



Behavioural
Science
Aotearoa

Text-message reminders to increase timely fine payments

APPLYING BEHAVIOURAL SCIENCE TO FINE
COLLECTIONS THROUGH TIMELY REMINDERS

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Executive summary

The Ministry of Justice (MoJ) Collections Unit (Collections) is responsible for collecting fines owed by New Zealanders. These fines can be overdue infringement fees from other prosecuting authorities (such as parking tickets issued by local councils) that are transferred to Collections to follow up, or fines issued by courts (for example, part of a sentence for a criminal act).

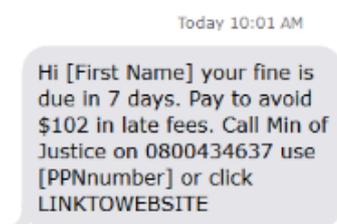
Many of these fines go unpaid: at the end of 2020, the outstanding balance was \$567 million.¹ Many people do not pay their fines on time because they procrastinate, get distracted or simply forget. However, their behaviour can be influenced by prompts that make it easier for them to pay, or that trigger them to consider what future costs they can save by taking action to resolve their fines now.

In this study, we (Behavioural Science Aotearoa) measure the effect of different text-message reminders on people's payment behaviours. Four randomised controlled trials identify the effects that small modifications to text messages have on the repayment behaviour of 44,585 New Zealanders.

These are our main findings:

- Sending a text-message reminder significantly increases the likelihood that a person will pay all, or part, of their fine on time by 10.3 percentage points (a relative increase of 27.2%), compared with people who receive no text-message reminder.
- Including MoJ's phone number in the text-message reminder significantly increases the rate of timely payment behaviour by 2.5 percentage points.
- Including a link to an online payment platform in the text-message reminder has no additional effect on payment behaviour. This may be because the online payment platform requires users to retrieve and provide extra information, such as the amount they owe, to complete their online payment.
- Including wording, in the text-message reminder, that is designed to motivate repayment increases payment behaviour by 2 to 3 percentage points.² This shows that motivational messages can positively affect payment behaviour (Figure 1 illustrates the most effective text-message reminder).

Figure 1: Most effective text-message reminder



¹ Ministry of Justice. (n.d.). *Research & Data* [webpage]. Justice services, Collections. Table 1: Amount of Collections Unit closing outstanding balance, including impositions, receipts, arrangements and reparations, 2011–2020. Retrieved on 8 June 2021 from: <https://www.justice.govt.nz/justice-sector-policy/research-data/justice-statistics/data-tables/#services>

² The results vary between 2 to 3 percentage points depending on the message and the model specification (whether we use an individual randomised control trial or combine results).



Based on these results, we estimate that sending timely text-message reminders for a full year would increase the number of fines paid before the MoJ Collections due date by 31.8%; generate an additional \$1,568,600; and result in 11,170 more repayment arrangements being set up. We estimate that this increase in on-time fine payments would benefit 6,300 people each year, by helping them avoid additional fees worth \$642,600. We conclude that sending a reminder message seven days before a fine is due is an effective intervention that increases timely payment behaviour.

People's inability to pay fines is likely to explain a proportion of unpaid fines. However, our results indicate many fines go unpaid due to people procrastinating or forgetting. Our text-message reminders are likely to be most effective for this group who already intend to pay. Therefore, reminders are most effective when they include information that make it easier for people to pay their fines.



Introduction — how text messages influence behaviour

Text messages are commonly used to remind people to complete an action. They have been used to engage people and change their behaviour in many sectors including education, health, tax administration and justice (see Appendix 1 for an expanded literature review). Text messages are often cheaper than other communication methods like letters or phone calls, yet just as effective.³ However, text-message reminders do not always affect behaviour,⁴ therefore, messages need to be tailored to new contexts and tested to ensure they are effective.

Behavioural Science Aotearoa (BSA) and the Ministry of Justice (MoJ) Collections Unit (Collections) have previously trialled using text messages to remind people that their fines are overdue (fines become overdue 28 days after they are imposed). That study shows that sending people a simple reminder to contact MoJ significantly increases 'payment behaviour', which Collections defines as making a payment (of any amount) or setting up an arrangement to pay.⁵

In 2020, Collections approached BSA to test the effectiveness of a new text-message service to prompt payment behaviour *before* a fine becomes overdue. As part of this trial, MoJ created a new channel so that people could access its online payment platform from the reminder text.

Reminder messages affect people's behaviour by prompting them to think about completing a behaviour they already intended to do.⁶ Reminder messages can also influence a desired behaviour by making it easier for people to complete it. We (BSA) expected that lowering the non-financial cost of the fine (this cost includes time, hassle and cognitive effort) would induce more people to pay their fines on time.⁷

Research highlights that these practices influence people's responses to text messages:

- **Including basic instructions and essential information (such as time and place in an appointment reminder).** The Behavioural Economics Team Australia (BETA) has demonstrated that a short text-message reminder increases on-time financial reporting by 13.5 percentage points. Importantly, a simple reminder message is just as effective as a message that includes extra information to motivate the target behaviour.⁸
- **Using the recipient's name to attract their attention and ensure they read the important content in the message.** Personalising a message is commonly cited as a factor that makes

³ The Behavioural Insights Team. (2018, 1 February). *Why Text?* [blog] Retrieved from: <https://www.bi.team/blogs/why-text/>

⁴ Cumberbatch, J. R., Barnes, G. C. (2018). This nudge was not enough: a randomised trial of text message reminders of court dates to victims and witnesses. *Cambridge Journal of Evidence-Based Policing*, 2, 35–51. <https://doi.org/10.1007/s41887-018-0024-4>

⁵ The size of this effect is both statistically and meaningfully significant. The rate of payment behaviour increased from 24.4% to 33.6%, equivalent to a relative increase of 37.4%.

⁶ Given the complexity and scale of the infringement and fines infrastructure in New Zealand, it is also possible that a reminder message will be the first time they learn they have a fine (for example, if they have moved address and did not receive their Notice of Fine letter).

⁷ Suffoletto, B. (2016). Text message behavioral interventions: from here to where? *Current Opinion in Psychology*, 9, 16–21. <https://doi.org/10.1016/j.copsyc.2015.09.012>

⁸ Behavioural Economics Team of the Australian Government. (2017). *Effective Use of SMS: Timely Reminders to Report On Time*. Australian Government. Retrieved from: <https://behaviouraleconomics.pmc.gov.au/sites/default/files/projects/sms-timely-reminders.pdf>



text-message reminders more effective.⁹ The UK Behavioural Insights Team has found messages that include the recipient's first name are especially effective at increasing the likelihood they will pay their fines.¹⁰ Another UK example shows that adding the recipient's name to a text-message reminder increases the likelihood that they will attend a job fair, from 10.5% to 14.8%.¹¹

- **Including extra information and motivational messages.** Using social norms (behaviours that other people demonstrate, such as paying their fines) in reminder *letters* is effective in increasing payment of overdue fines and in tax compliance.^{12, 13} However, there is little research on motivational messages in text-message reminders. There is weak evidence that 'reminder-plus' messages (reminder-plus messages include more than information than is essential for the reminder) are effective in health settings.¹⁴

Many text-message platforms have a character limit (such as 160 or fewer characters), which limits the information that can be included in text-message reminders. This makes it particularly important to understand the effect that different types of information have on people's behaviour, as we must make decisions about how to make the best use of the limited space.

The effect of an online payment option on fine payments

We have found little published research on the effect, on fine payments, of including an online payment option in text-message reminders.

In the MoJ context, an online payment option can make paying fines more attractive for people:

- who wish to avoid waiting on hold for the next available Collections staff member
- who find paying online avoids anxiety or discomfort associated with talking on the phone
- who want to pay their fine quickly. The link in the text message takes the recipient directly to the payment form and pre-populates the customer-code (PPN) field. While the letter also contains a weblink, the person needs to find the letter, enter the web address, navigate to the payment form and enter their PPN. The difference in these steps may seem small, but research finds that removing, even seemingly insignificant, barriers reduces 'friction costs' and can motivate people to perform desired behaviour.¹⁵

⁹ McLean, S. M., Booth, A., Gee, M., Salway, S., Cobb, M., Bhanbhro, S., & Nancarrow, S. A. (2016). Appointment reminder systems are effective but not optimal: results of a systematic review and evidence synthesis employing realist principles. *Patient Prefer Adherence*, 10, 479-99. <https://doi.org/10.2147/PPA.S93046>

¹⁰ Haynes, L. C., Green, D. P., Gallagher, R., John, P., & Torgerson, D. J. (2013). Collection of delinquent fines: an adaptive randomized trial to assess the effectiveness of alternative text messages. *Journal of Policy Analysis and Management*, 32(4), 718-730. <https://doi.org/10.1002/pam.21717>

¹¹ Briscese, G., & Tan, C. (2018). *Applying Behavioural Insights to Labour Markets: How Behavioural Insights Can Improve Employment Policies And Programmes*. The Behavioural Insights Team. Retrieved from: <https://www.bi.team/wp-content/uploads/2018/11/TheBehaviouralInsightsTeam-LabourMarketsReport.pdf>

¹² Behavioural Science Aotearoa. (2021). *Applying Behavioural Science to Increase Fine Payments: Evidence from Four Trials*. Unpublished.

¹³ Larkin, C., Sanders, M., Andresen, I., & Algate, F. (2018). Testing local descriptive norms and salience of enforcement action: a field experiment to increase tax collection. *Journal of Behavioural Public Administration*, 2(1), 1-11. <http://dx.doi.org/10.2139/ssrn.3167575>

¹⁴ McLean et al. (2016). Op. cit.

¹⁵ Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., Sanders, M., Pelenur, M., Gyani, A., Harper, H., Reinhard, J., & Kirkman, E. (n.d.). *EAST: Four Simple Ways to Apply Behavioural Insights*. The Behavioural Insights Team. Retrieved from: https://www.behaviouralinsights.co.uk/wp-content/uploads/2015/07/BIT-Publication-EAST_FA_WEB.pdf



On the other hand, MoJ may find referring a person to its online payment platform could negatively affect their payment behaviour, because:

- they must enter their fine amount, which usually means they will need their Notice of Fine letter. If they have discarded, lost or never received the letter, and do not know their outstanding fine balance, they may give up
- they cannot set up a payment arrangement online, which removes a potential option for timely payment behaviour
- they may perceive the link as untrustworthy, which increases the chance that they will ignore the message
- they may not have a phone with the technological capability to use the online link
- they may be uncomfortable using the online payment platform on their phone and prefer to use a desktop computer.

If people have problems with the online platform, or have incomplete information about their fines, some may phone the contact centre; however, others are likely to give up. If people try to pay their fines online but cannot use the system (for example, if they do not know their fine amount), they may use this experience to justify making no further efforts to pay.

It is therefore unclear whether an online link in text-message reminders will affect payment behaviour.



Intervention — what we did

We examined the effects of three attributes of text-message reminders on observed rates of payment behaviour:

- A reminder message sent before a fine becomes overdue
- A link in the text message to the Collections online payment platform
- Message framing to target motivation

We tested effects on the rate of payment behaviour by comparing seven treatment groups against one Control group. Each treatment group received a different text-message reminder; the Control group received no text message (see Table 1 for a list of the text messages we used).

Message design

Each message we used is a variation of MoJ's standard reminder message for overdue fines.¹⁶ We drew on behavioural science literature (see Appendix 1 for an expanded literature review) to design the elements for each message. Each message contained these common elements, which were therefore were not tested in this study:

- **First name.** Personalising a text message is commonly cited as a factor that makes them more effective.¹⁷
- **Fine is due in 7 days.** This is a timely reminder for people, especially those who have simply forgotten about their fine, to pay before their fine becomes overdue.
- **Call to action** (either contacting the MoJ phone number or going to its website). A call to action makes it clear to the recipient what they are being asked to do.
- **Sender identified as 'Min of Justice'.** All messages mention MoJ as the sender. This provides legitimacy and increases trust in the message.
- **160-character limit** (including the link, which is 24-characters long).

'Framing' a message means explaining what the recipient will gain by completing a behaviour or lose by not completing a behaviour (see Box 1 for a fuller description of framing). Research on message framing in text messages is inconclusive. American research shows gain-framed messages can increase

Box 1. What is message framing?

Framing is how people respond to options when they are framed as positive or negative. Often, people prefer avoiding a loss to acquiring an equal gain. For example, people tend to choose avoiding losing \$100 rather than gaining \$100. This tendency is important to consider when deciding how to frame a message like a request for fine payment (whether to present it as a behaviour that will lead to a loss or a gain).

¹⁶ 'Hi [First Name] pls call Min of Justice ASAP on 0800434637 (free frm mobile quote [PPNnumber] M-F 0700-2100hrs. 2stp reply STP.'

¹⁷ McLean et al. (2016). Op. cit.



early claims for social-security payments,¹⁸ but BETA finds framing, in reminders to report income to receive financial assistance, has no impact¹⁹ (see Appendix 1 for an expanded literature review). However, we decided it was an appropriate element to test, as this is a new initiative in a new location and context. We drew on previous research of using reminders in financial contexts (such as tax, benefits and fines) and investigated the effects of framing payment or information-reporting behaviours as gains or losses, depending on whether messages mentioned benefits of compliance or penalties of non-compliance.

We know that framing effects can, in some contexts, substantially influence behaviour. There is ample evidence for the theory of loss aversion, which demonstrates people are disproportionately sensitive to losses, relative to gains.²⁰ Therefore, we chose a gain frame and designed our messages to frame the benefits of paying a fine as avoiding wasting time and money (losses).²¹

Table 1. Text message treatment groups

| Group number | Group label | Text content |
|--------------|-----------------------------|--|
| 1 | Control | No text message |
| 2 | Simple Reminder | Hi [First Name], Min of Justice reminding you your fine is due in 7 days. Pls see your fine letter for how to pay |
| 3 | Link Only | Hi [First Name] your fine is due in 7 days. Pls go to Min of Justice website LINKTOWEBSITE to pay |
| 4 | Link + Phone | Hi [First Name] your fine is due in 7 days. Pls contact Min of Justice on 0800434637 quote [PPNnumber] or click LINKTOWEBSITE |
| 5 | Link + Gain (time) | Hi [First Name], your fine is due in 7 days. Save your time and pay online LINKTOWEBSITE. Thanks Min of Justice |
| 6 | Link + Gain (time + money) | Hi [First Name], your fine is due in 7 days. Pay to avoid \$102 in late fees. Save your time and pay online LINKTOWEBSITE. Thanks Min of Justice |
| 7 | Link + Phone + Gain (money) | Hi [First Name] your fine is due in 7 days. Pay to avoid \$102 in late fees. Call Min of Justice on 0800434637 use [PPNnumber] or click LINKTOWEBSITE |
| 8 | Phone + Gain (money) | Hi [First Name] your fine is due in 7 days. Pay to avoid \$102 in late fees. Contact Min of Justice on 0800434637 quote [PPNnumber]. Thanks Min of Justice |

Trial sample

We used these administrative data that MoJ collects for each fine: PPN, fine amount, reason for fine, gender and age.

¹⁸ Brown, J. R., Kapteyn, A., & Mitchell, O. S. (2016). Framing and claiming: how information-framing affects expected social security claiming behavior. *The Journal of Risk and Insurance*, 83(1), 139–162. <https://doi.org/10.1111/j.1539-6975.2013.12004.x>

¹⁹ Behavioural Economics Team of the Australian Government. (2017). Op. cit.

²⁰ Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: a reference-dependent model. *Quarterly Journal of Economics*, 106(4), 1039–1061. <https://doi.org/10.2307/2937956>

²¹ Due to the limited number of messages we could test, we could not test gain-framing messages (for example, 'Save time and pay online' and 'Avoid \$102 in late fees') against loss-framing messages (for example, 'Paying by phone takes longer' and 'You will receive a late fee of \$102 if you fail to pay').



Our sample consisted of people who, during the trial (17 August to 14 November 2020) had at least one fine imposed and had not paid, or set up an arrangement to pay, the fine 21 days since it was imposed. (Fines are imposed either through a court or by another agency, such as NZ Police or local government, and then transferred to MoJ.)

Our sample consisted of 44,585 people. Some people received multiple fines at the same time, or across several days. We excluded, from our analysis, anyone who received more than one text-message reminder.²² Participants were randomly allocated to a treatment group based on the last two digits of their PPN. Table 2 shows that the mean fine amount, percentage of female participants and mean age of the participants are similar in each treatment group.

Table 2. Summary statistics by treatment group

| Treatment group | N | Mean fine amount \$ (SD) | Percentage female | Mean age (years) |
|-----------------------------|--------|-----------------------------|----------------------|---------------------|
| Control | 3,503 | 219.9 (315.6) | 36.9 | 37.0 |
| Simple Reminder | 2,931 | 223.5 (310.3) | 36.1 | 37.0 |
| Link Only | 14,572 | 208.1 (280.3) | 35.7 | 36.5 |
| Link + Phone | 4,142 | 214.1 (236.9) | 35.9 | 36.6 |
| Link + Gain (time) | 3,212 | 206.2 (221.0) | 32.8 | 36.0 |
| Link + Gain (time + money) | 7,507 | 200.4 (279.3) | 36.1 | 35.8 |
| Link + Phone + Gain (money) | 4,347 | 185.3 (184.2) | 37.8 | 36.5 |
| Phone + Gain (money) | 4,371 | 195.6 (293.5) | 36.9 | 36.6 |

Table 3 shows the four most common reasons for a fine. The three most common reasons are speeding-related. The fourth most common is the offender levy, which is a \$50 levy imposed on anyone who is sentenced in a district court. These top four offences account for 37.1% of all fines in the sample.

Table 3. Most common reasons for fines

| Offence | Mean fine amount \$ | Percentage of all fines |
|---------------------------------------|---------------------|-------------------------|
| Exceeded 50km/h restricted-area speed | 155.6 | 15.3 |
| Exceed 80km/h gazetted-area speed cam | 180.4 | 8.5 |
| Exceeded 100 km/h posted speed limit | 200.0 | 8.3 |
| Offender levy | 50.0 | 5.0 |

²² The total number of text messages sent during the trial period was 60,523. However, this number includes people who received multiple fines on different days and therefore were sent multiple reminders. In our analysis, we removed 15,925 people who had been sent multiple text messages during the trial period, to avoid any potential impact of multiple reminders for separate fines. We conducted the trial in four stages, and randomised at the individual level within each stage, so that if a person had multiple fines on different days they were sent the same text message. We removed another 13 outliers who each had a fine greater than \$10,000.

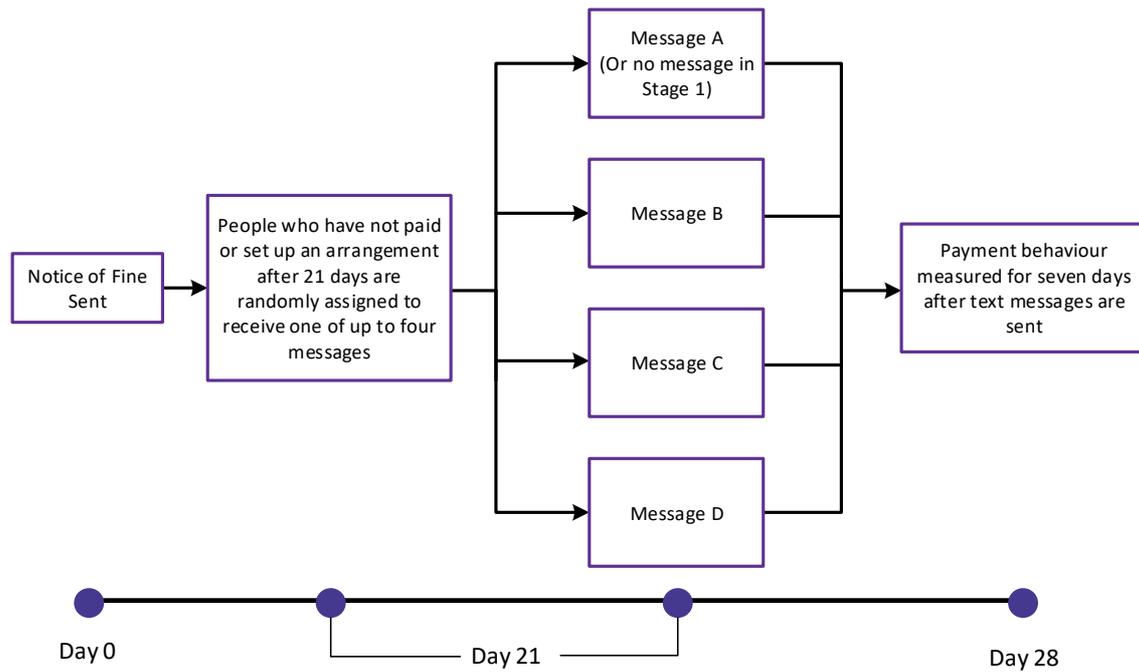


Trial design

We carried out our trial in four stages to accommodate operational limits on how many different messages can be tested at one time,²³ while achieving sample sizes that were large enough²⁴ to test each message.

The staged approach meant we could adapt the messages at each stage, guided by the three attributes of text-message reminders we wanted to test. Therefore, the messages we tested in stages 2 to 4 may have some dependence on results from previous stages.

Figure 2. Trial design for each stage



We conducted each stage as a randomised control trial (RCT) in which participants were randomly assigned to a treatment group (see Figure 2 for an illustration of the trial design). In every stage one group received the message that contained only the link to the online payment option (the 'Link Only' message). This allowed us to compare payment behaviour within the stage and between stages. Table 4 shows which text messages we tested in each stage.

²³ There is a limit on how many text messages can be sent during a period without exceeding demand on the contact centre. There is also a limit on how many different messages can be tested at a given time, as testing involves manually scheduling different templates.

²⁴ It is important to have large enough samples to test for statistically significant differences in behaviour, and to be able to conclude these differences are not due to chance (this is known as statistical power).



Table 4. Treatment groups by stage

| | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|-------------------------------|-------------------------|-----------------|-------------------------------|--------------------------------|
| N | 9,390 | 8,141 | 9,457 | 17,597 |
| Duration (days) ²⁵ | 12 | 12 | 18 | 23 |
| Treatment group (Message A) | 1. Control (no message) | 3. Link Only | 3. Link Only | 3. Link Only |
| Treatment group (Message B) | 2. Simple Reminder | 4. Link + Phone | 5. Link + Gain (time) | 6. Link + Gain (time + money) |
| Treatment group (Message C) | 3. Link Only | | 6. Link + Gain (time + money) | 7. Link + Phone + Gain (money) |
| Treatment group (Message D) | | | | 8. Phone + Gain (money) |

Outcome measures

Within each stage, we looked at the occurrence of three outcomes (behaviours) (see Table 5 for a description of the behaviours) within seven days of receiving a text message.

For specific behaviours of interest, we analysed the stages separately and present results based on the relevant RCTs. Our trial design also allows us to compare payments across all stages, under the assumption that the difference between the Link Only message (treatment group 3) and other text messages remains constant over time. We determined the duration of each stage using power analysis, which ensured we had a big enough sample to detect an effect.

Table 5. Description of behaviours

| Behaviour | Behaviour definition |
|-----------------|---|
| Any Behaviour | Within seven days of receiving the text message makes payment of any amount or sets up an arrangement to pay their fine off |
| Any Payment | Within seven days of receiving the text message makes payment of any amount |
| Any Arrangement | Within seven days of receiving the text message sets up an arrangement to pay their fine off |

As our sample includes only people who had not taken any action to resolve their fine within 21 days of it being imposed (that is, when they were sent a Notice of Fine), these measures do not reflect overall rates of on-time payment behaviour for people who have a fine imposed. Those rates would include payment behaviour in the first 21 days after the fine is imposed.

²⁵ Messages were sent daily from Monday to Saturday (excluding public holidays).



Results — what we found

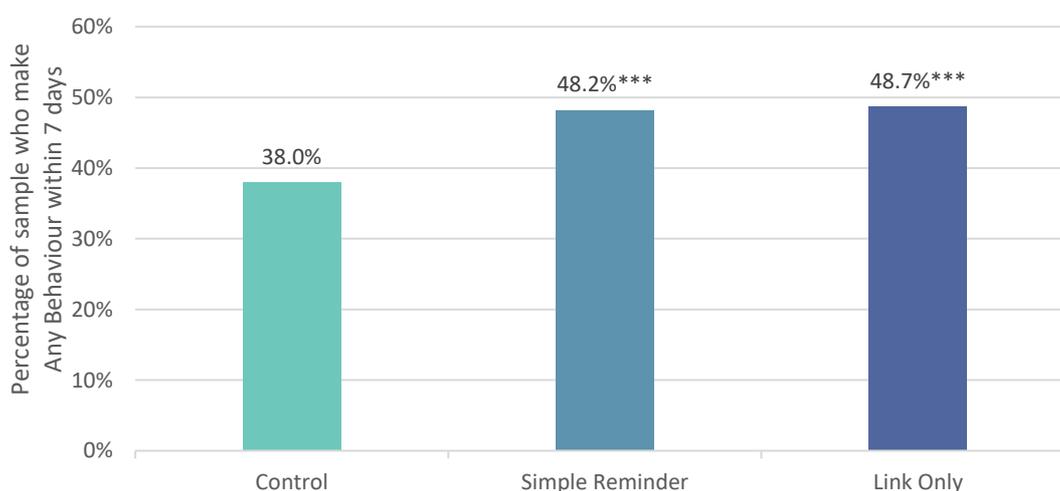
We find that sending text-message reminders significantly increases payment behaviour. In this section we describe our main findings — for a summary of results by stage, see Appendix 2.

Overall findings

Any text message significantly increases payment behaviour

In stage 1, we find that sending the Simple Reminder text message increases Any Behaviour by 10.2 percentage points (a relative increase of 27.2%) compared with receiving no text-message reminder ($p < 0.0001$) (see Figure 3). The mean rates of Any Behaviour in the Simple Reminder and Link Only treatment groups are both significantly greater than the Control group, but they are not statistically different from each other ($p = 0.6880$). This shows that receiving any text-message reminder significantly increases payment behaviour.

Figure 3. Effect of text-message reminders on Any Behaviour within 7 days (stage 1)



Significant difference compared to Control: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A phone number in the text message increases payment behaviour more than a link to the online payment platform

In stage 4, when we provide only one payment channel, the rates of Any Behaviour are significantly higher when the message includes the phone number compared with the link (50.4% for Phone + Gain (money) compared with 47.9% for Link + Gain (time + money), $p = 0.0178$) (see Figure 4).

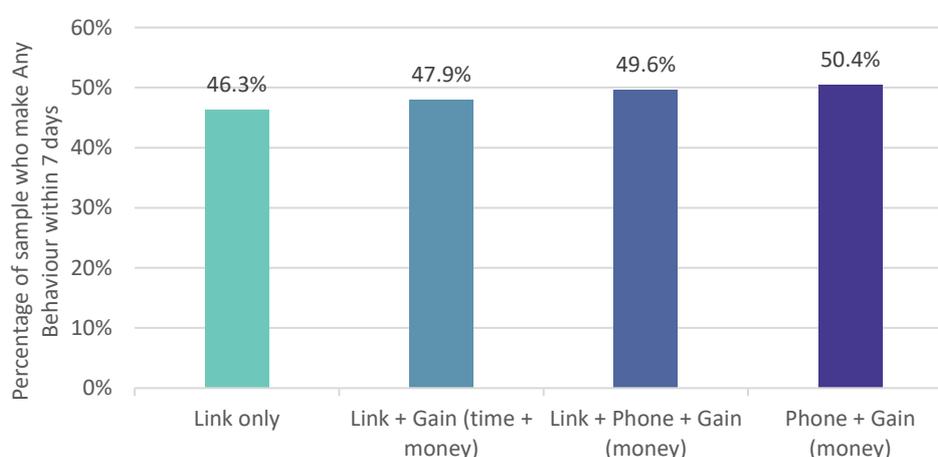
Across multiple stages, we find no evidence that including the link to the online payment platform has any significant effect (positive or negative) on any of the outcome measures. This is unsurprising, as the online payment system requires people to know, and be willing to type into the system, how much they owe.



In stage 1, there is no significant difference in the rates of Any Behaviour when we add the link to the text-message reminder (48.7% for Link Only compared with 48.2% for Simple Reminder, $p=0.6880$) (see Figure 3). Similarly, in stage 4, there is no significant difference in the rates of Any Behaviour between treatment groups whose text-message reminders differ only by whether the link is included (50.4% for Phone + Gain (money) compared with 49.6% for Link + Phone + Gain (money), $p=0.4468$) (see Figure 4).

These findings suggest that it is more effective to provide people with a phone number than the link to the online payment platform. Also, adding the link to a text message that already contains the phone number does not improve rates of Any Behaviour. However, we also find no evidence that including the link, as a second payment option, has any negative effects on Any Behaviour. Given the large sample size, we expect there are people (such as those with easy access to their Notice of Fine letter) who found receiving the link to the online payment platform was convenient, although there is no evidence of this in the mean rates of Any Behaviour.

Figure 4. Effect of text-message reminders on Any Behaviour within 7 days (stage 4)



Significant difference compared to Control: * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Messages that frame payment benefits may increase payment behaviour

In stage 3 the text messages all contain the link to the online payment platform, but those that include gain-framing messages significantly increase rates of Any Behaviour ($p<0.0233$)²⁶ by at least 2.8 percentage points compared with the Link Only message (see Figure 5). This suggests that framing text messages to highlight the benefit of paying online (that is, saving time) may significantly increase payment rates. We find no evidence of significant differences in rates of Any Behaviour between the three gain-framing messages we use in stage 3. This indicates there is likely to be no additional effect on rates of Any Behaviour from including a message about avoiding financial cost.

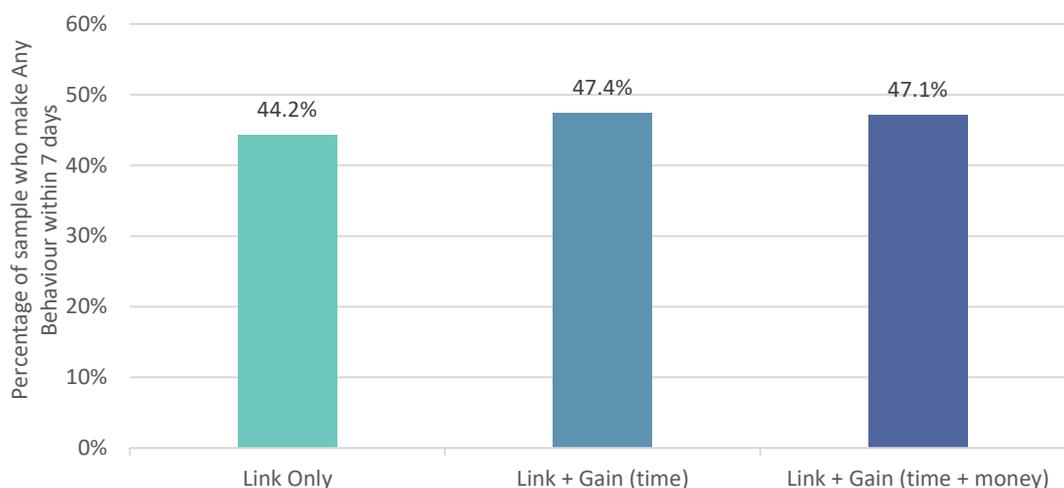
In stage 4 we also compare the Link + Gain (time + money) message with the Link Only message and find a smaller increase in Any Behaviour (1.6 percentage points) than in stage 3. This difference is no longer statistically significant ($p=0.1237$) (see Figure 4).

²⁶ This p-value tests the difference in mean rates of Any Behaviour between the Link Only, and the Link + Gain (time) and Link + Gain (time + money) treatment groups. It gives us confidence at a 95% level that the difference between the Link Only message and either of the gain-framed messages is greater than what we would expect from chance.



Considered together, the results from stages 3 and 4 are inconclusive on the potential benefits of gain framing. However, we can conclude that there is no evidence that gain framing has any negative effects and that, in general, the trend is positive.

Figure 5. Effect of text-message reminders on Any Behaviour within 7 days (stage 3)



Significant difference compared to Control: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Text-message characteristics that are most effective

We can account for variation in the baseline rates of payment behaviour across stages 1 to 4 by combining the data from the four stages and accounting for changes over time.

We sent the Link Only message in all four stages, which means we can use it to record differences, in the baseline rates of payment behaviour, over the course of the trial. Here we compare each treatment with the Simple Reminder text message, after controlling for stage, gender, age, fine amount and fine type (observable characteristics) (see Appendix 3 for the specification of our logistic model for these results).

Figure 6 shows the percentage-point difference in rates of Any Behaviour for each text message compared with the Simple Reminder, after differences attributed to stage and observable characteristics are accounted for. Across the four stages, the difference in rates of Any Behaviour between most text messages and Simple Reminder is significantly more (the only exception is the Link Only message). (See Appendix 3 for equivalent results for rates of Any Payment and Any Arrangement).

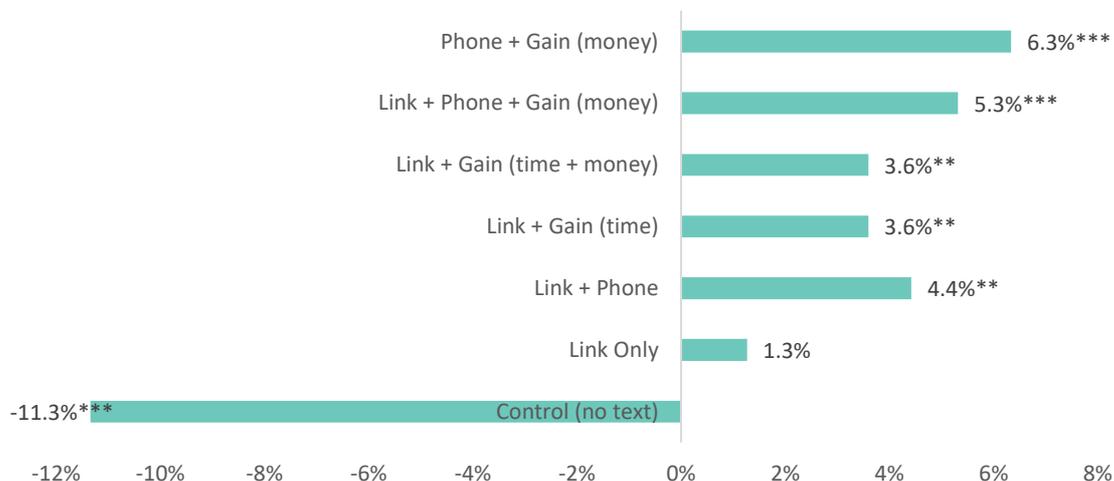
When Any Arrangement is the outcome measure, all text messages that include a phone number have statistically significant effects, and all text messages that do not include a phone number have a null effect. We see the same result in stages 2 and 4 when we look at Any Arrangement and Any Payment (see Tables 8 and 10 in Appendix 2), which indicates that payment arrangements may be a key driver of differences in payment behaviour. This suggests that text-message reminders should include a phone number.

When we combine data from all four stages, we find that combining the link with a gain-framing message has a statistically significant effect on Any Behaviour (2.3 percentage points for messages that include time, or time and money, benefits) compared with the Link Only message. Similarly, we find that Link + Gain (time) and Link + Gain (time + money) have statistically significant effects on Any



Payment (2.9 and 2.1 percentage points respectively). These results indicate that gain-framing messages can effectively prompt payment behaviour when they are used in text-message reminders.

Figure 6. Percentage-point difference in the rate of Any Behaviour between each text message and the Simple Reminder



Significant difference compared to Simple Reminder: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Findings about different groups of people

Here we compare the behaviours of people that received any type of text message during the trial with people that received no text message in stage 1 (the Control group)²⁷ while controlling for observable characteristics.

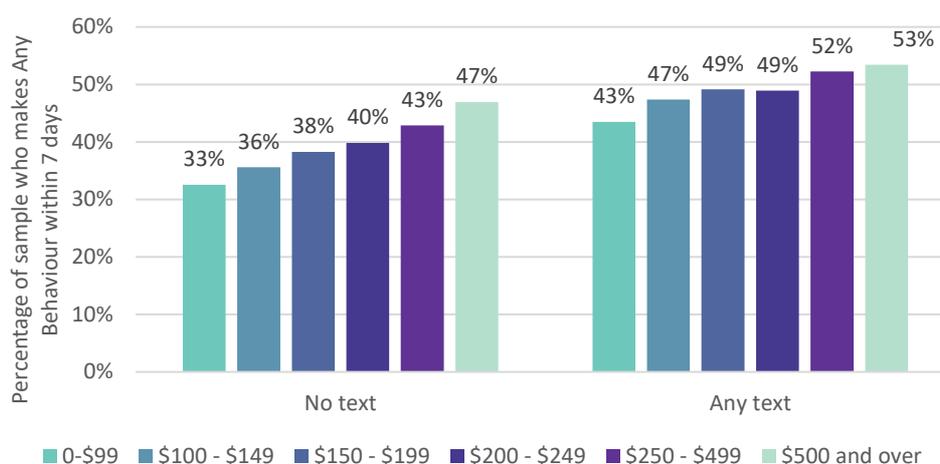
Reminder text messages are more effective for smaller fines

We looked at the total value of fines that a person owed to MoJ when they were sent a text message. Of all individuals analysed, the total fine value of 90% was under \$430 and of 99% was under \$1,030. In stage 1 the rate of Any Behaviour tends to increase with the fine amount, for people who did and did not receive a text message (see Figure 7).

²⁷ The Control group, which received no text message, is approximately 3500 people. This is significantly smaller than the total of the other groups (approximately 41,000 people) that all received a text message.



Figure 7. Probability of Any Behaviour within 7 days by people who received no text and people who received any text, by total value of fines owed (stage 1)



Looking at the whole sample, for different total fine values we compare the effect of receiving any text-message reminder on Any Behaviour, after accounting for observable characteristics. We find some evidence that text messages have a greater effect on people who owe less than those who owe more. For example, there is a 10 percentage-point difference between receiving no text-message reminder and any text-message reminder for those who owe under \$100 (33% compared with 43%) but a 6 percentage-point difference between receiving no text-message reminder and any text-message reminder for those who owe \$500 or more (47% compared with 53%) (see Figure 7).

Compared with people who owe \$500 or more, the effect of a text-message reminder on the odds of Any Behaviour is 1.55 times greater for people whose fines are under \$100 ($p=0.0061$) and 1.47 times greater for people whose fines are between \$100 and \$149 ($p=0.0118$) (after accounting for observable characteristics). The differences in effects of text-message reminders on people in the other fine-amount groups are not statistically significant.

Reminder text messages are equally effective for older and younger people

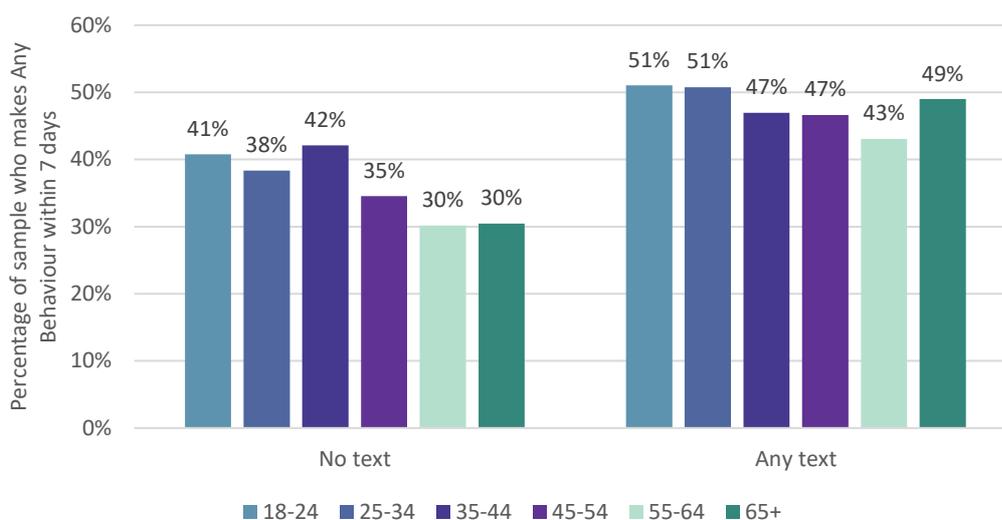
We compare rates of Any Behaviour by people of different ages (see Figure 8).²⁸ The median age of the sample is 34 years old (the median is the same for people who received a text and those in the Control group).

Across all groups in stage 1, younger people (under 35 years old) tend to be more likely to show Any Behaviour, while people aged 55 and over are less likely. However, within the Control group, people aged 35 to 44 years old have the highest rates of Any Behaviour.

²⁸ We calculated a person's age at 21 days since their fine was imposed (that is, when their Notice of Fine was sent to them). We excluded 13 people aged under-18 from our comparison of rates of Any Behaviour by people of different ages.



Figure 8. Probability of Any Behaviour within 7 days by people who received no text and people who received any text, by age (stage 1)



Looking at the whole sample, we compare the effect that receiving any text-message reminder has on Any Behaviour by different age groups, after controlling for observable characteristics. Holding everything else constant, text-message reminders are equally effective for all age groups except people aged 35 to 44 years old. Text-message reminders have a significantly smaller effect on this group compared with neighbouring age groups; the effect of a text-message reminder on odds of Any Behaviour is 0.65 to 0.77 times smaller for people aged 34 to 44 years old compared with people aged 25 to 34 and 45 to 64 years old ($p \leq 0.008$).

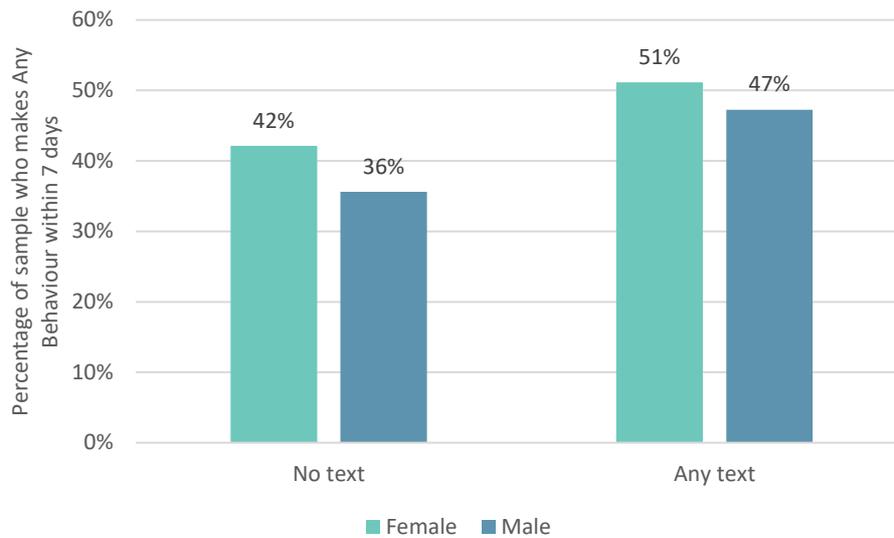
Reminder text messages are equally effective for men and women, but women have higher baseline rates of payment behaviour

Almost two-thirds of our sample (63%) are male and 36% are female. We do not have a record of the gender of 647 people (1% of our sample).

Looking at the whole sample, women have a higher rate of Any Behaviour than men (51.0% compared with 46.1% respectively, $p < 0.0001$), after accounting for observable characteristics. We find no evidence that a text-message reminder has a different effect ($p = 0.2447$) on Any Behaviour by men and women, when observable characteristics are held constant (see Figure 9).



Figure 9. Effect of text-message reminders on Any Behaviour within 7 days for people who received no text and people who received any text, by gender (stage 1)



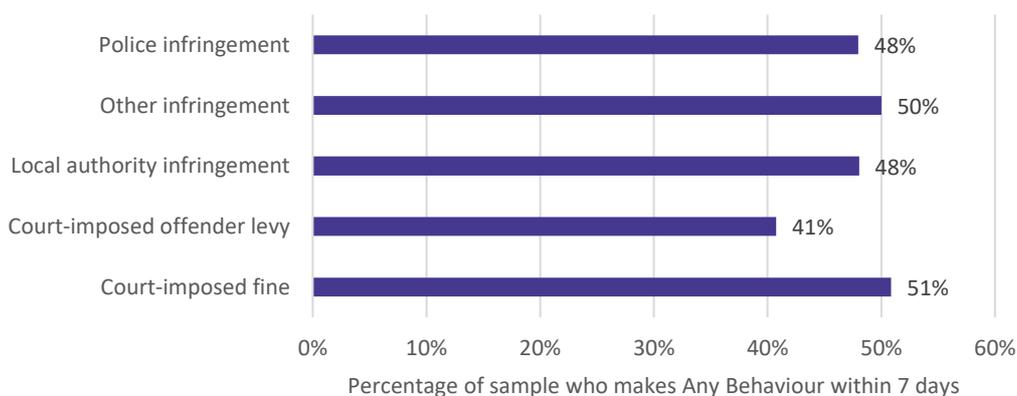
Text-message reminders are equally effective for all fine types

Imposed fines can be police infringements (74% of our sample), local-authority infringements (17% of our sample), offender levies imposed by a court (5% of our sample), fines imposed by a court (4% of our sample) or infringements imposed by another agency (0.1% of our sample).²⁹

We look at the type of the largest fine imposed on each person in our sample. We then look at the effect of the fine type on rates of Any Behaviour (see Figure 10).

We find the rate of Any Behaviour by people with offender levies (40.8%) is significantly lower than all other fine types ($p < 0.0079$), when observable characteristics are held constant. However, there is no evidence that a text-message reminder has a different effect on different fine types when the same factors are accounted for.

Figure 10. Rates of Any Behaviour within 7 days, by fine type



²⁹ The fine type was not available for five fines, so we excluded these fines from our comparison of rates of Any Behaviour by people with different fine types.



Text-message reminders are equally effective for all offence types

We look at the reason for each person's largest fine (their 'offence'). Traffic offences (83.1% of the sample), parking offences, offender levies and other local-authority offences comprise 97.9% of all fines (see Table 6).

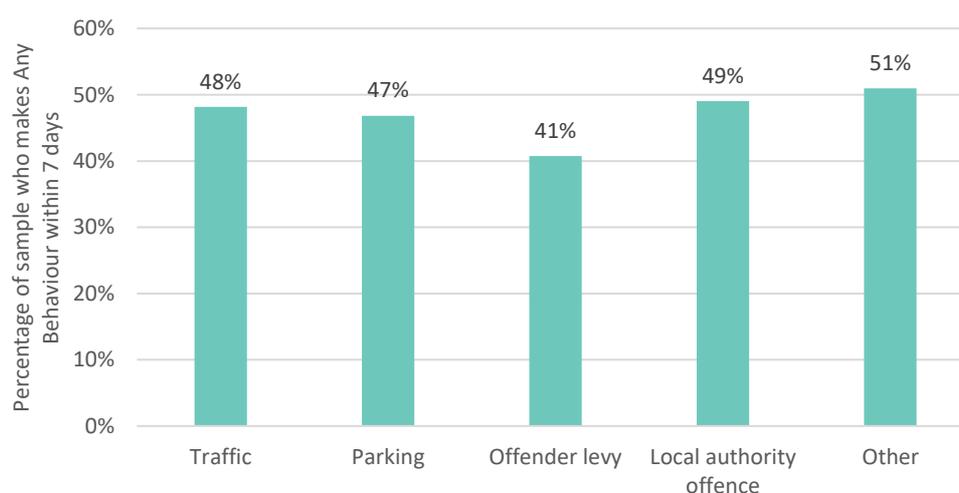
Table 6. Types of offences

| Type of offence | Percentage of all fines |
|---|-------------------------|
| Traffic offences (mostly imposed by police) | |
| • Speeding | 49.8 |
| • Warrant of fitness, registration or road-worthiness offences | 9.2 |
| • Licence offences | 9.2 |
| • Other traffic offences | 14.9 |
| Parking offences (mostly imposed by local authorities) | 8.9 |
| Offender levy (imposed by courts) | 5.0 |
| Other local-authority offences (such as contravening an alcohol ban, or a dog-control or freedom camping offence) | 0.9 |
| Other types of offences* | 2.1 |

* Of the other types of offences, 72% were imposed by courts

We compare the rates of Any Behaviour for the different offence types, holding observable characteristics constant (see Figure 11).³⁰ Consistent with our analysis of fine type, we find that people whose largest fine is an offender levy have a lower rate of Any Behaviour than people whose largest fine is for parking, traffic or other offences ($p < 0.0164$). We find no evidence of any other differences in the rates of Any Behaviour between other offence types. We also find no evidence that receiving any type of text message-reminder is more or less effective for any offence type, when observable characteristics are held constant.

Figure 11. Rates of Any Behaviour within 7 days, by offence type



³⁰ We did not include fine type in our logistic model (see Appendix 3, as it correlates highly with offence type).



Findings about the effects of timely reminders

Timely reminders could help Collections make significant savings

In stage 1, people who received no text message paid \$69,247 within the next seven days (that is, before their fines became overdue), which is an average of \$19.76 per person. In comparison, in stages 2 to 4 people who received any type of text-message reminder paid a total \$1,069,646 within the next seven days, which is an average of \$26.03 per text message sent.³¹

Using these figures, we can estimate the potential effect of sending a timely text-message reminder to all eligible people for 12 months:

- **No messages sent.** We estimate the total expected revenue from people making a payment of any amount (excluding making payment arrangements) in the week before their fine is overdue (21 to 28 days after the fine is imposed) would be \$4,940,000.
- **Timely text-message reminders sent.** We estimate the total expected revenue would increase to \$6,508,600. This is an additional \$1,568,600, which is equivalent to a 31.8% increase in on-time payments.³²

Sending text-message reminders significantly increases rates of Any Arrangement, particularly if the text includes a phone number. We can estimate the potential effect on payment arrangements from sending a timely text-message reminder for to all eligible people for 12 months:

- **No messages sent.** We estimate the number of arrangements established in the last week before the fine is overdue (21 to 28 days after fines are imposed) would be 16,690.
- **Timely text-message reminders sent.** We estimate the total number of arrangements established would increase to 27,857. This is an additional 11,170 arrangements, which is equivalent to a 66.9% increase.

We cannot be sure how much of their fines people will pay if they set up arrangements. Therefore, we estimated a 25-to-100% payment range based on the average value of fines issued to people who made arrangements during the trial and the percentage of the fines they paid.³³ Based on these calculations, in 12 months we estimate Collections could receive an additional \$601,600 to \$2,640,400 through arrangements people set up before their fines become overdue.

See Appendix 4 for a full financial breakdown.

Timely reminders can help people avoid additional fees

If a person has overdue fines and has not shown any payment behaviour, MoJ can take enforcement action to recover this debt (this can involve deducting money from their salary or bank account, or seizing their property). When MoJ takes enforcement action, it typically adds a \$102 fee to the person's

³¹ This is an average of everyone in a treatment group, so it reflects the average amount paid per text sent rather than the average amount paid per person who actually paid.

³² These figures are based on the average number of messages sent per week during this trial across all message types (N = 5,189). This counts each PPN once. Based on these figures, if text-message reminders were sent for 50 weeks, this would be 250,000 text-message reminders sent each year.

³³ These estimates are based on the 95% confidence interval for the mean total fine amount owed by people who set up an arrangement (\$215.50 and \$236.44).



existing debt. Other analysis by MoJ suggests that, of people who have not shown any payment behaviour within 28 days, nearly one-quarter (24%) have a \$102 enforcement fee added to their fine.

Our trial and other research shows sending timely text-message reminders increases the rate of timely payment behaviour, which reduces the number of people who will incur additional fees on top of their fines. If Collections sends any type of timely text-message reminder, we estimate that approximately 6,300 people each year would avoid incurring additional fees. This equates to \$642,600 in additional fees avoided in one year.



Discussion — what we conclude

Timely text-message reminders increase timely resolution of fines

Our results provide strong evidence that sending a simple reminder message seven days before a fine becomes overdue significantly increases payment behaviour (both paying any amount and setting up an arrangement to pay). This result supports previous research showing that simple reminders significantly change behaviour. It suggests that a significant proportion of people who receive a Notice of Fine may be able to resolve their fine but fail to because they forget, procrastinate or do not read the Notice.

In our study, the increase in timely payment behaviour led to a sizeable increase in the number of fines that were paid on time and the amount of money collected; we estimate this increase is equivalent to 31.8% or \$1,568,689 in one year. The number of people who set up additional arrangements also increased significantly; in the long run, this will save costs for people who owe fines and reduce MoJ's costs of enforcement action. Sending timely reminders could also mean an estimated 6,300 fewer people have additional fees added to their original fine; this is equivalent to \$642,600 in additional fees avoided by people who owe fines.

Text-message reminders that include a phone number are the most effective

We find strong evidence that payment behaviour varies depending on what information people are sent in a text-message reminder. Including a phone number in the message is significantly more effective than including a link to an online payment platform. Compared with a simple reminder that includes no payment channel, including a link to an online payment platform provides no additional benefit in observed rates of payment behaviour.

There are a few potential explanations for this finding. There may be parts of the Link Only message or the online payment platform that reduce the likelihood of payment. Some people may find the link off-putting, as they worry it is a scam (this reflects a few replies Collections received from people who received the Link Only message). We also know, from several replies, that some people did not have a Notice of Fine. These people would not know how much they owe and therefore could not use the link to the online payment platform. (See Appendix 5 for details of the replies we received to text-message reminders).

The success of the phone-number text-message reminders is likely to reflect the additional benefit the contact centre provides. For example, the contact centre enables people to set up an arrangement if they cannot pay a fine; provides them with more information about a fine; or gives them help if they want to dispute a fine. In stage 1 we saw that, even though we did not include a phone number in the text messages we sent, the rate of arrangements to pay (arrangements can be made only by phoning the contact centre) was higher among people who received a text-message reminder compared with those who did not. We also know that the difference in payment behaviour, between people who received a text-message reminder including a phone number and those who did not, is attributable largely to payment arrangements, because the number of people who paid any amount was roughly the same for both groups. Therefore, our results show a substantial proportion of people who owe fines prefer to call the contact centre. Including a phone number in text-message reminders appears to make it significantly easier for these people to use the contact centre.



Gain-framing messages increase timely resolution of fines

In stage 3 we find that framing messages to highlight timesaving significantly increases rates of payment behaviour by 3.1 percentage points, but we do not see a statistically significant effect in stage 4. We also find no evidence that framing messages to highlight cost savings (such as 'Pay to avoid \$102 in late fees') affects behaviour. When we combine stages 1 to 4 and control for observable characteristics, we find gain-framing messaging increases payment behaviour by 2 to 3 percentage points.

In our trial, while the benefits of saving time may have been enough to encourage some people to use the online payment platform, they would have reached the website and found they had to enter their fine payment amount from their Notice of Fine, which may have taken them more time to find. It is possible that people who received the Gain (money) message did not believe they would have to pay the \$102 late fee and therefore did not perceive there was any potential financial gain.

Timely text-message reminders are more effective for smaller fines

Timely text-message reminders increase payment behaviour by men and women; people in different age groups; and by people who have different fine types, offence types and fine amounts. The text-message reminders are similarly effective for most sub-groups. However, holding all else constant, they are significantly more effective for people whose total fine value is under \$150, and significantly less effective among people aged 35 to 44 years old.



Appendix 1 — literature review

Effects of text-message reminders

Electronic messages (such as text messages and email) can influence civic engagement³⁴ and a wide range of behaviours in multiple contexts including education,³⁵ health,^{36,37} finance and bill payment³⁸ and justice. They can attempt to change one-off behaviours (such as appointment reminders) or ongoing behaviour (such as adherence to a daily intervention).³⁹ Evidence, which to date mostly comes from the health sector, on behaviours like turning up for appointments or taking medication, shows that electronic messages are generally effective. However, their effectiveness is mediated by context, design and delivery.⁴⁰

Research on the use of electronic reminders is more limited in justice contexts. International research on sending text messages to remind people to turn up for court appearances has generally shown they are effective.^{41, 42} However, a UK trial of text-message reminders, sent to victims and witnesses two to three days before a court date, showed they have no effect on non-appearance rates.⁴³

Text messages are also used to remind people to pay debts or fines, or to submit financial reports such as filing taxes. A trial in the UK by the Behavioural Insights Team finds text-message reminders significantly increase the amount of unpaid fines that people pay off within a week of receiving a reminder.⁴⁴ That trial compares the average amounts paid by people who receive five different messages: a standard text message (this message does not include their name or the amount they owe); a text message that includes their name; a text message that specifies the amount they owe; a combined text message (this message includes their name and the amount they owe); and no text message (Control group). The results show that, overall, people who receive a text message pay more than those who do not.

³⁴ Dale, A., & Strauss, A. (2009). Don't forget to vote: text message reminders as a mobilization tool. *American Journal of Political Science* 53, 787–804. <https://doi.org/10.1111/j.1540-5907.2009.00401.x>

³⁵ Castleman, B. L., & Page, L. C. (2015). Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates. *Journal of Economic Behavior & Organization*, 115, 144–160. <https://doi.org/10.1016/j.jebo.2014.12.008>

³⁶ Heron, K. E., & Smyth, J. M. (2010). Ecological momentary interventions: incorporating mobile technology into psychosocial and health behaviour treatments. *British Journal of Health Psychology*, 15(Pt 1), 1–39. <https://doi.org/10.1348/135910709x466063>

³⁷ Gurol-Urganci, I., de Jongh, T., Vodopivec-Jamsek, V., Atun, R., & Car, J. (2013). Mobile phone messaging reminders for attendance at healthcare appointments. *Cochrane Database of Systematic Reviews*, 12.

<https://doi.org/10.1002/14651858.CD007458.pub3>; Robotham, D., Satkunanathan, S., Reynolds, J., Stahl, D. & Wykes, T. (2016). Using digital notifications to improve attendance in clinic: systematic review and meta-analysis. *BMJ Open*, 6:e012116. <https://doi:10.1136/bmjopen-2016-012116>

³⁸ Karlan, D., McConnell, M., Mullainathan, S., & Zinman, J. (2010). Getting to the top of mind: how reminders increase saving. *Discussion Papers*, 996. Retrieved from: <https://elischolar.library.yale.edu/egcenter-discussion-paper-series/996>

³⁹ Head, K. J., Noar, S. M., Iannarino, N. T., & Harrington, N. G. (2013). Efficacy of text messaging-based interventions for health promotion: a meta-analysis. *Social Science & Medicine*, 97, 41–8. <https://doi.org/10.1016/j.socscimed.2013.08.003>

⁴⁰ Suffoletto, B. (2016). Op. cit.

⁴¹ Nice, M. (2006). *Court Appearance Notification System: Process and Outcome Evaluation. A Report for the Local Public Safety Coordinating Council and The CANS Oversight Committee*. Report #002–06. Multnomah County, Oregon. Retrieved from: https://multco-web7-psh-files-usw2.s3-us-west-2.amazonaws.com/s3fs-public/budget/documents/12_cans.pdf

⁴² NSW Government. (2018). *The Behavioural Insights Unit Report*. Retrieved from: <https://www.dpc.nsw.gov.au/assets/dpc-nsw-gov-au/files/Behavioural-Insights-Unit/files/67bo800ebf/2018-Behavioural-Insights-Report.pdf>

⁴³ Cumberbatch & Barnes. (2018). Op. cit.

⁴⁴ Haynes et al. (2013). Op. cit.



An RCT in Uganda tests whether text-message reminders increase loan repayments.⁴⁵ The trial design compares a text-message reminder with two financial incentives: a lump-sum cash reward paid when the loan is completed; and a 25% reduction on the interest rate of a subsequent loan. The results suggest that each of three conditions lead to a 7 to 9% increase in the probability that a person will pay on time. However, context is likely to play an important role, as an RCT on text-message reminders in The Philippines shows simply receiving a text message has no overall effect on loan repayments.⁴⁶

Findings from New Zealand research

During the 2016 local government election in Auckland, the New Zealand Electoral Commission conducted an RCT of text-message reminders to establish their effect on increasing voter turnout. The Commission finds that people who receive a text message on election day are 4.7 percentage points more likely to vote than those who do not. The reminders have more effect on people who live in a sparsely populated area, people who are recently enrolled to vote, and people who live in an area with a high percentage of Māori residents.⁴⁷

In 2018, BSA and the Department of Corrections trialled using text messages to remind people to attend community work. The trial found that while the messages are well received, they do not have a meaningful effect on long-term attendance rates.⁴⁸ This finding may relate to the type of behaviour people are being reminded to perform, as other BSA trials consistently show reminders (both electronic reminders and letters) have positive effects on payment behaviour. In 2019, a trial of text-message reminders for unpaid fines demonstrated that, compared with people who receive no text-message reminder, people who are sent a text message are 32.2% more likely to make a payment, and 71.8% more likely to set up an arrangement to pay.⁴⁹

Factors affecting text-message reminders

Experimental research into text-message reminders primarily examines three elements: timing (best times to send them), frequency (how often to send them) and content (what the messages should say).

A meta-analysis of studies of text-message reminders, for various types of appointments in healthcare settings, identifies factors that could decrease the effectiveness of messages.⁵⁰ These include the receiver not understanding the reminder, the reminder being poorly timed, and the message not being tailored to high-risk groups.

⁴⁵ Cadena, X., & Schoar, A. (2011). Remembering to pay: reminders vs. financial incentives for loan payments. *National Bureau of Economic Research Working Paper 17020*. <https://doi.org/10.3386/w17020>

⁴⁶ Karlan, D., Morten, M., & Zinman, J. (2016). A personal touch in text messaging can improve microloan repayment. *Behavioral Science & Policy*, 1(2), pp. 25–31.

⁴⁷ Williams, M., Allpress, J., & Rootham, E. (2018). *Increasing Voter Turnout Using Behavioural Insights*. Technical report 201/006. Auckland Council. Retrieved from: <https://dpmc.govt.nz/sites/default/files/2019-02/TR2018%20006%20Increasing%20voter%20turnout%20using%20behavioural%20insights.pdf>

⁴⁸ Behavioural Science Aotearoa. (2019). *Increasing attendance at Community Work: Initial report on behavioural insights text message trial*. Unpublished.

⁴⁹ Behavioural Science Aotearoa. (n.d.). *Using Text-message Reminders to Prompt Payment of Overdue Fines*. Awaiting publication.

⁵⁰ McLean et al. (2016). Op. cit.



Message content

Research on message content has mixed results. Meta-analyses of studies on the effectiveness of text-message reminders in health contexts suggest that simple reminders of the time and location of appointments increase attendance.⁵¹ They also find weak evidence that reminder-plus messages (these messages include motivational messages about consequences or rewards) improve show-up rates compared with simple reminders.

It is less clear whether findings from health contexts extend to fine payments. For example, personalising text messages to make them more salient is commonly cited (in areas including treatment adherence, physical exercise and smoking cessation) as a factor that makes text-message reminders more effective.⁵² A UK trial by the Behavioural Insights Team finds messages that include recipients' first names are especially effective at increasing the likelihood they will pay their unpaid fines.⁵³ A UK employment trial shows that adding the receiver's name to a text-message reminder about a job fair increases the likelihood of their attendance from 10.5% to 14.8%. Personalising the message even more by adding the sender's name increases the likelihood of their attendance to 17.4%.⁵⁴

Evoking a sense of reciprocity in the message, by emphasising that the sender has already made an effort on the receiver's behalf, has also been shown to be effective. In one study on increasing attendance at recruitment events, the message, 'I've booked you a place, good luck!' was the most effective, leading to an attendance rate of 26.8%.⁵⁵ However, in a study designed to prompt reporting on income, Behavioural Economics Team Australia finds no difference between text-message reminders that include the recipient's name and those that do not.⁵⁶ Likewise, a meta-analysis of studies in health contexts finds no significant difference in the effects of more personalised or group-specific messages (for example, messages that include the recipient's name or messages tailored to their gender) compared with messages that contain uniform content sent to all recipients of text-message reminders.⁵⁷

Motivational content

Adding statements to text-message reminders that target people's motivation may also influence their behaviour. A US study of text-message reminders finds that including the consequences of not attending court, plus prompting people to plan how to get to court, is more effective than including only one or other of those elements. Receiving any of the reminders decreases 'failures to attend' (FTA) by 21%, but messages combining consequences and planning are more effective; they decrease FTA by

⁵¹ McLean, S., Gee, M., Booth, A., Salway, S., Nancarrow, S., Cobb, M., & Bhanbhro, S. (2014). *Targeting the Use of Reminders and Notifications for Uptake by Populations (TURNUP): A Systematic Review and Evidence Synthesis*, Chapter 4, Results. Southampton (UK): NIHR Journals Library.

⁵² Ibid.

⁵³ Haynes et al. (2013). Op. cit.

⁵⁴ Briscese & Tan. (2018). Op. cit.

⁵⁵ Sanders, M., & Kirkman, E. (2014). *I've Booked You a Place. Good Luck: A Field Experiment Applying Behavioural Science to Improve Attendance at High-impact Recruitment Events*. Working Paper No. 14/334. The Centre for Market and Public Organisation, Bristol, UK. Retrieved from: <http://www.bristol.ac.uk/media-library/sites/cmpo/documents/WebVersion.pdf>

⁵⁶ Behavioural Economics Team of the Australian Government. (2017). Op. cit.

⁵⁷ Orr, J. A., & King, R. J. (2015). Mobile phone SMS messages can enhance healthy behaviour: a meta-analysis of randomised controlled trials. *Health Psychology Review*, 9(4), 397–416. <https://doi.org/10.1080/17437199.2015.1022847>



26%.⁵⁸ A Belgian study shows that reminder letters significantly increase tax compliance when the reminder message emphasises the potential consequences of failing to pay and the recipient's ability to take immediate action to avoid those consequences.⁵⁹

The findings from research on message framing are inconclusive. Most research looks at framing the outcome as something the recipient can get (gain frame) or something they can lose (loss frame). For example, in a study to encourage dental hygiene, a gain-framed message (a message that emphasises the benefits of dental hygiene) is more effective than a loss-framed message (a message that highlights the negative consequences of not maintaining dental hygiene).⁶⁰ However, another trial finds the number of missed outpatient appointments is reduced by emphasising the cost to the hospital of a missed appointment.⁶¹ A third trial, which used text messages to remind people to submit income reports for government benefits, concludes the outcomes from gain-framing versus loss-framing messages are no different compared with plain reminder messages.⁶²

⁵⁸ Cooke, B., Diop, B. Z., Fishbane, A., Hayes, J., Ouss, A., & Shah, A. (2018). *Using Behavioral Science to Improve Criminal Justice Outcomes: Preventing Failures to Appear in Court*. Ideas42 & University of Chicago Crime Lab. Retrieved from: <https://www.courthousenews.com/wp-content/uploads/2018/01/crim-just-report.pdf>

⁵⁹ De Neve, J-E., Imbert, C., Spinnewijn, J., Tsankova, T., & Luts, M. (2020). How to improve tax compliance? Evidence from population-wide experiments in Belgium. *The Warwick Economics Research Paper Series, 1252*. University of Warwick, Department of Economics.

⁶⁰ McLean et al. (2014). Op. cit.

⁶¹ Behavioural Insights Unit. (2015). *Spotlight on Health Results: Behavioural Insights Short Report*. NSW Department of Premier and Cabinet. Retrieved from: <https://www.dpc.nsw.gov.au/assets/dpc-nsw-gov-au/publications/Behavioural-Insights-Unit/2246d2f134/Spotlight-on-Health-Results-Behavioural-Insights-Short-Report.pdf>

⁶² Behavioural Economics Team of the Australian Government. (2017). Op. cit.



Appendix 2 — results for each stage

Stage 1

In stage 1 we compare the effect of a simple reminder message that has no information on payment channels (the Simple Reminder message) with the status quo, which is no text-message reminder (the Control group).

We find strong evidence that any message is better than no message (see Table 7):

- **Control group:** 37.9% exhibit Any Behaviour
- **Simple Reminder:** 48.2% exhibit Any Behaviour (10.3 percentage points higher than the Control group, equivalent to a relative increase of 27.2%, $p < 0.001$)⁶³

We also look at the effects on payment behaviour from adding a link to the online payment platform to the text-message reminder (Link Only message) — 48.7% of people who received this message exhibited Any Behaviour. While the Simple Reminder and Link Only messages are both statistically different from the Control, they are not statistically different from each other (see Table 7).

Table 7. Effect of text-message reminders on payment behaviour within 7 days (stage 1)

| Message | Any Behaviour | Any Payment | Any Arrangement |
|-----------------|---------------|-------------|-----------------|
| Control | 37.9% | 34.7% | 6.7% |
| Simple Reminder | 48.2%*** | 42.8%*** | 12.1%*** |
| Link Only | 48.7%*** | 42.6%*** | 11.8%*** |

Significant difference compared to Control: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Stage 2

In stage 2 we aim to understand the effects of including information about payment channels in the text-message reminder. We compare a message including a phone number and a link to the online payment platform (Link + Phone) with the Link Only message.

People who receive a message with a phone number exhibit higher rates of Any Behaviour (52.4%) compared with people who receive the Link Only message (50.3%), but this difference is not statistically significant ($p = 0.0537$) (see Table 8).

However, we find strong evidence that including a phone number in the message increases the rate of Any Arrangement ($p < 0.001$) (arrangements to pay can only be set up over the phone):

- **Link Only:** 11% exhibit Any Arrangement
- **Link + Phone:** 14.4% exhibit Any Arrangement

⁶³ Within each stage, we use simple logistic regression to test if the differences in payment behaviour between treatment groups are greater than differences we would expect due to chance alone. In this model, we include indicators for each stage. We do not include controls for fine reason or amount.



There is no evidence that these two messages make any difference to Any Payment within seven days of receiving the message (see Table 8).

Table 8. Effect of text-message reminders on payment behaviour within 7 days (stage 2)

| Message | Any Behaviour | Any Payment | Any Arrangement |
|--------------|---------------|-------------|-----------------|
| Link Only | 50.3% | 44.7% | 11.0% |
| Link + Phone | 52.4%* | 44.6% | 14.4%*** |

* Significant difference compared to Link Only: * p<0.1, ** p<0.05, *** p<0.01

Stage 3

In stage 3 we tested the effects of framing messages — saving time or money — on payment behaviour. We compared two gain-frame messages — Link + Gain (time) and Link + Gain (time + money) — with the Link Only message. The gain-frame messages increase Any Behaviour by about 3 percentage points (p<0.05):

- **Link Only:** 44.3% exhibit Any Behaviour
- **Gain (time):** 47.4% exhibit Any Behaviour
- **Gain (time + money):** 47.1% exhibit Any Behaviour (see Table 9)

Both gain-frame messages result in significantly higher rates of Any Payment than the Link Only message (p<0.05), but they are not significantly different from each other (see Table 9).

The Gain (time + money) message results in significantly higher rates of Any Arrangement than the other messages (p<0.05):

- **Link Only:** 8% exhibit Any Arrangement
- **Gain (time):** 7.7% exhibit Any Arrangement
- **Gain (time + money):** 9.7% exhibit Any Arrangement (see Table 9)

There is no significant difference in Any Arrangement rates between the Link Only and Gain (time) messages.

Table 9. Effect of text-message reminders on payment behaviour within 7 days (stage 3)

| Message | Any Behaviour | Any Payment | Any Arrangement |
|----------------------------|---------------|-------------|-----------------|
| Link Only | 44.3% | 39.6% | 8.0% |
| Link + Gain (time) | 47.4%** | 43.1%** | 7.7% |
| Link + Gain (time + money) | 47.1%** | 42.4%** | 9.7%** |

* Significant difference compared to Link Only: * p<0.1, ** p<0.05, *** p<0.01

Stage 4

In stage 4 we use evidence from stages 1 to 3 to test combinations of elements that increase payment behaviour, such as including a phone number and a gain-frame message. We use a message that includes a phone number but no link — Phone + Gain (money) — to rule out any negative effects the



link to the online payment platform may have on behaviour. We include the Link Only message, so we can compare payment behaviour between stages.

Both messages including a phone number result in significantly higher rates of Any Behaviour than the Link Only message ($p < 0.05$):

- **Link Only:** 46.3% exhibit Any Behaviour
- **Link + Phone + Gain (money):** 49.5% exhibit Any Behaviour
- **Phone + Gain (money):** 50.4% exhibit Any Behaviour (see Table 10)

However, only the Phone + Gain (money) message has a significantly higher rate of Any Behaviour than the Link + Gain (time + money) message ($p < 0.05$).

We find that only the Phone + Gain (money) message results in a significantly higher rate of Any Payment than the Link Only message ($p < 0.05$):

- **Link Only:** 41.4% exhibit Any Payment
- **Link + Phone + Gain (money):** 43.9% exhibit Any Payment (see Table 10)

We find strong evidence that both messages that include a phone number result in higher rates of Any Arrangement (between 3.2 and 3.7 percentage points higher) than messages without a phone number ($p < 0.001$). The highest rate of Any Arrangement comes from the Phone + Gain (money) message, while the lowest rate comes from the Link Only message (see Table 10).

Across all outcome measures, there is no significant difference between results from messages without a phone number (Link Only and Link + Gain (time + money)), or between messages with a phone number (Link + Phone + Gain (money) and Phone + Gain (money)) (see Table 10).

Table 10. Effect of text-message reminders on payment behaviour within 7 days (stage 4)

| Message | Any Behaviour | Any Payment | Any Arrangement |
|-----------------------------|---------------|-------------|-----------------|
| Link Only | 46.3% | 41.4% | 9.7% |
| Link + Gain (time + money) | 47.9% | 43.2%* | 10.0% |
| Link + Phone + Gain (money) | 49.6%** | 42.8% | 13.2%*** |
| Phone + Gain (money) | 50.4%** | 43.9%** | 13.4%*** |

Significant difference compared to Link Only: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



Appendix 3 — combined analysis

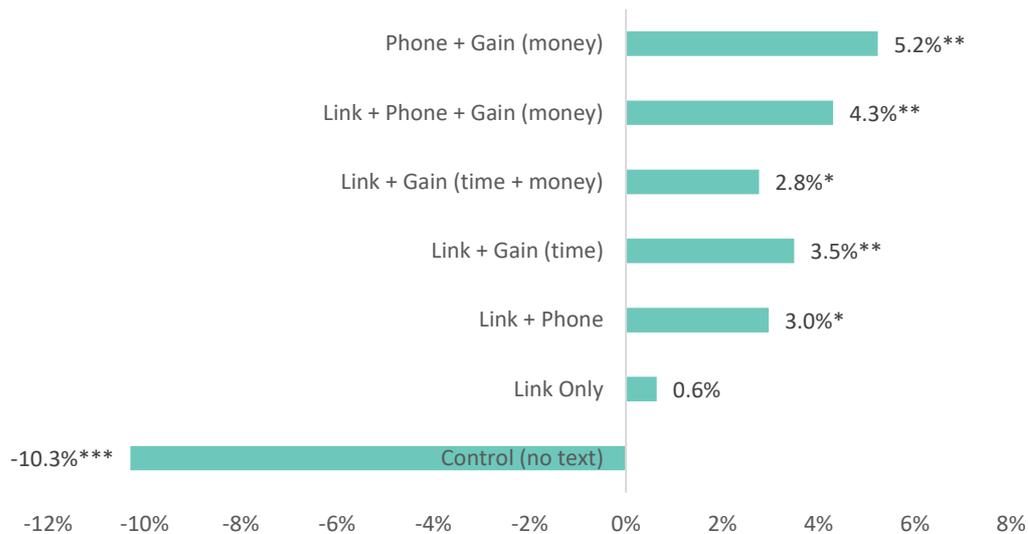
Our logistic model takes this form:

$$\frac{P(y_i)}{(1-P(y_i))} = \beta_1 NoText_i + \beta_2 LinkOnly_r + \beta_3 LinkPhone_{ist} + \beta_4 LinkTime_i + \beta_5 LinkTimeMoney_i + \beta_6 LinkPhoneMoney_i + \beta_7 PhoneMoney_i + \delta_2 + \delta_3 + \delta_4 + \mathbf{x}_i' \Pi + e_i$$

where y is the binary outcome of interest (Any Payment, Any Behaviour, Any Arrangement). The subscript i notes individual and δ_x notes indicators for each stage. This accounts for variation between stages in baseline payments. For example, the later stages took place close to Christmas, which may have reduced people’s willingness or ability to pay a fine compared with the earlier stages.

People who receive the Simple Reminder text message are the omitted category, so we are comparing the effectiveness of each text-message reminder against the Simple Reminder. Controls for gender, age, fine amount and offence type are included in the column vector \mathbf{x}_i . We convert the odds ratio on the left-hand side into percentage-point change (see Figure 12 and Figure 13).

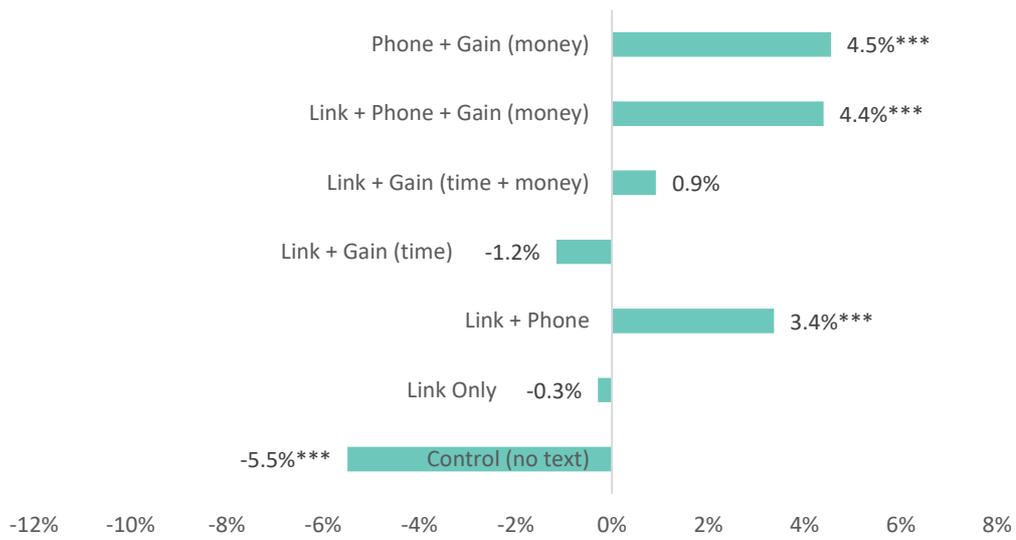
Figure 12. Percentage-point change in the rate of Any Payment for all messages compared with the Simple Reminder



Significant difference compared to Simple Reminder: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



Figure 13. Percentage-point change in the rate of Any Arrangement for all messages compared with the Simple Reminder



Significant difference compared to Simple Reminder: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



Appendix 4 — financial breakdown

| Stage | Message | Number of fines | Total owed (NZD) | Total paid within 7 days of text-message reminder (NZD) | Average paid per person within 7 days of text-message reminder (for those who paid any amount) (NZD) | Amount paid per fine within 7 days |
|-------------------------------------|-----------------------------|-----------------|--------------------|---|--|------------------------------------|
| Stage 1 | Control (no text) | 3,503 | \$770,417 | \$68,241 | \$56.07 | \$19.48 |
| | Simple Reminder | 2,931 | \$655,047 | \$82,766 | \$65.95 | \$28.24 |
| | Link Only | 2,956 | \$645,388 | \$81,987 | \$65.07 | \$27.74 |
| Stage 2 | Link Only | 3,999 | \$854,688 | \$103,606 | \$58.01 | \$25.91 |
| | Link + Phone | 4,142 | \$886,723 | \$119,713 | \$64.78 | \$28.90 |
| Stage 3 | Link Only | 3,095 | \$670,829 | \$71,626 | \$58.47 | \$23.14 |
| | Link + Gain (time) | 3,212 | \$662,247 | \$88,943 | \$64.22 | \$27.69 |
| | Link + Gain (time + money) | 3,150 | \$663,528 | \$75,972 | \$56.91 | \$24.12 |
| Stage 4 | Link Only | 4,522 | \$862,173 | \$99,960 | \$53.31 | \$22.11 |
| | Link + Gain (time + money) | 4,357 | \$840,904 | \$112,396 | \$59.72 | \$25.80 |
| | Link + Phone + Gain (money) | 4,347 | \$805,397 | \$105,042 | \$56.44 | \$24.16 |
| | Phone + Gain (money) | 4,371 | \$855,178 | \$116,331 | \$60.62 | \$26.61 |
| Any message (except Control) | | 41,082 | \$8,402,100 | \$1,058,342 | \$60.03 | \$25.76 |
| Total | | 44,585 | \$9,172,517 | \$1,126,583 | \$59.77 | \$25.27 |

These figures reflect the people included in the final analysis. The actual amount paid during the trial may, therefore, be higher.

Appendix 5 — replies to text-message reminders

During the trial, Collections staff recorded the 913 replies people sent to the text-message reminders. The replies are not representative and reflect a small percentage of the number of text messages sent. However, it is worth noting these common themes in the replies, as some provide insight into what barriers people face to resolve their fines:

- Indicating a problem that will prevent them resolving their fine online (51.3% of replies)
- Confirming they will pay or make contact (16% of replies)
- Requesting more information about the fine (14.5% of replies)
- Notifying MoJ that their address has changed (9.6% of replies)
- Querying the existence of the fine (that is, not aware of the fine) (8.5% of replies)
- Stating that they are already paying off the fine (8.2% of replies)
- Stating that they had already paid this fine or been in contact (7.6% of replies)
- Stating that the message had been sent to a wrong number (7.2% of replies)

A large proportion of the replies (51.3%) indicated something that would prevent them resolving their fine online. These issues include being unaware of the fine or not having received a Notice of Fine; being unable to use the online link or suspecting a scam; or wanting to set up an arrangement.

There are also some interesting differences in the replies during the separate stages. In stage 1 more people replied to the Simple Reminder message than to the Link Only message (3.1% compared with 2.1%, $p=0.002$). Around 40% of people who replied made a request, such as asking for more information about their fine. This highlights that people have legitimate questions that they need or want to have answered before they resolve their fines.

In stage 2, fewer people replied to text-message reminders that included a phone number than to the Link Only message (0.8% compared with 1.4%, $p=0.003$). A smaller proportion of replies to text-message reminders that included a phone number asked for more information or other actions. This suggests that people may have used the phone number for their questions.

In stage 3, some people who were not sent a phone number in their text-message reminder replied to ask for one. Five people said that they had already tried calling or resolving the fine but found the Ministry was unresponsive.

In stage 4 the number of replies to text-message reminders was also significantly lower when the reminder included a phone number.

