displayed. If the gamble was accepted a screen as shown in Figure 4 followed, depending on whether the gamble had won or lost. In the physical condition the experiment was identical, bar some small changes in what was displayed on the equivalent of the Figure 4 screen. There was no option to "Show Balance", as the physical money was in an envelope in front of the participant. The wording did not inform participants that their account balance had changed, instead, it instructed participants to "withdraw" their physical cash winnings or "deposit" their physical cash losses after each accepted gamble. "Next" brought the participant to the next question.

At the end of the risky decision-making task participants in the physical condition were asked to add up the amount of money they had accumulated and enter the result. This was for the contestant to feel like the money was worth something, the increases and decreases were stored on Gorilla and available on the results spreadsheet.

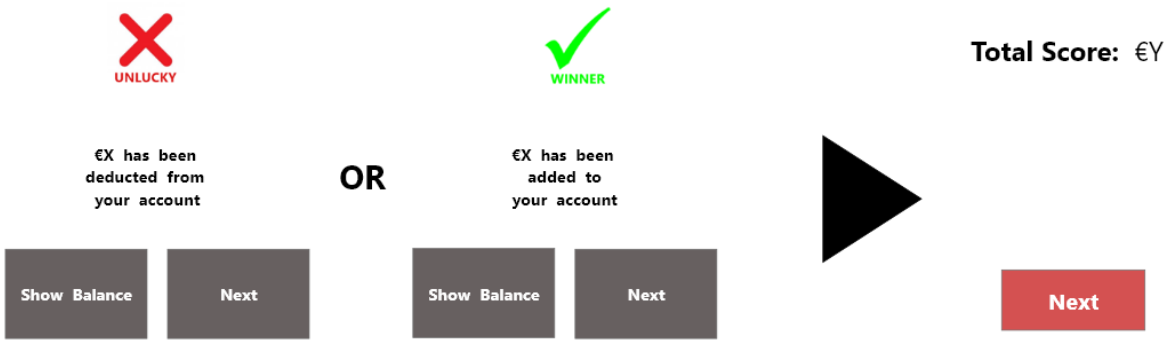


Figure 4. - The Results: If a participant accepted the gamble, an animation of a coin being tossed was displayed and they then ended up on a screen like the one depicted above. Informing them whether their gamble played out as a winner or a loser, as well as how much they had won or lost. In the digital condition, they could choose to "Show balance" and this would bring them to the "Total Score" screen, where they could view their balance. When the participant chose "Next", they were brought to the next question.

Analysis. To analyse the data from the decision-making task, gambles were separated into 3 categories, low, medium, and high risk. Low-risk was the chance to win €7 or lose €2 and €3, medium-risk was the chance to win €7 or lose €4 and €5 and high-risk was the chance to win €7 or lose €6, €7, and €8. The analysis was based on the portion of decisions accepted by the participants for each of these risk categories. A mixed ANOVA with risk categories (low, medium, and high) as the within-subject factors and payment mode as the between-subject factors was used. This was to test for the effect of payment method on the portion of accepted gambles, given the different risk levels. An independent sample t-test between each individual risk category and payment method was used to further inspect where the differences arose.

Risk attitude was measured per participant using the DOSPERT questionnaire. The two group's risk attitudes were compared and added as a covariate in the ANOVA test. This was to

ensure that a higher portion of risk accepted was due to payment method and not due to the individual's preferences. Existing literature has indicated that gender plays a role in risk attitude. An independent sample t-test between DOSPERT and sex was therefore conducted to see if this research concurred. To follow on from this separate mixed ANOVA tests for male and for female were carried out.

Results

The data from the decision-making task was analysed using the computer software JASP, version 0.14.1 (Love et al., 2019). The data was first cleaned and participants which exceeded the exclusion criteria were left out for data analysis. The raw data was observed and further investigated using JASP. The results will be discussed in more detail in this section.

Mean Portion of Accepted Gambles per Category

Firstly, an analysis of the portion of accepted gambles per risk category was carried out. When viewing the raw data, there was a noticeable difference between the means of risk category acceptance levels. The mean proportion of acceptance in the low-risk category per group were quite similar (digital-low M = 0.846, SD = 0.234, physical-low M = 0.871, SD = 0.214). There was a larger gap between the two groups in the medium-risk category (digital-medium M = 0.512, SD = 0.369, physical-medium M = 0.417, SD = 0.353). But the biggest difference of all was in the high-risk group (digital-high M = 0.277, SD = 0.288, physical-high M = 0.145, SD = 0.209). (See Table 1, Figure 5).

Risk Categories	Mode	Mean	SD	N
Low	Digital	0.846	0.234	41
	Physical	0.871	0.214	40
Medium	Digital	0.512	0.369	41
	Physical	0.417	0.353	40
High	Digital	0.277	0.288	41
	Physical	0.145	0.209	40

Table 1. Mean portion of accepted gambles per risk category and payment mode: The number of subjects, standard deviation, and mean portion of accepted gambles per risk category and payment mode are shown in the above table. The low-risk category contains losses of €2 and €3, the medium-risk category contains losses of €4 and €5, and the high-risk category contains losses of €6, €7, and €8. The value of a win stayed constant at €7 for each of the risk categories. The payment modes are physical and digital money.

General repeated measures ANOVA

To investigate the overall differences between the average portion of accepted gambles per risk category for each payment method, a repeated-measures ANOVA was conducted. Risk categories were used as the within-subject factors, with payment mode as the between-subject factors. There was a significant difference between risk categories (F (2, 158) = 216.5, p = <0.001) and a significant difference between payment modes (F (2, 158) = 3.4, p =<0.05). See Figure 5.

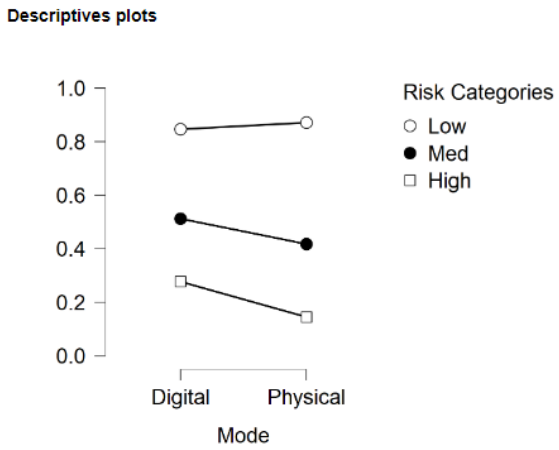


Figure 5. Repeated Measures ANOVA: The differences between the means of the two groups were investigated. Specifically, the mean acceptance levels of the three risk categories were presented to participants. This was done using a repeated-measures ANOVA. The y-axis represents the mean acceptance levels, 1.0 being 100% of gambles

accepted, and 0.0 being 0% of gambles accepted. On the x-axis are the payment mode conditions, physical and digital money, that were used in the decision-making task.

Independent sample t-tests. Three extra independent sample t-tests on each risk category were carried out to investigate these results further. To correct for multiple comparisons the Bonferroni method was used to correct the alpha of 0.05. As there were three risk categories, 0.05 was divided by three, giving a corrected p-value of 0.0167.

An independent sample t-test test was conducted to investigate further where these differences arose. There were no significant differences between groups in the low-risk category (t (79) = -0.5), p = 0.619) or the medium-risk category (t (79) = 1.18, p = 0.241), there was a larger difference between payment mode conditions in the high-risk category, but this was not found to be significant upon the Bonferroni correction (t (79) = 2.36, p = 0.021). See Figure 6.

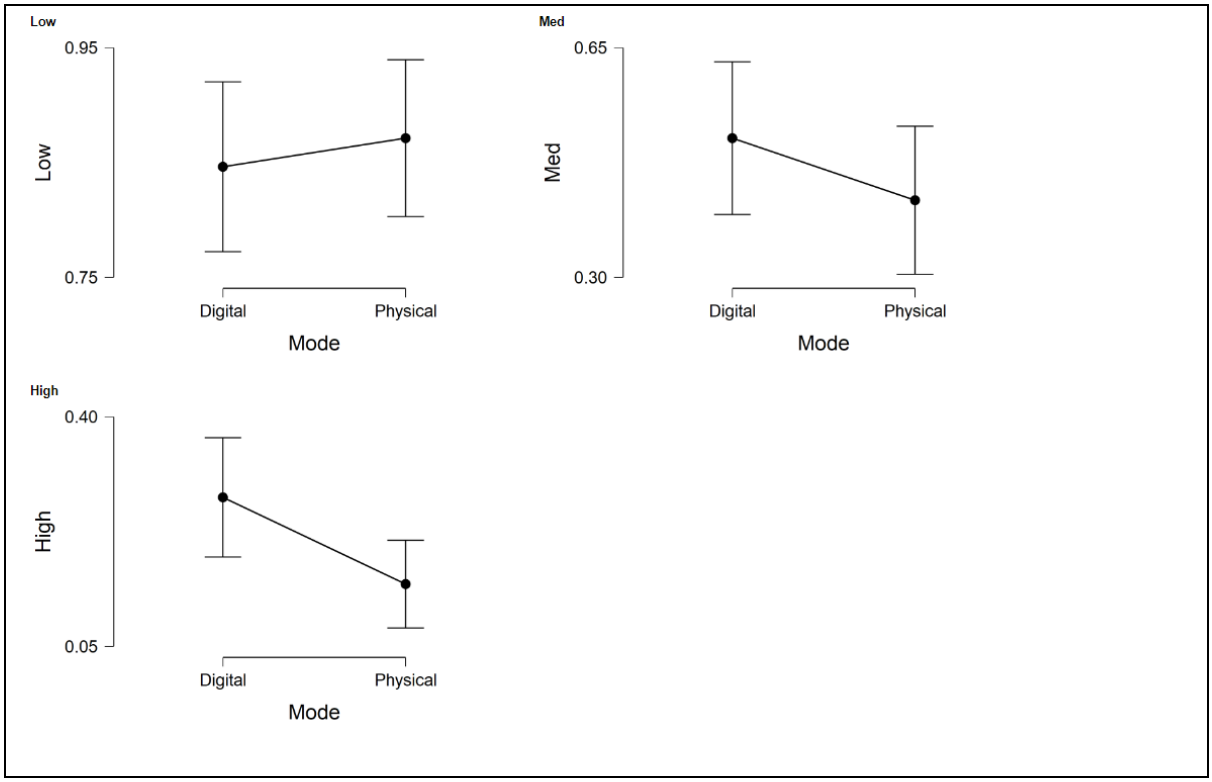


***Figure 6. Independent Sample T-Tests*:** Results of the independent sample t-test of payment mode by each risk category separately. The y-axis represents the mean portion of gambles accepted in each risk category and the x-axis represents the payment mode used by the participant for the gamble.

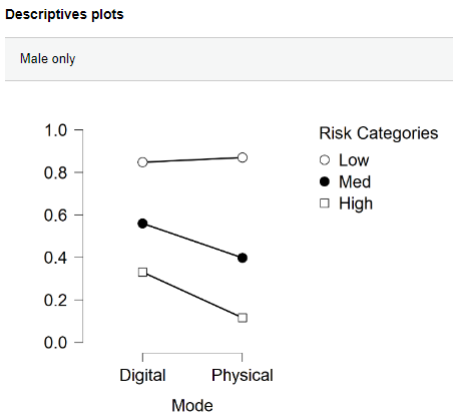
General repeated measures ANOVA with DOSPERT covariate. In order to test whether risk attitude accounted for the differences in behaviour across conditions, and not the payment methods, participant's DOSPERT scores were added as a covariate in the ANOVA test. This measured the risk-seeking attitude for each of the participants. Therefore, if results became non-significant after the addition of DOPERT as a covariate it would show that differences arose due to individual risk attitude, not payment method. The result remained significant for the interaction between risk categories and payment mode (F (2, 156) = 3.15, p =< 0.05) and not significant between risk category and DOSPERT (F (2,156) = 0.894, p = 0.411).

DOSPERT by Gender. Based on the literature, it is clear that there are behavioural differences between females and males when it comes to risk-seeking behaviour (Figner & Weber, 2011; Gong & Yang, 2012; Hayhoe et al., 2000; Parrotta & Smith, 2013; Sereetrakul et al., 2013). Therefore, exploratory analyses on gender-specific effects were tested.

Firstly, to see if there was an overall difference in risk attitude between male and female participants, DOSPERT scores across gender were compared. Results showed female participants had, on average, a lower DOSPERT score (N = 31, M = 104.7, SD = 20.33) than male participants (N = 50, M = 143.3, SD = 22.46). An independent sample t-test on the relationship between DOSPERT and sex highlighted the significance level (t (79) = -7.8, p = <.001).

Repeated measures ANOVA by gender

Based on the DOSPERT results, two separate analyses for female and for male were performed. Mixed ANOVAs were conducted with risk categories as the within-subject factors and payment mode as the between-subject factors. The differences between the physical and digital conditions were significant for male (F (2, 96) = 4.5, p = <0.05) (See Figure 7). However, the differences between payment conditions were not significant for female subjects (F (2, 58) = 0.05, p = 0.95) (See Figure 8).



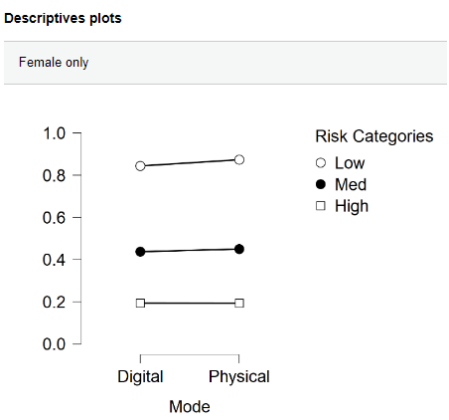


Figure 7. Male ANOVA (LEFT), Figure 8. Female ANOVA (RIGHT): Repeated measures ANOVAs for males and females separately. The differences between the average portion of accepted gambles per each risk category were investigated across gender. On the x-axis are the payment mode conditions of physical and digital money, that were used in the decision-making task. On the y-axis is the portion of accepted gambles, 1.0 being 100% of gambles accepted, and 0.0 being 0% of gambles accepted.

Discussion

In this study, a common loss aversion experiment was used to investigate the quantitative behavioural differences between participants using different payment modes,

namely physical and digital money. This behaviour was quantified using the levels of loss each participant was willing to accept and compared this across groups. By asking participants the levels of risk they would accept through a series of low-stake 50-50 gambles, over the course of ten rounds, clear evidence of participants' standard loss averse behaviours were collected. It was found that a section of the sample population was less loss averse when spending digitally. Based on this research, men accept more gambles when using digital money rather than physical money. Conversely, in this experiment women spend similarly whether the money is physical or digital.

In the physical condition, there were no significant differences in the levels of loss aversion between age groups or genders. This finding is consistent with previous research in spending behaviour. One explanation of this consistency across groups is that the pain of paying in cash (Zellermayer, 1997) can create a barrier to how much a person is willing to part with, and this feeling seems to be homogeneous across age and sex. It could also be that the participants were used to using physical cash as a budgeting tool and that deterred them from accepting too much risk (Hernandez et al., 2017). Loss aversion has been closely tied to the endowment effect, which does not enhance the appeal of the good one owns but does increase the pain of giving it up (Kahneman et al., 2018). As the physical money may feel like more of a "possession" than the digital money on the screen, the endowment effect may have come into play. These findings could explain the increased loss aversion in the physical condition and importantly, suggests that physical money keeps risk level acceptance consistent, and spending controlled.

In the digital condition, there was a significant difference between payment methods in general (F (2, 158) = 3.4, p =<0.05) and more specifically with how the male portion of the sample population behaved with different payment methods (F (2, 96) = 4.5, p = <0.05). When using digital money, loss aversion was lower than in the physical condition. This could be

because the money is perceived more abstractly when in its digital form (Chen et al., 2017), making the risk seem less real. The transparent, painless nature of spending digital money makes spending easier (Soman, 2003) and this could be at the heart of the reason for the increased risk-taking and spending. The consequences of relinquishing cash from society may result in increased spending, higher risk-taking, and overall, less conscientiousness when it comes to people's hard-earned money. People give a large portion of their lives to work in order to create money. Systems that create carelessness with money should be carefully revised and those which help maintain awareness should be utilized for the benefit of the consumer.

As the results of the gender-specific ANOVA's show, the disparity mainly lies across gender. Under the digital condition, the male portion of the population accepted more gambles than females under the same condition. There is no dearth in the literature exploring the greater risk-seeking behaviour of males in comparison to females (Figner & Weber, 2011; Gong & Yang, 2012; Hayhoe et al., 2000; Parrotta & Smith, 2013; Sereetrakul et al., 2013). The results of the male and female DOSPERT scores from this experiment support this. Although researchers explain that these differences may be the result of social constructs as opposed to psychological underpinnings (Ronay & Kim, 2006; Garrison & Gutter, 2010), they still have notable effects on behaviour. The female portion of this sample population accepted similar levels of risk across conditions. Whereas male behaviour contrasts significantly.

According to this study, men are more affected by the change in payment method than women. Males in the digital condition accepted significantly more gambles than males in the physical condition (F (2, 96) = 4.5, p = <.05). The unusual difference found in this research was that there was little difference between the levels of risk accepted across gender in the physical condition, but in the digital condition, the difference between males and females arose.

The female portion of the sample population taking similar risks across conditions could be explained by females having the characteristics of being more digitally native, that

they are more proficient in the digital language of computers, video games, and the internet (Yong & Gates, 2014), thus keeping their digital spending controlled. Similarly, the increased pain of payment may have kept physical spending consistent. Along with females' natural ability for sticking to a budget and planning their spending in a more controlled manner than males (Hayhoe et al., 2000). These factors in conjunction may help females maintain awareness over their overall spending.

Males scored notably higher in their DOSPERT scores (female $N = 31$, $M = 104.7$, $SD = 20.33$, male $N = 50$, $M = 143.3$, $SD = 22.46$). The results remained significant when DOSPERT was added as a covariate, but this increased risk-seeking tendency may have affected their gambling behaviour. Research has shown that men display more impulsive behaviour than females (Bevilacqua & Goldman, 2013). These studies suggest that males have an overall higher risk-seeking tendency and lower loss aversion than females. The increase in loss aversion in males when using physical money may be connected to their more natural spatial ability (FitzGerald, 1986; Gaulin & Fitzgerald, 1989). The increased transparency and physicality may give males more control over their spending when using physical money, but when money becomes more abstract and less transparent, they default to their risk-seeking tendencies. More research is needed to identify the cause of this difference.

Although the findings of digital spending are in line with earlier studies, it does not necessarily rule out the possibility that the limitations of this research affected the results. There are limitations to this study that need to be acknowledged. First, the number of males and females were not equal. Had they been equal there may have been more of an effect in the female population between payment methods. Second, the focus of this study was on the general differences between payment methods, not the specific differences in gender use of said payment methods. Third, incentivization may not have been high enough. Some participants may have discounted themselves from the possibility of winning and therefore

employed a lazier strategy which was not representative of how they would conduct themselves in everyday life. Fourth, as the gamification element was emphasized some participants may not have taken the decisions as seriously as they would with real transactions. Fifth, the variation of age may have been too great and if specified age groups were selected results may have been more refined. Sixth, this study was based on an Irish population only. Loss aversion varies across cultures (Wang et al., 2017), this may affect how other cultures behave with different payment methods.

Therefore, future research is needed to investigate these differences further. This would be of benefit to the field of decision-making, cognition, economics, as well as to the general public. According to this research, men take more risks when spending with digital money. Assumptions can be made as to why but unless evidence is presented these assumptions will remain unproven. This is a topical issue and necessary measures should be taken by males, females, and policymakers to protect against risky spending using digital payment methods. These measures should be based on scientific evidence in order to best solve the underlying issue.

Conclusion

It was set out to investigate the differences in spending behaviour in peoples' use of digital and physical money. The hypothesis was that people take higher financial risks and spend more when paying with digital money. This was tested through inspecting levels of loss aversion accepted under the different payment conditions. The investigation provided significant results on the target population. As the findings show, there are behavioural differences in the use of physical and digital money. The difference lies in decisions under higher levels of risk, specifically in the male portion of the sample population. This research suggests that males take more risks and have lower loss aversion when using digital money rather than physical money. Females take similar spending risks no matter the payment method.

Based on these findings, the consequences of the push towards becoming a cashless world would have implications on the behaviour of a large portion of society. If any section of society would take more risks when using digital money, then they may not act in their best interests and worsen their financial positions. This can be seen in our experiment by an increased level of risk being accepted by the male portion of the sample population. Therefore, the move away from physical money should be scrutinized and precaution taken when moving towards a cashless society. If cashless is indeed the future, research and action is needed in the development of digital payment systems to safeguard against risky spending for consumers.

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