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ABSTRACT

Many consumers struggle to repay their credit card debt, in part because paying small portions of large bills often feels fruitless. We introduce a novel credit card payment option– repayment-by-purchase– and examine its influence on both the amount consumers' repay and their perception of progress toward reducing their debt. With typical repayment, consumers simply enter the amount they wish to pay toward their total balance– often the minimum required payment. With repayment-by-purchase, in contrast, consumers can select specific purchases (e.g., a coffee at Starbucks, a utility bill) that they wish to repay, and make payments specifically directed toward "eliminating" these purchases. Five studies reveal that repayment-by-purchase increases awareness of what is being repaid, which increases perceptions of progress toward reducing debt, which in turn encourages higher repayment. In a large field experiment, credit card customers who were given the opportunity to allocate their payment toward specific purchase categories paid 12.18% more toward their debt balance than a control group. These findings advance our practical understanding of how consumers can be encouraged to pay more toward credit card debt and offer conceptual insight into how both increased awareness and perceived goal progress enhance consumer motivation to get out of debt.

Keywords: consumer debt, goal pursuit, goal progress, financial decision-making, personal finance

"Repayment-by-Purchase" Helps Consumers to Reduce Credit Card Debt

Think of the last credit card statement you viewed, online or on paper: your eyes likely started to scan the countless purchases, which started to run together into a sea of debt, until you found the bottom of the bill, where you could choose to pay the total balance (often out of reach financially), enter a different amount (which consumers rarely do), or pay the minimum balance. Not surprisingly, many consumers choose the final option, resulting in ever-increasing debt. Indeed, credit card debt is a serious problem for many consumers: nearly half of all U.S. households report holding unsecured debt from credit cards (Federal Reserve 2014). In 2016, credit card debt rose 6.5%, resulting in a national balance of revolving credit of over 1 trillion dollars (Federal Reserve 2016). While credit card debt balances have steadily increased over the last decade, the percent of household income allocated toward repaying these debts has decreased by 17 percent (Federal Reserve 2014), and nearly 30 percent of consumers have reported failing to make a monthly payment (Federal Reserve 2013). When credit card debt goes unpaid, consumers are subjected to increased interest charges and late fees (Consumer Financial Protection Bureau 2017), as well as a reduced credit score, which may limit their future ability to make major purchases (Hayashi and Stavins 2012). Further, consumers can default on their credit card debt if they fail to make a payment for an extended period—a trend that has been increasing in recent years (Federal Reserve 2017).

Given that many consumers fail to pay off their credit card debt each month, and as a result, experience negative financial consequences, what interventions might help them avoid such damage? Imagine instead of your typical credit card statement, you were able to allocate payment toward specific purchases on a credit card bill – what we term

"repayment-by-purchase." Under this process, you could select specific purchases (e.g., a coffee at Starbucks, a utility bill) that you wished to repay, and then make payments specifically directed toward "eliminating" these purchases. We suggest that this setup could help to reduce the feeling of an endless sea of purchases, instead making consumers more aware of what they are paying off, thereby increasing their feelings that they can make progress on their debt – leading them to repay more.

Specifically, we offer a low-cost, practical means of achieving tighter coupling of consumption and repayment, thus leading consumers to become more aware of the purchases they are "paying off" (Prelec and Loewenstein 1998). Our primary result is that repayment-by-purchase results in significantly higher repayment toward debt than typical repayment. Moreover, we document the psychological processes underlying this effect: repayment-by-purchase increases awareness of the past purchases that are now being repaid, which results in greater perceived progress toward reducing the debt – leading consumers to dedicate more financial resources toward that debt.

THEORETICAL DEVELOPMENT

Credit Cards Decouple Purchase from Payment

Consumers regularly identify the costs and benefits associated with transactions and link the two together when making purchase evaluations (Prelec and Loewenstein 1998; Thaler 1985; 1999). The means by which consumers pay for goods influence how such "losses" are experienced. For instance, the physical form of cash makes salient

parting with money, resulting in tight coupling of the costs and benefits of the transaction, whereas credit cards do not feel as concrete, thereby reducing the salience of parting with money and making it easier to spend (Raghubir and Srivastava 2008; Shah et al. 2016; Thaler 1985). Indeed, a primary feature of credit cards is that they do not require the immediate payment of money, instead introducing temporal distance between the experience of consumption and payment by presenting consumers with a monthly bill (Gourville and Soman 1998; Raghubir and Srivastava 2008). The monthly bill also combines numerous purchases, drawing consumers' attention to the total balance, reducing the salience of each individual expense (Srivastava and Raghubir 2002).

While previous research has primarily investigated how decoupling payment from consumption increases the pleasure of consuming (Gourville and Soman 1998; Linville and Fischer 1991) and reduces barriers to spending (Raghubir and Srivastava 2008; Soman 2001), relatively little is known as to how these features influence debt repayment decisions. We suggest decoupling repayment from consumption reduces consumer awareness of the individual purchases that make up their debt, and in turn, reduces awareness of what is being repaid—stunting repayment motivation, and ultimately reducing the amount of money dedicated to debt repayment.

How Might Repayment and Consumption be Most Effectively Recoupled?

Prelec and Loewenstein (1998) hypothesize that tighter coupling between repayment and consumption should be preferred, as tighter coupling could evoke thoughts about the benefits being financed. For example, their argument might suggest

that credit card statements should arrive in close temporal proximity to purchases. However, there are a number of reasons why temporal or even informational recoupling may not raise motivation to repay. First, consumers have difficulty accurately recalling their past purchases, typically recalling credit card purchases by making an estimate based on some holistic extrapolation (Srivastava and Raghubir 2002). Second, while credit card bills provide information about purchases from the current payment cycle, the typical procedure of allocating a payment toward the total balance of the bill does not require consumers to evaluate these purchases. In fact, because consumers avoid negative financial information (Karlsson, Loewenstein, and Seppi 2009), they may avoid evaluating individual past expenses on their credit statement altogether, focusing instead only on the overall balance. If consumers cannot afford to pay the balance in full, they may elect to make a partial payment, such as the minimum payment required. Repayment and consumption remain decoupled, which we argue results in low awareness of past consumption, low awareness of what is being repaid, and low perceptions of progress toward reducing their debt balance, reducing motivation to repay. In contrast, we suggest that prompting consumers to allocate payment toward specific purchases on the bill (i.e., offering repayment-by-purchase), can recouple payment and consumption, resulting in increased repayment.

Why Does Recoupling Increase Payment Motivation?

We suggest three primary drivers for the positive effect of repayment-by-purchase on debt repayment. First, repayment-by-purchase should raise awareness of purchases more effectively than does typical repayment. Second, repayment-by-purchase should

increase perceptions of progress toward eliminating debt more effectively than typical repayment. Third, repayment-by-purchase partitions the debt into smaller "subintervals" across which consumers may wish to diversify their payment. However, we hypothesize that awareness and perceptions of progress will contribute to higher repayment above and beyond the effects of general diversification of payment.

Repayment-by-Purchases Increases Awareness of Purchases

Choosing among alternatives requires consumer attention (Krajbich, Armel and Rangel 2010; Krajbich et al. 2012; Krajbich and Rangel 2011; Shimojo, Simion, Shimojo, and Scheier 2003) and cognitive processing (Shiv and Fedorikhin 1999; Simonson 2005). Visual attention increases awareness of distinct attributes (Carrasco 2006), and consumers tend to prioritize distinctive attributes when making decisions. For example, in one experiment, when participants were presented with two budget categories (e.g., "charity" and "gifts") and their attention was directed toward one of the categories (e.g., "charity"), participants reported that category (e.g., "charity") as more distinct and reported greater willingness to prioritize more funds toward that category (e.g., "charity") when making a budget (Mrkva and Van Boven 2017). Therefore, because repayment-by-purchase requires consumers to choose which item(s) to repay from the purchases on the bill, consumers should become more aware of each item, making them more distinct, resulting in greater prioritization of debt repayment compared to typical repayment.

Narrow Bracketing and Perceptions of Progress Toward Reducing Debt

By creating stronger awareness of individual purchases of the bill, repayment-by-purchase narrowly brackets the debt into a collection of distinct purchases, rather than one lump sum. As a result, we suggest that when purchases are paid and removed from the bill, consumers should experience increased perceptions of progress toward reducing debt. Research suggests that narrow bracketing (i.e., prompting individuals to focus on distinct aspects of an array of information or behavior rather than the entire group as a whole) facilitates self-control when people are budgeting resources, because the narrow frame in which an outcome is evaluated provides a tangible goal (Read et al. 1999). Indeed, creating sub-goals is a form of narrow bracketing that consumers frequently use when approaching a goal that is distant or difficult to accomplish (Bagozzi and Edwards 1998; Bandura and Simon 1977). When consumers complete small, proximal goals, they receive feedback about their performance and are able to attribute a positive outcome to their effort, which generates a sense of achievement (Schunk 1982), resulting in increased motivation toward the overall goal (Bandura 1986; Zhang and Gao 2016). The completion of a discrete sub-goal also acts as a marker of progress (Gal and McShane 2012), which also helps a consumer realize the progress they have made toward their overall goal, increasing goal persistence (Cheema and Bagchi 2011; Kivetz et al. 2006).

With regard to debt repayment, previous research suggests that the overall goal of becoming debt free may be overwhelming because of its broad nature and that a more narrow and selective focus may be a preferred strategy when making repayment decisions (e.g., Amar et al. 2011; Gal and McShane 2011). For instance, consumers with multiple

debt accounts – like those who receive several credit card bills each month – tend to treat each debt account as an independent sub-goal toward the overall goal of becoming debt free (Amar et al. 2011; Brown and Lahey, 2015; Gal and McShane 2011), and typically prioritize repaying smaller debt accounts over larger accounts (Amar et al. 2011; Gal and McShane 2012; Kettle et al. 2016). The discrete event of closing out a debt account increases motivation to continue paying toward other debt accounts (Brown and Lahey 2015; Gal and McShane 2012). While this research has focused on understanding the motivational consequences of debt repayment across multiple debt accounts, our research explores how consumers can be motivated to repay when paying toward a single debt.

A typical credit card statement is composed of multiple purchases; under typical repayment schemes, the consumer must make a payment toward the aggregation of their past purchases by allocating payment toward the total balance. Because statements are composed of multiple purchases, however, a natural sub-goal (i.e., narrow bracket) may be to repay a specific purchase (e.g., a flight). Repayment-by-purchase offers exactly this possibility: a consumer selects the purchase(s) they want to allocate a payment toward, such that the purchase will be removed from the bill—allowing the consumer to "cross the purchase off" their bill. This provides a visual indicator of progress toward reducing debt, and such progress indicators are useful in motivating people to continue working toward a goal (Cheema and Bagchi 2011); moreover, when visual reminders of the output of effort is removed, persistence in tasks is reduced (Ariely, Kamenica, and Prelec 2008). Therefore, we propose that repayment-by-purchase couples repayment to consumption by increasing awareness of the items on the bill, which, in turn, leads to increased

perceptions of progress toward reducing debt – relative to when a payment is allocated across the total bill.

Repayment-by-Purchase and Partition Dependence

Finally, it is likely that at least some of the effect of repayment-by-purchase is due to partition dependence. Partition dependence refers to the tendency for consumers to make different allocations among the same set of options as a function of the way these options are grouped (Fox, Ratner, and Leib 2005). Consumers demonstrate a tendency to diversify their allocations of money and consumption choices when they are presented with multiple options (Benartzi and Thaler 2001; Read and Loewenstein 1995), and allocate more money to superordinate categories when they are broken into subintervals (Fox et al. 2005). While repayment-by-purchase may increase repayment in part due to consumers' desire to diversify their payment across "subintervals" – we suggest that heightened awareness of purchases and perception of progress toward reducing debt that result from repayment-by-purchase drive increased repayment over and above the effects of partition dependence. We compare the effects of coupling and partition dependence in our experiments, and find that repayment increases when consumers make payments toward specific purchases, but not when making payments toward generic "subintervals" (e.g., a "charge").

Could Repayment-by-Purchase Backfire?

Why might repaying by the purchase not work, or even backfire? Narrow framing can lead to less optimal behavior by drawing consumer attention to a target that is *too* narrow, stunting effort toward the overarching goal (Camerer, Babcock, Loewenstein and Thaler 1997). Therefore, purchase repayment may make consumers overly focused on eliminating a specific purchase, rather than eliminating the entire debt balance. Given consumers' tendency to prioritize repaying the smallest debt balance in a debt set (Amar et al. 2011), they may anchor toward repaying the smallest purchase of a debt balance. Eliminating a small item may create an illusion of progress without having a substantial impact on the overall debt balance. Second, purchase repayment might add complexity to the repayment decision. By allocating a payment toward specific purchases, consumers not only decide how much to repay, but also which items they wish to repay, and consumers can experience conflict when deciding among attractive options, leading them to defer choice (Dhar 1997; Iyengar and Lepper 2000; Tversky and Shafir 1992). We explore potential boundary conditions in our experiments, tracing the effectiveness of repayment-by-purchase to our overall account of when and why allowing consumers to eliminate specific debts increases overall repayment.

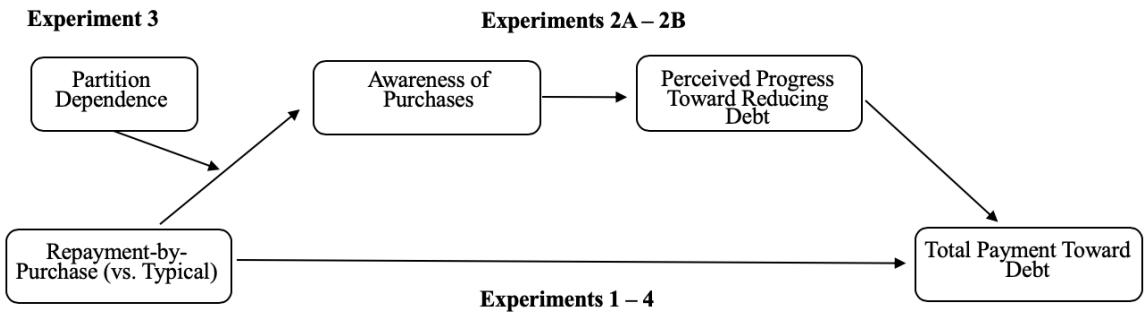
OVERVIEW OF EXPERIMENTS

In our experiments, all participants made a payment toward actual or hypothetical credit card balances, and were randomly assigned (or given the opportunity) to allocate their payment toward the total balance (typical repayment) or toward specific purchases that made up the balance (repayment-by-purchase). Experiment 1 demonstrates that

significantly more money is allocated toward debt repayment under repayment-by-purchase than typical repayment. Experiments 2a and 2b explore our proposed mechanism: consumers perceive greater progress toward reducing debt using repayment-by-purchase relative to typical repayment, because making payments toward specific purchases increases awareness of what purchases are being repaid; these effects are robust whether holding total amount repaid constant or not. Experiment 3 tests the contributing role of partition dependence; compared to mere partitioning of debt into categories, consumers paid significantly more under repayment-by-purchase, demonstrating the unique contribution of repayment-by-purchase over and above partitioning, while further demonstrating the role of awareness in increasing payment. Finally, experiment 4 tests our effect in the field. In a large field experiment with Commonwealth Bank of Australia, credit card customers who were given the opportunity to allocate their payment toward specific purchase categories paid 12.18% more toward their debt balance than customers who allocated their payment toward their total balance.

Collectively, these experiments advance our understanding of the behavioral consequences of tighter coupling of consumption and repayment, demonstrating the underlying psychology of increased awareness and perceived progress toward reducing debt in driving debt repayment motivation (see Figure 1 for our theoretical model.)

Figure 1
Theoretical Model and Overview of Studies



EXPERIMENT 1: REPAYMENT-BY-PURCHASE VERSUS TYPICAL REPAYMENT

To explore whether repayment-by-purchase would increase the total payment made toward credit card debt, we varied the method in which payments were allocated toward a hypothetical credit card debt in a 2 condition (payment method: repayment-by-purchase or typical repayment) between subjects design.

Methods

Participants and Design. One hundred eighty-one adults (41.4% female; M_{age} = 30.18, *SD* = 8.96) participated in a series of unrelated lab studies at a university in the northeastern United States in exchange for $20. We randomly assigned participants to one of two experimental conditions where we varied repayment method toward a hypothetical debt.

Procedure. Participants were asked to imagine that they used a credit card to pay for a series of expenses from January through April. Participants imagined spending $300 on a vacation to Florida and $300 to pay for a procedure for their dog at the veterinarian in January. In February, participants imagined spending $150 on clothes from a department store and $150 at the mechanic to repair a flat tire. In March, participants imagined that they spent $125 on a nice dinner at an Italian restaurant and $125 to repair

their laptop. Finally, in April, participants imagined spending $100 on a night class at a community college and $100 for the course textbook. Therefore, by May, participants learned that over the past four months they had used their credit card to make a total of 8 purchases, which had accrued an interest charge of $26 for a total debt balance of $1,376.00. Participants were then informed that after paying all of their fixed expenses (e.g., rent and bills) for the month of May, that they had $800 in discretionary money and were asked how they would allocate this money across a few variable expenses: their credit card bill, groceries, and social experiences. Participants were required to allocate all $800, but were not required to make a minimum payment toward any expense.

Payment Toward Credit Card. In the typical repayment condition (N = 90), participants allocated a payment toward the total balance of their credit card, while in the repayment-by-purchase condition (N = 91), participants allocated a payment toward the specific purchase(s) that made up their bill (see Appendix for a depiction of the repayment procedures in both conditions).

Results

Payment Toward Credit Card. Consistent with our hypothesis, participants paid significantly more toward the credit card debt in the repayment-by-purchase condition (M = $559.74, SD = $147.51), compared to those in the typical repayment condition (M = $473.50, SD = $155.02), $t(179) = 3.83$, $p < .001$, $d = .57$.

Items Repaid in the Repayment-by-Purchase Condition. We also evaluated which purchases were most likely to be repaid in the repayment-by-purchase condition.

Participants were significantly more likely to make a payment toward relatively smaller purchases (*ß* = -.25, *SE* = .09; *t*[819] = 2.74, *p* = .006) and purchases with older purchase dates (that were positioned at the top of the bill) (*ß* = -.11, *SE* = .05; *t*[819] = -2.21, *p* = .03). See the Appendix for full procedure and statistics.

Discussion

Experiment 1 provides initial evidence that consumers will pay significantly more toward debt under repayment-by-purchase, relative to typical repayment. While repayment-by-purchase did encourage participants to prioritize repaying smaller purchases, it did not appear to reduce effort toward eliminating the overall debt balance.

In this experiment all participants lacked enough money to pay the debt off in full. As 65.2% of our sample reported that they did not typically pay their credit card debt in full each month, this circumstance may be representative. However, we reran this experiment (*N* = 214; 37.1% female; M_{age} = 32.14, *SD* = 9.76), endowing participants with $1,500 (an amount that would be sufficient to repay the credit card balance in full). We replicated our findings— participants in the repayment-by-purchase condition paid significantly more (*M* = $1,136.30, *SD* = $205.93), than those in the typical repayment condition (*M* = $1,034.29, *SD* = $265.37), *t*(212) = 3.14, *p* = .002, *d* = .43.

In our next studies, we explore our proposed underlying mechanism as to why purchase repayment results in higher repayment. Specifically, in our next study we evaluate if repayment-by-purchase increases awareness over what is being repaid (Prelec and Loewenstein 1998), and in turn, perceptions of progress toward reducing debt (e.g.,

Kettle et al. 2016) relative to typical repayment, and evaluate the role of these variables in explaining increased repayment.

EXPERIMENT 2A: EXPLORING THE ROLE OF AWARENESS AND PERCEIVED PROGRESS TOWARD REDUCING DEBT ON EQUIVALENT REPAYMENT

While our initial experiment provided consistent evidence that consumers dedicate more money toward debt repayment under repayment-by-purchase than typical repayment, we now look to understand the underlying mechanism explaining this increase. We posit that repayment-by-purchase narrowly brackets the repayment decision, bringing greater awareness of what the payment is going toward. In turn, consumers should perceive greater progress toward reducing debt by eliminating an item from their bill. As in our previous studies, we vary whether participants make a payment toward purchases (repayment-by-purchase) or the total balance (typical repayment) of a credit card bill, however in this study we hold constant the amount participants pay toward debt and measure perceptions of awareness and progress toward reducing debt.

Methods

Participants and Design. Two hundred forty-seven adults (44.9% female; M_{age} = 34.13, *SD* = 10.59; 82.0% White) were recruited through Amazon's Mechanical Turk and paid a nominal fee for participating.

Procedure. Participants were presented with a credit card statement consisting of 10 purchases with a total balance of $888.14 (see Appendix). The statement included minimum payment information, including CARD Act regulations stating the implications of making a minimum payment. All participants were required to make a payment of $250. Participants were randomly assigned to one of two repayment conditions: in the typical repayment condition (N = 127) participants made a payment toward the total balance, while participants in the repayment-by-purchase condition (N = 120) made a payment toward specific purchases that made up the bill.

Participants in the repayment-by-purchase condition were instructed to click on a purchase on the credit statement that they wished to make a payment toward. Once the participant clicked on a purchase, a payment window appeared and the participant would type in the amount they wished to pay toward that item. Both full and partial payments were allowed. When the full balance of the purchase was paid, the item would disappear from the bill. When partial payments were made, the purchase remained on the bill but the balance of that purchase (and the overall total balance) updated to reflect the payment. Participants assigned to the typical repayment conditions were instructed to click on a payment box at the bottom of the credit card bill. This payment was made toward the total balance of the bill and not specific purchases.

Next, participants completed measures assessing how much their repayment procedure made them aware of what they were repaying, and their perceptions of progress toward reducing their debt balance.

Awareness. Participants indicated the extent to which they agreed that their payment made them aware of what they were paying off. Responses were recorded on a 7-point scale (ranging from 1, *not at all*, to 7, *a great deal*).

Perceived Progress Toward Reducing Debt. Participants indicated the extent to which they agreed that their payment (a) reduced their debt balance in a meaningful way, (b) significantly reduced their debt balance, and (c) made their debt balance more manageable ($\alpha = .93$). Responses were recorded on a 7-point scale (ranging from 1, *not at all*, to 7, *a great deal).*

Manipulation Check. We also administered a manipulation check regarding our repayment procedure. Participants indicated the extent to which they felt they were making a payment toward individual items or the total balance. Responses were recorded on a 7-point scale (ranging from 1, *individual items*, to 7, *the total balance*).

Results

Manipulation Check. Participants in the repayment-by-purchase condition were much more likely to report making a payment toward individual items ($M = 3.23$, $SD = 2.04$) than participants in the typical repayment condition ($M = 5.77$, $SD = 1.42$), $t(245) = 11.38$, $p < .001$, $d = 1.45$.

Awareness. We observed a significant difference in awareness by repayment condition. Participants expressed greater awareness in the repayment-by-purchase condition ($M = 6.08$, $SD = 1.01$) compared to those in the typical repayment condition ($M = 5.11$, $SD = 1.67$), $t(243) = 5.49$, $p < .001$, $d = .70$.

Perceived Progress Toward Reducing Debt. We also observed a significant difference in perceived progress toward reducing debt by repayment condition. Participants perceived greater progress with their payment in the repayment-by-purchase condition (M = 5.14, SD = 1.48) than the typical repayment condition (M = 4.45, SD = 1.57), $t(245) = 3.45$, $p < .001$, $d = .44$.

Mediation. We examined whether the higher perceived progress toward reducing debt observed in the repayment-by-purchase condition was explained by the differences we observed in awareness. To test for mediation, we used the PROCESS Macro (Hayes and Preacher 2014), using model 4. Results are shown in Table 1 and demonstrate that purchase-by-repayment increased perceptions of impact because of heightened awareness of what is being paid (95% CI, .35 to .79).

Items Repaid in the Repayment-by-Purchase Condition. We also evaluated which purchases were most likely to be repaid in the repayment-by-purchase condition. We found no effect for purchase size ($ß$ = -.02, SE = .02; $t[1198] = -1.44$, $p = .15$) and purchase date ($ß$ = -.01, SE = .01; $t[1198] = -.74$, $p = .46$), perhaps because of the lack of variability in repayment amount. However, because participants were allowed to make multiple decisions in this repayment task, we estimated the same model predicting repayment order. Participants paid relatively smaller purchases before relatively larger purchases ($ß$ = .58, SE = .10; $t[731] = 5.89$, $p < .001$), and purchases with relatively older purchase dates before items with relatively newer purchase dates ($ß$ = .55, SE = .08; $t[731] = 6.73$, $p < .001$). See the Appendix for full procedure and statistics.

Discussion

Experiment 2a provides initial support for our proposed mechanism of awareness and perceived progress toward reducing debt. When holding the total payment constant, greater perception of progress toward reducing debt was perceived in the repayment-by-purchase condition because of increased awareness of what the payment was funding. In our next experiment we explore how awareness and perceived progress influence payment when the amount paid is allowed to vary.

EXPERIMENT 2B: EXPLORING THE ROLE OF AWARENESS AND PERCEIVED PROGRESS TOWARD REDUCING DEBT ON INCREASED REPAYMENT

While experiment 2a provided initial evidence for the role of awareness and perceived progress toward reducing debt when holding the payment amount constant, in the current experiment we explore how awareness and perceived progress influence repayment when the amount can vary.

Methods

Participants and Design. Four hundred eighty-three adults (46.4% female; M_{age} = 37.62, *SD* = 12.03; 85.1% White) were recruited through Amazon's Mechanical Turk and paid a nominal fee for participating.

Procedure. We used the same procedure as experiment 2a, where participants were asked to evaluate a credit card statement consisting of 10 purchases with a total debt balance of $888.44. Unlike experiment 2a, participants were not required to make a $250 payment; instead, participants were required to make a minimum payment of $37, but could make any payment up to $500. Participants were randomly assigned to one of two repayment conditions: typical repayment (N = 241) or repayment-by-purchase (N = 242).

Next, participants completed the same measures from experiment 2a assessing how much their repayment method made them aware of what they were repaying, the perceived progress they felt their payment made toward reducing their debt and a manipulation check.

Results

Manipulation Check. Participants in the repayment-by-purchase condition were more likely to report making a payment toward individual items (M = 3.74, SD = 2.14) than participants in the typical repayment condition (M = 5.99, SD = 1.34), $t(481) = 13.84$, $p < .001$, $d = 1.26$.

Payment Toward Credit Card. Participants paid significantly more toward the credit card in the repayment-by-purchase condition (M = $264.93, SD = $150.66) compared to those in the typical repayment condition (M = $229.99, SD = $122.81), $t(481) = 2.79$, $p = .005$, $d = .25$.

Awareness. We also observed a significant difference in awareness by payment condition. Participants expressed greater awareness in the repayment-by-purchase

condition (M = 5.99, SD = 1.15) than in the typical repayment condition (M = 5.25, SD = 1.55), $t(480) = 5.99$, $p < .001$, $d = .54$.

Perceived Progress Toward Reducing Debt. We also observed a significant difference in perceived progress toward reducing debt by repayment condition. Participants perceived greater progress with their payment in the repayment-by-purchase condition (M = 4.93, SD = 1.49) than in the typical repayment condition (M = 4.45, SD = 1.29), $t(481) = 3.83$, $p < .001$, $d = .35$. Given that larger payments toward a credit card could result in increased perceptions of progress, we tested if the significant difference in perceived progress held when controlling for the total amount paid toward the credit card. In a regression predicting perceived progress from two independent variables: (a) a condition dummy variable (1 = purchase repayment, 0 = balance repayment) and (b) total paid toward credit card, we found the model to be significant, $F(2,480) = 53.99$, $p < .001$ ($R^2 = .18$). While total payment was a significant predictor of perceived progress ($ß = .39$, $p < .001$), purchase repayment also remained a significant predictor ($ß = .12$, $p = .004$).

Mediation. We examined whether higher repayment observed in the purchase repayment condition was explained by the differences we observed in awareness and perceived progress. We used the PROCESS Macro (Hayes and Preacher 2014), and we tested our mediators sequentially using model 6. Results are shown in Table 2 and demonstrate making a payment toward specific purchases (repayment-by-purchase) increases awareness of what is being paid, which in turn leads to greater perceptions of progress toward reducing debt, resulting in higher repayment (95% CI, 7.87 to 19.04).

Items Repaid in the Repayment-by-Purchase Condition. We also evaluated which purchases were most likely to be repaid in the repayment-by-purchase condition.

Participants were significantly more likely to make a payment toward relatively smaller purchases (*ß* = -.05, *SE* = .01; *t*[2392] = -4.31, *p* < .001) and toward purchases with a relatively older purchase date (*ß* = -.06, *SE* = .01; *t*[2392] = -5.45, *p* < .001). As in experiment 2a, we estimated the same model predicting repayment order. Participants paid relatively smaller purchases before relatively larger purchases (*ß* = .73, *SE* = .08; *t*[1104] = 8.81, *p* < .001), and purchases with relatively older purchase dates before items with relatively newer purchase dates (*ß* = .59, *SE* = .07; *t*[1104] = 8.42, *p* < .001). See the Appendix for full procedure and statistics.

Discussion

Experiment 2b provides additional support for the underlying mechanism of our effect: repayment-by-purchase increases awareness of what the payment is financing, in turn increasing impressions of progress made toward reducing debt, resulting in a higher overall amount paid toward the credit card debt. We also find evidence that participants allocate their payments toward smaller expenses before larger ones, and start toward the top of the bill and work their way down.

While we have found evidence suggesting higher repayments are the result of increased awareness and perceptions of progress, another explanation is that repayment-by-purchase partitions the overall debt balance, providing the consumer with a choice set in which they can allocate their payment (see Fox and Clemen 2005; Fox, Ratner, and Leib 2005). In our next study we evaluate the importance of partitioning to that of awareness by manipulating the partition to which payments are made.

EXPERIMENT 3: PARTITION DEPENDENCE AND THE ROLE OF AWARENESS

In this study we evaluate the role of awareness and payment diversification from partition dependence in predicting greater repayment. As in our previous studies, we compare repayment-by-purchase to typical repayment. In this study we introduce a second independent variable of purchase description. In the purchase description conditions participants evaluate a credit card statement as presented in our previous studies where each purchase includes the vendor name and the charge (e.g., "Macy's $120.00"). In the purchase description absent condition, participants evaluate a card statement where the vendor name is missing (e.g., "$120.00 charge"). We hypothesize that paying $120 toward a Macy's purchase will create greater awareness of what the $120 is funding relative to making an equivalent payment to a $120 charge, and this awareness will lead to greater perception of reducing debt, and in turn, a higher amount of debt repayment. If partition dependence is responsible for our effect we expect payments across the partition conditions to be constant, whereas if awareness is influencing payments we expect payments to be highest in the purchase partition.

Methods

Participants and Design. Six hundred two adults (48.9% female; M_{age} = 36.24, *SD* = 11.22; 77.7% Caucasian) were recruited through Amazon's Mechanical Turk and

paid a nominal fee. We randomly assigned participants to one of four experimental conditions where we varied payment allocation method (repayment-by-purchase versus typical repayment) and purchase description (vendor name present versus not present).

Procedure. We used the same credit card statement as experiment 2a and 2b, which included 10 purchases with a total debt balance of $888.44. Participants randomly assigned to the vendor name not present conditions evaluated the statement with a generic "charge" in place of each vendor name (see Appendix for the stimuli used in both purchase description conditions). Participants were required to make a minimum payment of $37, but could make any payment up to $500.

Next, participants completed measures assessing how much their repayment method made them aware of what they were repaying, their perceived progress toward reducing their debt, and a manipulation check.

Awareness. In this experiment we used a different measure of awareness: we presented participants with 15 different purchases (e.g., "Macys, $120") and asked if they thought each purchase was on their bill by responding *yes* (coded as 1) or *no* (coded as 0). We summed the number of correct responses as a proxy for awareness.

Perceived Progress Toward Reducing Debt. Participants indicated the extent to which they agreed that their payment (a) reduced their debt balance in a meaningful way, (b) significantly reduced their debt balance, and (c) made their debt balance more manageable ($\alpha = .93$). Responses were recorded on a 7-point scale (ranging from 1, *not at all,* to 7, *a great deal).*

Manipulation Check. We also administered a manipulation check regarding our repayment procedure. Participants indicated the extent to which they felt they were

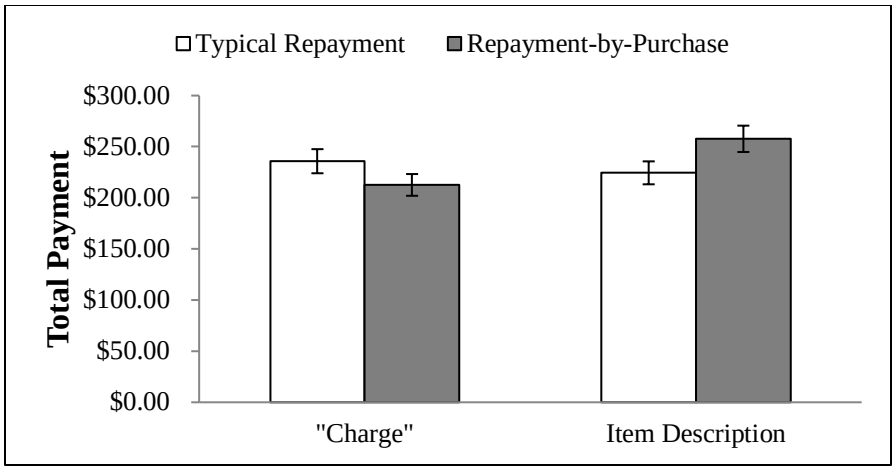
making a payment toward individual items or the total balance. Responses were recorded on a 7-point scale (ranging from 1, *individual items,* to 7, *the total balance*).

Results

Manipulation Check. Participants in the repayment-by-purchase conditions were more likely to report making a payment toward individual items (M = 3.80, SD = 2.12) than participants in the typical repayment condition (M = 5.96, SD = 1.44), $t(598) = 14.63$, $p < .001$, $d = 1.19$.

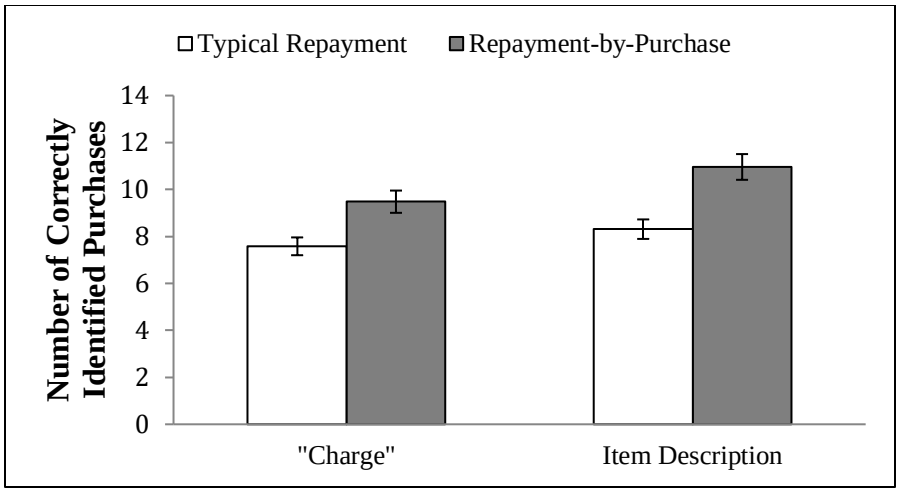
Payment Toward Credit Card. There was a non-significant main effect of payment procedure on total payment, $F(1,598) = .19$, $p = .66$. There was also a non-significant main effect for purchase description, $F(1,598) = 2.12$, $p = .15$. However, there was a significant interaction, $F(1,598) = 5.94$, $p = .02$ (see Figure 2). When participants were presented with item descriptions that included the vendor name, they paid significantly more toward debt under repayment-by-purchase (M = \$257.69, SD = \$148.10) than typical repayment (M = \$224.43, SD = \$125.73), $t(296) = 2.09$, $p = .04$, $d = .24$. However, when the vendor name was absent and replaced with a generic “charge,” participants paid the same under repayment-by-purchase (M = \$212.61, SD = \$148.75), as typical repayment (M = \$235.80, SD = \$144.38), $t(302) = 1.38$, $p = .17$, $d = .16$.

Figure 2
Credit Card Payment



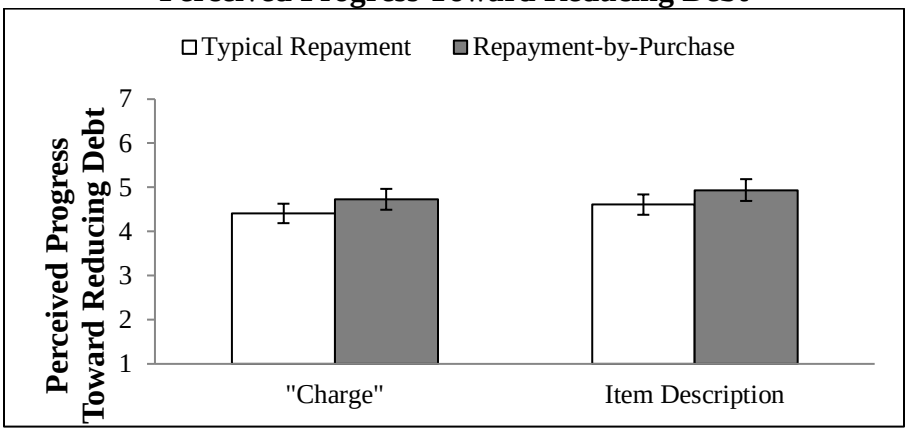
Awareness. Participants correctly recalled significantly more items under repayment-by-purchase (M = 10.20, SD = 2.75) than typical repayment (M = 7.95, SD = 2.83), $F(1,598) = 103.96$, $p < .001$. There was also a significant main effect for purchase description, $F(1,598) = 24.67$, $p < .001$, in that participants correctly recalled more items when the purchase description was included (M = 9.63, SD = 3.02), than when the description was labeled a "charge" (M = 8.55, SD = 2.90). In addition, there was a marginally significant interaction, $F(1,598) = 2.86$, $p = .09$ (Figure 3).

Figure 3
Awareness



Perceived Progress Toward Reducing Debt. Participants perceived greater progress toward reducing debt under repayment-by-purchase (M = 4.83, SD = 1.51) than under typical repayment (M = 4.51, SD = 1.61), $F(1,598) = 6.54$, $p = .01$. There was a marginally significant effect for purchase description, $F(1,598) = 2.69$, $p = .10$, but a non-significant interaction between repayment condition and purchase description, $F(1,598) = .00$, $p = .96$ (see Figure 4). Given that larger payments toward a credit card could result in increased perceptions of progress made with the payment, we tested if the significant difference in perceived progress held when controlling for the total amount paid toward the credit card. In a regression predicting perceived progress from two independent variables: (a) a condition dummy variable (1 = purchase repayment, 0 = balance repayment) and (b) total paid toward credit card, we found the model to be significant, $F(2,599) = 84.41$, $p < .001$ ($R^2 = .22$). While total payment was a significant predictor of perceived progress ($ß = .46$, $p < .001$), repayment-by-purchase remained a significant predictor ($ß = .18$, $p = .008$), suggesting that repayment-by-purchase resulted in greater perceptions of progress even when controlling for the amount paid.

Figure 4
Perceived Progress Toward Reducing Debt



Mediation. To test for mediation, we used the PROCESS Macro (Hayes and Preacher 2014), and we tested our mediators sequentially using model 6. Results are shown in Table 3 and demonstrate that when the purchase description is present, making a payment toward specific purchases (repayment-by-purchase) increases awareness of what is being paid, which in turn leads to greater perceptions of progress, resulting in higher repayments (95% CI, .19 to 13.37). However, when the item description is not present, awareness and perceived progress do not mediate (95% CI, -4.07 to 8.50).

Items Repaid in the Repayment-by-Purchase Condition. We also evaluated which purchases were most likely to be repaid in the repayment-by-purchase conditions. Participants were significantly more likely to make a payment toward relatively smaller purchases ($ß$ = -.04, SE = .01; t[3128] = -3.70, p < .001) and toward purchases with a relatively older purchase date ($ß$ = -.04, SE = .01; t[3128] = -4.76, p < .001). As in experiment 2a and 2b, we estimated the same model predicting repayment order. Participants paid relatively smaller purchases before relatively larger purchases ($ß$ = .67, SE = .07; t[1343] = 9.51, p < .001), and purchases with relatively older purchase dates

before items with relatively newer purchase dates ($ß$ = .67, SE = .06; t[1343] = 11.44, p < .001). See the Appendix for full procedure and statistics.

Discussion

Experiment 3 provides further evidence that repayment-by-purchase increases the amount of money repaid toward debt repayment. Our findings also suggest that this effect is not merely the result of partitioning debt into smaller categories. Specific purchase partitions made consumers more aware of what the payment was financing, resulting in higher perceptions of progress and in turn, higher repayment relative to other less vivid partitions. While other less vivid partitions increased awareness of what was being repaid, this awareness did not increase impressions of progress toward reducing debt, demonstrating the important role of increased awareness in our process.

EXPERIMENT 4: FIELD EXPERIMENT EVALUATING CREDIT CARD REPAYMENT DECISIONS

To test this effect in the field, we collaborated with Commonwealth Bank of Australia—a nationwide retail bank tat at the time of the experiment, had more than 1,000 branches and more than 10 million retail banking customers. This bank was the largest issuer of credit cards in its market, with over 3 million credit card holders and annual transaction volume exceeding $50 billion USD. The bank approved an

intervention that would allow customers to allocate repayment toward specific categories of purchases (e.g., 'Eating Out', 'Home'), rather than individual purchases.

Methods

Participants and Design. From June 26, 2018 through December 13, 2018, we collaborated with Commonwealth Bank of Australia to conduct a field experiment on its credit card repayment mobile application, engaging a subset of customers who were considering making a payment toward their credit card bill. A total of 272,826 customers were randomly assigned to one of two experimental conditions. Both conditions were balanced in terms of demographic characteristics and financial variables (see Table 4).

Table 4
Demographic and Financial Covariates – Full Sample (Experiment 4)

	Control (N = 136,377)	Treatment (N = 136,449)	Statistic
Demographics			
Age	40.83 (SD = 13.04)	40.89 (SD = 13.02)	$t(267{,}140) = -1.32$, $p = .19$
Gender (1 = male)	53.4%	53.5%	$\chi^2(1, N = 267{,}149) = 1.26$, $p = .53$
Customer Characteristics			
Tenure with Bank (years)	20.20 (SD = 11.34)	20.23 (SD = 11.20)	$t(267{,}110) = -.69$, $p = .48$
Credit Card Balance	\$4,598.01 (SD = \$7,168.94)	\$4,606.88 (SD = \$7,151.05)	$t(267{,}150) = -.32$, $p = .75$
Financial Wellbeing Score	48.64 (SD = 23.97)	48.51 (SD = 23.93)	$t(220{,}470) = 1.27$, $p = .20$
Account Holdings			
Checking (1 = yes)	91.4%	91.2%	$\chi^2(1, N = 267{,}150) = 1.94$, $p = .16$
Savings (1 = yes)	67.3%	67.3%	$\chi^2(1, N = 267{,}150) = .01$, $p = .90$
Personal Loan (1 = yes)	11.3%	11.1%	$\chi^2(1, N = 267{,}150) = 1.18$, $p = .27$
Home Loan (1 = yes)	27.2%	27.3%	$\chi^2(1, N = 267{,}150) = .21$, $p = .64$

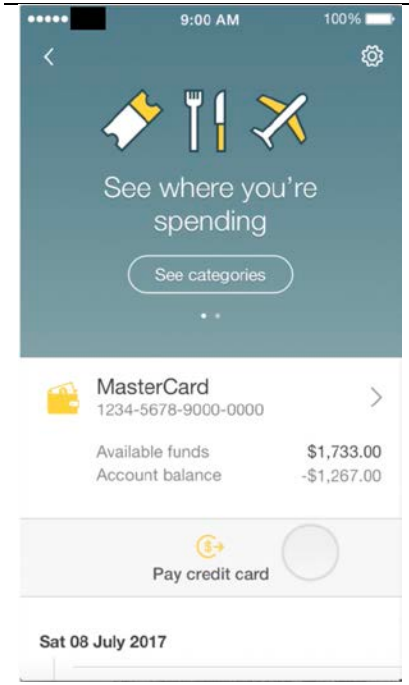
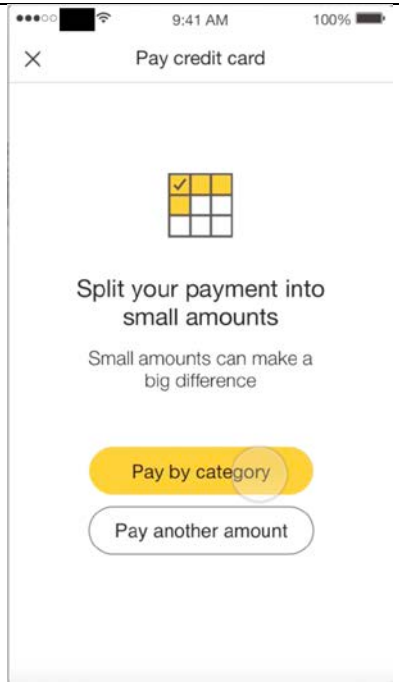
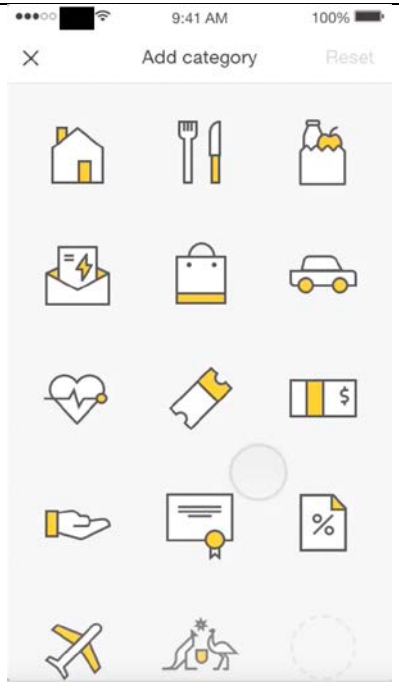
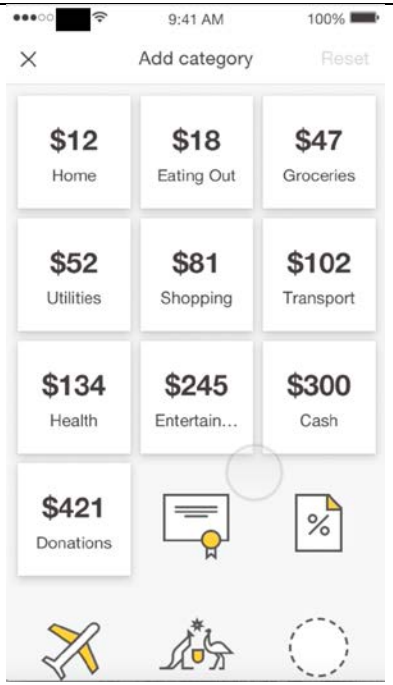
Procedure. Customers assigned to the control condition (N = 136,377), encountered standard repayment information when logging into the mobile credit card repayment application. Customers were presented with their credit card balance and had

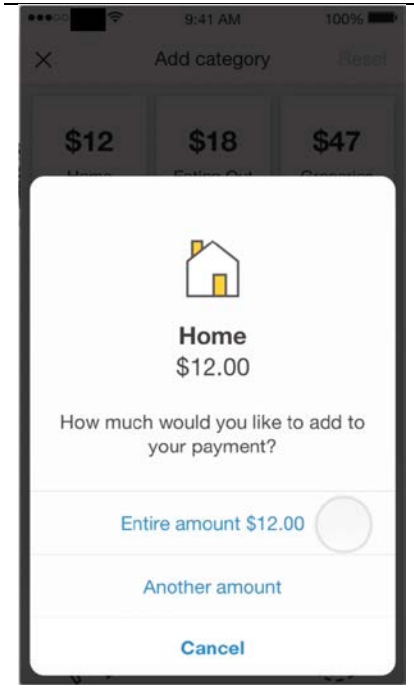
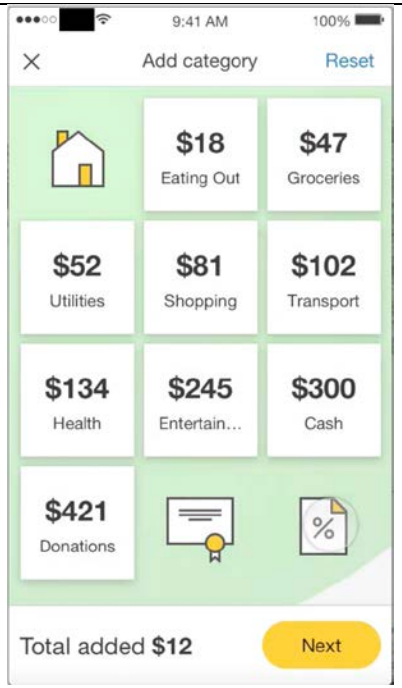
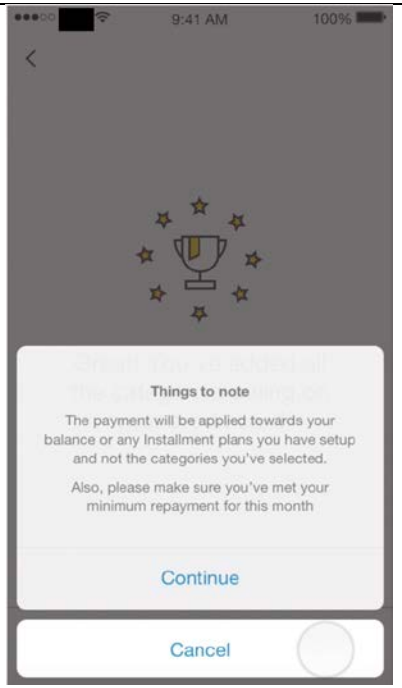
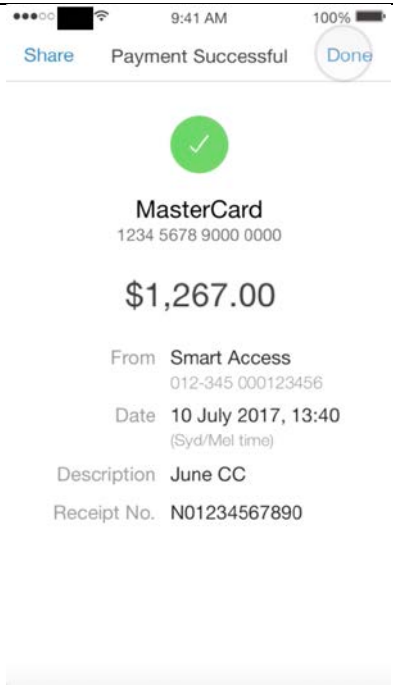
the opportunity to click a button to “Pay Credit Card.” After selecting “Pay Credit Card,” the customer could select to: (a) pay the closing (i.e., full) balance, (b) pay the minimum (i.e., 2% of the balance owing on the statement date), or (c) pay another amount. If the customer selected to pay another amount an open response window appeared for the customer to type the amount they wished to pay. Customers were required to enter a payment amount that satisfied the minimum repayment requirement.

Customers assigned to the treatment condition (N = 136,449), were also presented with their credit card balance and the opportunity to click a button to “Pay Credit Card.” The customer was then introduced to the treatment (see Table 5), which was referred to as “Pay by category” and was described as a way to “split your payments into small amounts—small amounts can make a big difference.” After selecting “Pay Credit Card”, the customer could select to: (a) pay by category, or (b) pay another amount. If the customer selected to pay another amount an open response window appeared for the customer to type the amount they wished to repay. Customers were required to enter a payment amount that satisfied the minimum repayment requirement (i.e., 2% of the balance owing on the statement date). Customers selecting to “Pay by Category” were presented with their current balance of 14 different categories of purchases (e.g., “Home”, “Eating Out”, “Groceries”, “Transport”, “Entertainment”), presented in ascending order of balance size. When a customer selected the category they wished to make a payment toward, a window appeared asking if the customer wished to pay the entire balance of the category or another amount. If the customer elected to pay the category balance in full, the icon presenting the balance would be removed from the category payment options. Customers could elect to make a partial or full payment to as

many categories as they wished, but were required to satisfy the minimum repayment requirement (see Table 5).

Table 5
Category Repayment User Experience (Experiment 4)

STEP 1	STEP 2	STEP 3	STEP 4
			
Upon login, a customer is presented with their credit card account(s) and balance(s). The customer has the option to select "Pay credit card".	The customer is introduced to the category repayment feature and by clicking 'Pay by category' they opt into the feature. If the customer selects 'Pay another amount' they are directed toward the standard repayment procedure.	Customers are presented with an icon representing 14 different categories of payments.	The customer is presented with their current balance for each category. Categories with icons present represent no current balance. Categories are presented in order of lowest to highest balance.

STEP 5	STEP 6	STEP 7	STEP 8
			
When a customer clicks a category balance they are presented with a screen summarizing the balance, providing the opportunity to pay the balance in full or another amount. If the customer clicks “Another amount” they would type in the amount they wish to repay.	If the customer elects to pay the category balance in full, the category will close. The customer will continue repaying categories as long as they wish, and will click the “Next” button when they are finished making a payment.	The customer is presented with information informing them that their payment will be applied toward the total balance or any installment plan they have set up and not to the actual categories selected. If the customer has not made a minimum payment they will be reminded of the remaining payment required.	The customer is presented with a summary of their payment.

Results

Proportion of Credit Card Bill Repaid (Intent-to-Treat). We compare the average proportion of the credit card bill repaid as a function of treatment aggregated across the entire study period. We evaluate the total proportion of the bill repaid rather than the raw payment amount because of the variance in balance size across customers. Further, the proportion of the credit card bill that was repaid was significantly skewed (Shapiro, Wilk and Chen, 1968; skewness test, $t = 224.27$, $p < .001$), therefore we Windsorize this value to control for extreme outliers (Dixon, 1960). There was a marginally significant treatment effect, $t(272{,}810) = 1.70$, $p = .087$, in that customers in the control condition ($M = 170.24\%$, $SD = 2.34$, *median* = 98.43%) paid a smaller proportion of their bill than those in the treatment condition ($M = 171.77\%$, $SD = 2.35$, *median* = 98.95%).[1] While we observe a marginal effect from our treatment, this intent-to-treat analysis includes all payments made by customers in both conditions, even customers in the treatment condition who did not opt into the treatment repayment procedure. Therefore, to more closely isolate the effect of our treatment, we compare the Windsorized proportion of the bill repaid between customers in the treatment condition who made a payment through the category repayment treatment, or through the typical repayment procedure and compare both of these groups to the control condition.

[1] A customer's closing date (the last day of their billing cycle) occurs 21 days before their payment due date. A customer may choose to pay more than their closing balance if they have a revolving balance or have made additional purchases during the 21 days between their closing date and payment due date.

Proportion of Credit Card Bill Repaid (Comparing Category Repayments to Non-Category Repayments and Control Payments). A total of 2,157 customers (1.58% of customers in the treatment condition) opted to make a repayment using the Category Repayment feature at least once during the study period, and a total of 9,344 payments were made through the category repayment feature during the study (M_{payments} = 3.16, *SD* = 4.48, median = 2). A one-way ANOVA compared the Windsorised proportion of the bill per payment that was repaid between customers in the treatment condition who made a payment through the treatment, or through the typical repayment procedure to the control condition and revealed a significant effect, $F(2, 3{,}128{,}743) = 287.00$, $p < .001$. Planned contrasts revealed that repayments made through the category repayment feature (*M* = 109.14%, SD = 1.62, median = 26.65) were significantly higher than payments that were made by customers in the treatment condition that opted to make a payment through the standard procedure (*M* = 64.06%, *SD* = 1.24, median = 9.66; Tukey HSD, $p < .001$), and participant payments made in the control condition (*M* = 63.56%, SD = 1.24, median = 9.74; Tukey HSD, $p < .001$). However, payments were also significantly higher between participants in the treatment condition who made a payment through the standard procedure and the control condition ($p = .001$), perhaps because these participants were exposed to the treatment before making their payment.

Given the opt-in nature of the treatment, we explore whether differences exist between customers who elected to make a payment through the treatment and our control condition. Unlike our intent-to-treat analysis where our two experimental conditions were balanced in terms of demographic characteristics and financial standing, we observed

significant differences between customers who opted in to our treatment and our control condition (see Table 6).

Table 6
Demographic and Financial Covariates – Control vs. Participants to who Opted into Treatment (Experiment 4)

	Control (N = 46,954)	Treatment (N = 2,157)	Statistic
Demographics			
Age	38.62 (SD = 12.58)	32.97 (SD = 11.11)	$t(2{,}417) = 22.97$, $p < .001$
Gender (1 = male)	46.8%	47.1%	$\chi^2(1, N = 49{,}111) = .25$, $p = .61$
Customer Characteristics			
Tenure with Bank (years)	17.05 (SD = 12.57)	14.36 (SD = 10.76)	$t(2{,}376) = 11.31$, $p < .001$
Credit Card Balance	$3,667.42 (SD = $6,431.79)	$1,900.26 (SD = $3,757.57)	$t(2{,}773) = 20.51$, $p < .001$
Financial Wellbeing Score	49.93 (SD = 23.81)	52.01 (SD = 23.25)	$t(2{,}141) = -3.84$, $p < .001$
Account Holdings			
Checking (1 = yes)	92.6%	96.8%	$\chi^2(1, N = 49{,}111) = 37.58$, $p < .001$
Savings (1 = yes)	70.2%	80.1%	$\chi^2(1, N = 49{,}111) = 78.02$, $p < .001$
Personal Loan (1 = yes)	11.9%	10.4%	$\chi^2(1, N = 49{,}111) = 1.83$, $p = .17$
Home Loan (1 = yes)	20.9%	12.4%	$\chi^2(1, N = 49{,}111) = 82.86$, $p < .001$

Customers who opted into the treatment were younger, had a shorter tenure with the bank, and were more likely to have a checking account and savings account as well as a home loan with the bank ($ps < .001$) compared to the control condition. Importantly, customers who opted into the treatment also had a significantly lower credit card balance (M = $1,900.26, SD = $3,757.57, median = $374.77) than control ($M$ = $3,667.41, SD = $6,431.79, median = $1,191.88), $t(2{,}773) = 20.51$, $p < .001$.

Synthetic Control. To account for selection effects as a result of the opt-in nature of the treatment we fit a microsynth model to construct a synthetic control group to the customers who have self-selected into the category repayments feature (c.f., Abadie, Diamond, & Hainmueller, 2010; Ariely & Levav, 2000; John & Norton, 2013). To construct this synthetic control, the microsynth model calculated weights for all

customers in the control group in order to match customers who opted into the treatment on all demographic and financial covariates prior to the experiment. Customers with missing outcomes, demographic or financial covariates for any month of the evaluation period were required to be omitted for analysis to apply this model. The resulting synthetic model ensured that both conditions were balanced in terms of demographic characteristics and financial variables (see Table 7).

Table 7
Demographic and Financial Covariates – Treatment vs. Synthetic Control (Experiment 4)

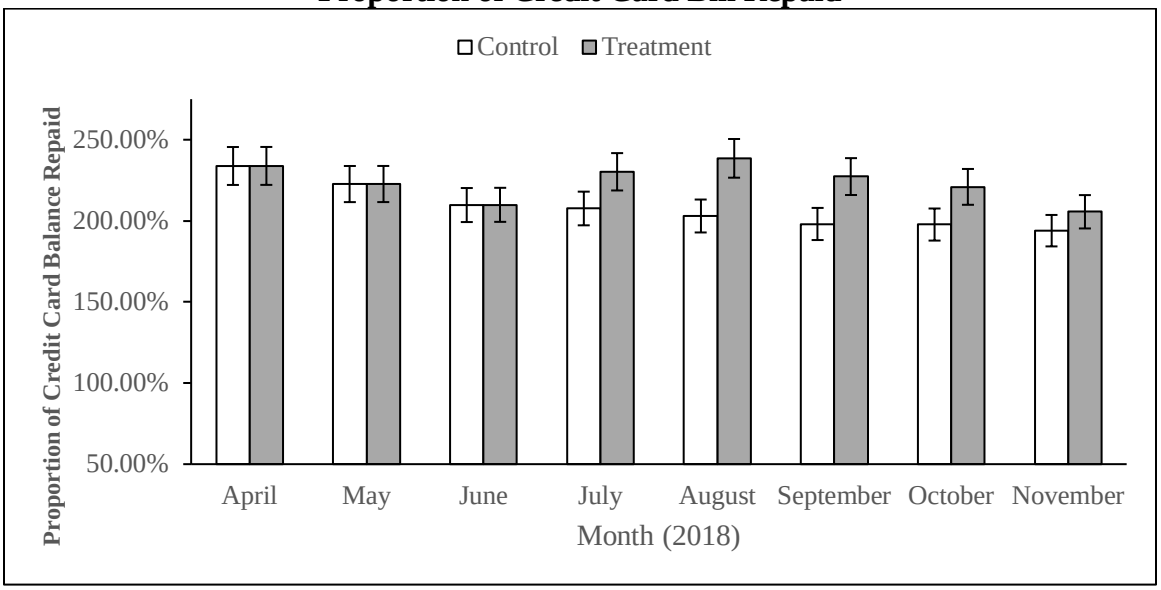
	Control (N = 1,519)	Treatment (N = 1,519)	Statistic
Demographics			
Age	32.77 (SD = 9.67)	32.77 (SD = 11.54)	$t(1621.79) = .00$, $p = .99$
Gender (1 = male)	52.9%	52.9%	$\chi^2(1, N = 3038) = .00$, $p = .99$
Customer Characteristics			
Tenure with Bank (years)	15.35 (SD = 10.07)	15.35 (SD = 11.22)	$t(1637.33) = .00$, $p = .99$
Credit Card Balance	$2,510.39 (SD = $3475.98)	$2,510.39 (SD = $4378.25)	$t(1610.96) = .00$, $p = .99$
Financial Wellbeing Score	51.84 (SD = 23.88)	51.82 (SD = 23.08)	$t(1523.01) = .03$, $p = .97$
Account Holdings			
Checking (1 = yes)	98.1%	98.1%	$\chi^2(1, N = 3038) = .00$, $p = .99$
Savings (1 = yes)	81.0%	81.0%	$\chi^2(1, N = 3038) = .00$, $p = .99$
Personal Loan (1 = yes)	10.1%	10.1%	$\chi^2(1, N = 3038) = .00$, $p = .99$
Home Loan (1 = yes)	15.3%	15.3%	$\chi^2(1, N = 3038) = .00$, $p = .99$

Proportion of Credit Card Bill Repaid (Synthetic Control). We compare the average proportion of the credit card bill repaid as a function of treatment across the entire study period. We evaluate the total proportion of the bill repaid because of the variance in balance size across customers. Further, as before, the proportion of the credit card bill that was repaid was significantly skewed (Shapiro, Wilk and Chen 1968; skewness test, $t = 162.63$, $p < .001$), therefore we Windsorize this value to control for

extreme outliers. There was a significant treatment effect, $t(1,646.46) = 4.19$, $p < .001$, in that customers in the treatment condition ($M = 202.54\%$, $SD = 2.29$, *median* = 111.84) paid a significantly larger proportion of their bill than those in the control condition ($M = 177.37\%$, $SD = 2.13$, *median* = 102.21).

Proportion of Credit Card Bill Repaid Before and During Treatment Period (Synthetic Control). To evaluate the effect of the introduction of the treatment, we construct a linear regression predicting the proportion of the credit card bill repaid during each month of the study period, as well as the three months prior to the beginning of the study. We interacted treatment condition with a dummy variable indicating the introduction of the treatment (0 = pre-treatment, 1 = treatment) and observed a significant interaction, $F(1,244,515) = 7.86$, $p < .001$, (see Figure 5). As expected, prior to the experiment there were no differences in the proportion of the bill repaid by condition ($t = 0.012$, $p = .99$). However, in the first month of the treatment (July), the category repayment condition resulted in a 10.89% increase in the proportion of the bill repaid, which was statistically significant, ($t = 2.32$, $p = .02$). In the second month of the treatment (August), the category repayment condition resulted in a 17.51% increase in the proportion of the bill repaid, a significant difference, ($t = 3.57$, $p < .001$). The treatment effect also significantly increased the proportion of the bill repaid in September (14.76% increase, $t = 3.062$, $p = .002$) and in October (11.74% increase, $t = 2.45$, $p = .01$), but did not produce a significant difference during the final month of the experiment (November; 6.00% increase, $t = 1.306$, $p = .19$). Overall, during the treatment period customers in the category repayment treatment paid 12.18% more toward their debt balance than the control group.

Figure 5
Proportion of Credit Card Bill Repaid



Note. The experiment was introduced on June 26, 2018.

Items Repaid in the Repayment-by-Purchase Condition. We also evaluated which categories were most likely to be repaid in the treatment condition. Customers were significantly more likely to make a payment toward shopping (*ß* = 3.25, *SE* = .08; *t*[140,272] = 41.32, $p < .001$), transport (*ß* = 3.04, *SE* = .08; *t*[140,272] = 38.42, $p < .001$), and entertainment (*ß* = 2.87, *SE* = .08; t[140,272] = 36.23, $p < .001$). When customers select multiple categories, we find that they are most likely to select cash, fees and interest earlier than other categories, $\chi^2(98, N = 20{,}580) = 904.79$, $p < .001$. Finally—and consistent with our earlier studies—we observe an ordering effect, in that customers selected the category that was at the top of the screen and followed by the category that was positioned second and so on, $\chi^2(84, N = 20{,}580) = 11074$, $p < .001$, and position does have a significant impact on selection order, $\chi^2(12, N = 20{,}580) = 2645.10$, $p < .001$. However, controlling for category placement, customers were still more likely to pay

cash, fees and interest charges before other purchase categories $\chi^2(14, N = 20{,}580) = 505.01$, $p < .001$.

Discussion

Experiment 4 provides critical evidence of how such a feature may influence credit card repayment decisions that are financially consequential. First, we replicate the effects observed in our earlier studies supporting the evidence that repayment-by-purchase will increase payment toward credit card debt. We were also able to evaluate how the feature could influence future spending on the credit card (see Appendix), and found that the experimental treatment also decreased future spending on the card. This finding suggests that a "pay-by-purchase" intervention may not only impact repayment decisions but also influence the decision to accumulate additional debt on the card.

While this study provides external validity to the promise of such a repayment option, the study also had limitations. First, the treatment was opt-in, and we observed a relatively low opt-in rate (~2.5%) to the treatment, and of the customers who opted into the treatment, the average customer only elected to use the feature a twice over the treatment period. The opt-in nature of the treatment also resulted in selection effects which we attempted to account for in a synthetic control model. One benefit of the opt-in nature of the experiment is that we could identify which customers are most likely to participate in such a feature—customers who were younger, had a lower tenure with the bank and had a lower credit card balance were most likely to opt-in to the feature. One possible explanation for why customers with a lower credit card balance were more likely

to opt-in to the feature is that the repayment procedure required more work (more evaluation of purchase categories, and more clicking), and customers may have preferred a more simplified repayment option for bills with many categories.

Overall, this study provided consistent effects with our controlled lab experiments, suggesting promise for repayment-by-purchase to increase the amount consumers pay toward their credit card bill.

GENERAL DISCUSSION

Across five experiments we demonstrate that consumers make significantly higher payments toward their debt when given the opportunity to make a payment toward the specific purchases (repayment-by-purchase) that make up their bill relative to making a payment toward the total balance (typical repayment). We demonstrate that consumers make larger payments toward their bill because making a payment under repayment-by-purchase increases awareness of what is being repaid, and this awareness leads to greater perceptions of progress toward reducing debt. Consumers prioritize repaying older and less expensive items on the bill.

Theoretical Implications

This research contributes to the literature on mental accounting by investigating how tighter coupling of consumption and repayment can influence repayment decisions. While previous research has primarily investigated how decoupling payment from

consumption increases the pleasure of consuming (Gourville and Soman 1998) and increases spending (e.g., Raghubir and Srivastava 2008; Soman 2001), we demonstrate that tighter coupling may increase debt repayment. We find that coupling the repayment decision with past consumption results in greater awareness of what is being repaid. Given that consumers typically have difficulty recalling past credit card expenses (e.g., Soman 2001; Srivastava and Raghubir 2002), this awareness is an important component increasing consumer motivation, as awareness of the benefits derived from the payment enhances the perception that the payment made meaningful progress toward reducing the debt.

This work also contributes to our current understanding of narrow bracketing and partition dependence, as we find repayment behavior to be most affected by a meaningful narrow bracket. When a debt was sub-bracketed with individual purchases, the connection between the payment and consumption was strongest, resulting in higher repayment. When the narrow bracket made purchases less salient (i.e., "as a charge") payment did not increase. Narrow bracketing has been found to facilitate self-control when people are budgeting resources (Read et al. 1999), but such framing has resulted in reduced and misguided consumer motivation (e.g., Camerer et al. 1997; Fishbach and Dhar 2005), our findings suggests that multiple narrow bracketed decisions may help facilitate motivation and persistence toward difficult and aversive tasks when the brackets communicate information that increases awareness of what the bracket represents.

These findings also contribute to our understanding of debt repayment as a goal pursuit. While previous research has suggested debt repayment progress is inferred through the discrete closing of a debt account (Brown and Lahey 2015; Gal and McShane

2012) and the proximity to account closure (Amar et al. 2011; Kettle et al. 2016), our results make an important contribution by demonstrating that consumer motivation can be increased by repayment-by-purchase for a single debt account. It may not be necessary to have consumers pay off an entire debt balance to increase persistence, instead bringing awareness to what the payment is funding seems to be an important predictor of impressions of progress and repayment persistence.

Further, previous work suggests that acquiring tangible rewards piece by piece motivates people to continue earning rewards relative to when they are earned in one lump sum (Zhang and Gao 2016). In debt repayment there is no tangible reward being earned, however we do find evidence that a repayment-by-purchase strategy may increase persistence and motivation. With typical repayment, consumers generally do not review their credit statements and are not able to accurately recall their past spending (Soman 2001), resulting in minimal engagement and attention dedicated to debt repayment. Indeed, our mechanism is in part simple awareness—for debts, people do not want to look at or acknowledge them, so we are using a repayment-by-purchase strategy to simply get consumers to pay attention to their debt. In contrast, the pursuit of tangible rewards does not elicit an avoidance mindset, and Zhang and Gao (2016) find no role for awareness. Therefore, we are adding another critical contribution of repayment-by-purchase effect- in a negative, avoidance-based domain, awareness plays an important role in goal motivation.

Repayment-by-purchase not only encourages the consumer to evaluate each purchase one at a time, but to also make a repayment choice in isolation, and often times to make numerous decisions that make up an overall repayment decision. Therefore, our

work also contributes to the literature on consumer choice. Previous research finds that people experience conflict when deciding among many attractive options (e.g., Iyengar and Lepper 2000), and when experiencing conflict people are more likely to defer choice (Dhar 1997). While most work has evaluated choice in the context of purchase selection, we evaluate choice under a novel circumstance where choice is typically not available: in debt repayment. In our experiments, we find no evidence of choice deferral, as demonstrated by higher repayments under repayment-by-purchase relative to those made toward the typical repayment. By evaluating repayment choice, we find some evidence of how the choice set is evaluated: consumers tend to evaluate credit statements along an alignable difference, most typically by the purchase size and purchase date. Evaluating choice sets along an alignable difference is a less cognitively demanding evaluation strategy (Gourville and Soman 2005), and the ease in evaluation may contribute to the attractiveness and success of this feature. We found mixed evidence that consumers make repayment decisions along non-alignable differences. In choice sets where there were fewer discretionary purchases we found participants to prioritize repaying non-discretionary items, however in choice sets where there were many discretionary purchases, we found participants to prioritize repaying these goods. It is unclear if consumers are more strongly influenced by purchase specific attributes, or the attributes of the choice set—in that consumers may seek to repay the dominant purchase type in a choice set.

Policy Implications

Our experiments suggest that consumers will make a larger payment toward their debt under repayment-by-purchase than typical repayment. This intervention offers an inexpensive and scalable policy option to help consumers get out of debt. In 2009, the Credit Card Accountability, Responsibility, and Disclosure (CARD) Act was enacted by the US federal government and began requiring credit card companies to present additional information on monthly credit card statements regarding the financial consequences of making a minimum payment. Specifically, the policy required that creditors notify consumers of the total time they would be indebted and the total amount of money they would spend on interest if making the minimum payment, and required lenders to report the amount a consumer would need to pay to be debt free in 3 years. Recent research has suggested that this minimum payment warning resulted in the unintended consequence of *lowering* repayments (Hershfield and Roese 2015), as consumers anchored their payments to the three-year suggested amount as they do to minimum payment information (Navarro-Martinez et al. 2011; Stewart 2009). Like the CARD Act, allowing consumers to allocate their payment toward specific purchases could be a policy intervention that would require a small change to a credit card statement, which may result in higher repayment. While our field experiment provided initial evidence that such a feature increased the proportion of the debt balance repaid, we also observed that customers with smaller debt balances were more likely to opt-into the feature. This intervention should undergo further field-testing to better understand if the unintended consequence of lowering payments would be observed for customers with larger debt balances.

Another important consideration is that of credit companies, as they might be interested in adopting this payment feature voluntarily. While creditors make money through interest charges, they may not see the financial benefits of offering this repayment feature to their customers. However, creditors also make money by serving more customers, and this feature might generate a new customer base, as a consumer may be willing to switch credit companies for this repayment feature. Indeed, in experiment 1 nearly 30 percent of our sample reported that they would be willing to leave their current credit company and switch to a creditor that offered repayment-by-purchase. In fact, JP Morgan Chase offers their credit cardholders an online feature to help manage their credit card debt that is very similar to allocating payments toward specific purchases. Their feature is available through online banking and allows a consumer to select purchase specific categories they would like to pay in full each month and also allows consumers to allocate a specific payment amount to larger items each month until the item is paid off (JP Morgan Chase 2017). Another possible solution would be to offer this repayment feature to a segmented group of consumers. For instance, a creditor may be able to generate some revenue from a delinquent consumer rather than sending their account to a collections company.

Concluding Remarks

Our research suggests that consumers will allocate a higher payment toward their credit card balance under repayment-by-purchase than typical repayment. Repayment-by-purchase results in higher payment because the consumer allocates their money toward

purchases, increasing awareness of what is being repaid, and in turn, increasing the perception progress toward reducing debt, in turn increasing repayment motivation. As consumers continue to struggle with accumulating credit card debt, we offer an inexpensive and effective solution that should help the consumers who struggle most with debt repayment.

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TABLES

Table 1
Awareness Fully Mediates the Link between Repayment-by-Purchase and Perceived Progress Toward Reducing Debt (Experiment 2a)

	Repayment-by-Purchase to Awareness (path a)	Awareness to Perceived Progress (path b)	Indirect effects of Condition on Perceived Progress (ab paths)	Total effect of Condition to Perceived Progress (path c)	Direct effect of Condition to Perceived Progress (c-prime path)	Bootstrap results: 95% CI range
Awareness	.97***	.56***	.55 (.11)	.70***	.15	[.35, .79]

***p < .001

Table 2
Awareness and Perceived Progress Toward Reducing Debt Partially Mediate the Link between Repayment-by-Purchase and Higher Repayment (Experiment 2b)

	Condition to mediator (path a)	Awareness to Perceived Progress (path b)	Mediator to Payment (path c)	Indirect effects of Condition on Payment (ab paths)	Total effect of Condition to Payment (path d)	Direct effect of Condition to Payment (d-prime path)	Bootstrap results: 95% CI range
Awareness	.74***		-20.14***	-14.94 (4.17)	34.13**	26.51*	[-24.35, -7.66]
Awareness & Perceived Progress	.74***	.36***	46.36***	12.52 (2.77)			[7.87, 18.70]
Perceived Progress	.22†		46.36***	10.04 (5.74)			[-.82, 22.14]

†p = .08
*p < .05
**p < .01
***p < .001

Table 3
Awareness and Perceived Progress Toward Reducing Debt Mediate the Link between Repayment-by-Purchase and Higher Repayment (Experiment 3)

	Condition to mediator (path a)	Awareness to Perceived Progress (path b)	Mediator to Payment (path c)	Indirect effects of Condition on Payment (ab paths)	Total effect of Condition to Payment (path d)	Direct effect of Condition to Payment (d-prime path)	Bootstrap results: 95% CI range
ITEM DESCRIPTION							
Awareness	2.65***		4.73	12.50 (7.04)	33.26*	8.60	[-.69, 26.34]
Awareness & Perceived Progress	2.65***	.06*	36.67***	5.98 (3.35)			[.19, 13.37]
Perceived Progress	.17		36.67***	6.17 (7.46)			[-7.81, 21.84]
"CHARGE"							
Awareness	1.89***		-2.07	-3.92 (5.21)	-23.19	-33.79*	[-14.85, 6.11]
Awareness & Perceived Progress	1.89***	.02	45.41***	1.96 (3.12)			[-4.07, 8.50]
Perceived Progress	.28		45.41***	12.56 (9.78)			[-5.51, 32.54]

*p < .05
**p < .01
***p < .001