

Repayment Concentration and Consumer Motivation to Get Out of Debt

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Many indebted consumers carry multiple credit cards with significant balances and do not generate enough income to pay off these balances in full at the end of each repayment period. In managing their debt over time, these consumers must decide how to allocate repayments across their debt accounts. This research examines how different monthly repayment allocations, varying from entirely concentrated into one debt account (i.e., a concentrated strategy) to equally dispersed across all debt accounts (i.e., a dispersed strategy), influence consumers' motivation to repay their debts. Evidence from a field study of indebted consumers with multiple debt accounts and from three experiments shows that concentrated (vs. dispersed) repayment strategies tend to boost consumers' motivation to become debt free, leading them to repay their debts more aggressively. Importantly, this motivating effect is most pronounced when the repayments are concentrated into consumers' smallest accounts because consumers tend to infer overall progress in debt repayment from the greatest proportional balance reduction (proportion of starting balance repaid) within any one account. These findings advance our understanding of how consumers repay their debts and help pinpoint the psychological process by which debt repayment strategies affect consumers' motivation to get out of debt.

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

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Credit card debt is a serious problem for many consumers. Recent data indicate that nearly half of US households are unable to pay their credit card bills in full each month, forcing them to carry a balance, and this segment of the population owes more than \$700 billion, an average of over \$15,000 per indebted household spread across an average of four credit cards (Federal Reserve Bank of New York 2016; US Federal Reserve 2014). Because consumers with problematic revolving debt typically have their financial liabilities distributed across multiple debt accounts for which balances cannot be paid in full (Bolton, Bloom, and Cohen 2011), they must regularly decide how to allocate debt repayments among their different accounts (Amar et al. 2011; Orman 2000; Ramsey 2003).

In this research, we examine the motivational consequences of how indebted consumers allocate repayments among their different debt accounts. Specifically, we examine

how consumers' perceptions of goal progress and motivation to make subsequent repayments are affected by whether their repayments are *concentrated* into a few debt accounts or *dispersed* across multiple accounts. We propose that when consumers hold multiple debt accounts, they generally perceive to have made more progress toward their debt management goal—and are thus more motivated to repay their remaining debt—when their debt repayments are concentrated into a single account as opposed to dispersed across multiple accounts.

We first investigate repayment strategies using a combination of a large-scale field study on credit card debt repayment and three experiments. Based on credit card transaction data on indebted consumers with multiple debt accounts, we show that the use of a concentrated (vs. dispersed) strategy influences the magnitude of subsequent debt repayment amounts in the wild. We then present evidence from three experiments that examine how and when consumers' perceptions of progress and motivation to repay their debt are enhanced versus abated by concentrating repayments into fewer accounts. Our results show that the effect of a concentrated (vs. dispersed) strategy on perceptions of goal progress and motivation to repay remaining debt is contingent on whether repayment allocations are concentrated into accounts with smaller versus larger amounts of debt.

We demonstrate that it is the proportional balance reduction (i.e., proportion of starting balance repaid) that drives the effect of a concentrated strategy on perceived goal progress and motivation—and not the magnitude of repayment amount or perceptions of proximity to goal attainment (i.e., debt remaining) as previously hypothesized (Brown and Lahey 2015; Gal and McShane 2012; Kivetz, Urminsky, and Zheng 2006). That is, our results show that the size of the account into which repayments are concentrated influences perceived progress and motivation to get out of debt. By considering both repayment and account size, we identify conditions under which a concentrated strategy is more versus less motivating than a dispersed strategy.

The present research builds on recent findings in the area of financial decision making that have focused on the motivational consequences of repayments (Amar et al. 2011; Cheema and Soman 2008; Gal and McShane 2012; Soll, Keeney, and Larrick 2013; Soman and Cheema 2002). In contrast to prior work that focuses on the discrete event of closing out a debt account (Amar et al. 2011; Gal and McShane 2012), we investigate the motivational effects of paying down accounts—how partial repayment influences perceptions of goal progress and motivation to get out of debt. This distinction is critical because for heavily indebted consumers, closing out a revolving debt account is an infrequent event (Gal and McShane 2012). Indebted consumers do, however, regularly make payments into their debt accounts and monitor their progress toward repaying those accounts. It is therefore essential, both for

theory and practice, to understand how the partial repayment of debt accounts influences the motivation of indebted consumers to repay their debt. We show that the *partial* repayment of a single account affects perceptions of goal progress and motivation, and that it is not necessary to fully pay off individual debt accounts to achieve the motivational benefits of concentrating repayments (Brown and Lahey 2015; Gal and McShane 2012; Orman 2000; Ramsey 2003). In relation to prior research, we thus provide a more nuanced investigation of how concentrated versus dispersed repayment strategies influence goal progress and motivation to repay debt. We also show that concentrated repayment strategies may, under certain circumstances, be demotivating.

THEORETICAL FRAMEWORK

Goal Pursuit

Consumers struggle to stay committed to goals that seem distant or difficult to achieve (Locke, Latham, and Erez 1988). While it is reasonable to assume that most indebted consumers strive to become debt free, unfortunately repaying all of their debts in full can seem like a daunting task (Lea, Webley, and Levine 1993). Prior research has established that it is important for consumers to perceive that they have been making progress toward attaining their end goal because the feeling of having made progress toward goal attainment leads to reinforcement and, therefore, greater subsequent motivation and goal persistence (Bandura 1991; Fishbach and Dhar 2005; Fishbach, Dhar, and Zhang 2006; Huang and Zhang 2011; Kivetz et al. 2006; Koo and Fishbach 2012; Louro, Pieters, and Zeelenberg 2007). One strategy that consumers use to increase their commitment to goals that seem distant or difficult to achieve is to create subgoals—smaller, more proximal goals established as subsets of the overarching goal (Amar et al. 2011; Bagozzi and Edwards 1998; Bandura and Simon 1977; Gollwitzer and Brandstätter 1997). Subgoals predictably influence one's motivation to pursue the overarching goal by serving as reference points or markers of absolute progress toward the overarching goal. Given that subgoals are necessarily smaller and more proximal than the overarching goal, they are by definition easier to achieve. In line with recent work (Amar et al. 2011; Gal and McShane 2012), we argue that indebted consumers with multiple debt accounts have an overarching goal of becoming debt free and treat each of these accounts as independent subgoals.

In most contexts, consumers use subgoals that are necessarily ordered. For instance, a marathon runner who sets 5-mile subgoals to complete must focus on attaining these subgoals sequentially because attaining the first 5-mile subgoal is a necessary condition for activating the second 5-mile subgoal. In this example, making progress toward

completing the first 5-mile subgoal signals that one is moving steadily toward attaining the overarching goal of completing the marathon, and thus it promotes beliefs that the goal can be attained. For the marathon runner, a 5-mile subgoal enhances his motivation in two ways: first, he is closer to completing the next 5-mile subgoal than he is to completing the marathon, and the overarching goal thus feels more attainable by focusing on the subgoal. Second, every step he takes represents proportionally greater reduction in distance to completing the 5-mile subgoal than it does to completing the marathon, and the use of the subgoal thus makes the equivalent amount of distance completed feel like greater progress (Bagozzi and Dholakia 1999; Bagozzi and Edwards 1998).

In contrast to many goals, such as marathon running or losing weight, the realm of debt repayment entails a nonordered form of multiple subgoal pursuit. For an indebted consumer with multiple debt accounts, completely paying off the first debt account is not a necessary condition for paying down the second debt account. There is no mandated order, and in most cases consumers should make payments (at least minimum payments) to each of their accounts and then decide how to allocate additional payments. Although prior research has examined motivational effects of pursuing and attaining subgoals that are ordered (Fishbach et al. 2006; Heath, Larrick, and Wu 1999; Huang and Zhang 2011) or that can be completed in fixed or flexible sequence (Jin, Huang, and Zhang 2013), less is known about how perceptions of progress toward a focal goal are influenced by the partial completion of concurrently active and simultaneously pursued nonordered subgoals.

Debt Repayment Strategies and Nonordered Subgoal Pursuit

Consumers with multiple debts have flexibility in how they choose to repay their debt accounts. To illustrate, imagine a consumer, Dave, who carries a balance of \$1500 on each of two credit cards. Suppose that Dave has just earned an extra \$300 that he wishes to use to pay down his credit card debt. One possibility for Dave is to disperse his payments equally and pay \$150 to each account. Alternatively, he could also choose to concentrate his entire \$300 payment into one account or choose any other distribution of the \$300 across his two debts. In fact, Dave's debt repayment strategy can be quantified on a continuum from fully dispersed (the repayment amount is divided evenly across all debt accounts) to fully concentrated (the full repayment amount is deposited into only one of the debt accounts). We suggest there should be consequences for Dave's subsequent motivation depending on which strategy he pursues.

Consistent with prior research, we argue that indebted consumers view each of their debt accounts as discrete

subgoals (Amar et al. 2011; Brown and Lahey 2015; Gal and McShane 2012) and that their motivation to repay their overall debt is influenced by the pursuit of these subgoals. Recent debt research suggests that successful completion of a subgoal enhances motivation to complete the overarching goal (Brown and Lahey 2015; Gal and McShane 2012) and, consistent with the goal-gradient hypothesis, that motivation increases with partial subgoal completion (Brown and Lahey 2015). Yet in its consideration of the discrete event of paying off individual debt accounts, prior research has assumed that indebted consumers pursue subgoals in a particular order, completing one and then another. In the context of ordered subgoals, it is nearly impossible to determine whether partial subgoal completion enhances perceived progress because it (1) leads to a smaller amount remaining in the subgoal or because (2) a large proportion of the subgoal has been completed. In fact, prior work has used these two competing explanations interchangeably (Gal and McShane 2012).

In the present work, we conceptualize consumers' debt repayment allocations as relating to multiple nonordered subgoals. This has ecological validity given that most indebted consumers must make at least minimum monthly payments to each of their accounts and then decide how to allocate debt repayments among their different accounts. In doing so, we are able to disentangle the following three competing hypotheses for the motivating effect of a concentrated (vs. dispersed) repayment strategy when paying down multiple debt accounts: (1) a concentrated repayment strategy involves a larger single repayment into one account (payment magnitude hypothesis), (2) a concentrated repayment strategy results in a single account having a smaller balance remaining (subgoal proximity hypothesis), and (3) a concentrated repayment strategy leads to a greater proportional reduction of the starting balance in any account (proportional balance reduction hypothesis).

The first explanation, the payment magnitude hypothesis, proposes that consumers infer overall progress toward getting out of debt from the *largest repayment* amount they make toward a single debt account. Assuming that this hypothesis is true, then it should follow that a concentrated repayment strategy should lead to similar perceived levels of goal progress irrespective of which account the large payment is applied to. For example, consumers should infer just as much progress regardless of whether they paid \$300 into a \$4500 debt account or they paid \$300 into a \$500 debt account.

The second explanation, the subgoal proximity hypothesis, suggests that consumers infer overall progress not from the repayment amount but from the smallest amount of *debt remaining* in a single account after repayments have been made (consistent with Gal and McShane 2012). If this hypothesis is true, then consumers should infer the same amount of progress if they paid \$300 into a \$500 debt account (remaining debt amount of \$200) or if they paid

\$200 into a \$400 debt account (remaining debt amount of \$200).

In the third explanation, the proportional balance reduction hypothesis, we propose that consumers infer overall progress toward getting out of debt from the largest proportion of starting balance repaid across all their debt accounts. This implies that an important moderator of the effect of a concentrated debt repayment strategy will be the starting balance of the debt account—for instance, whether the largest repayment is made to the smallest account or to the largest account. If this explanation is true, then a more concentrated repayment strategy should enhance motivation when the largest repayments are made into the debt account with the smallest starting balance, but it could reduce motivation when concentrated repayments are made into the debt account with the largest starting balance.

In what follows, we first introduce our conceptualization and operationalization of different debt repayment strategies. We then present evidence from a large-scale field study of indebted consumers' credit card transactions and from three experiments that examine the interplay between debt repayment strategy, perceived progress, and motivation. The results of the field study show that the use of a concentrated debt repayment strategy increases subsequent debt repayment success among actual indebted consumers. Experiment 1 provides evidence that repaying debts with a concentrated (vs. dispersed) strategy enhances individuals' motivation to engage in work to repay their debts. In experiment 2, we examine our proposed mediator—perceived goal progress—in the context of equal-size nonordered subgoals. In experiment 3, we examine debt repayment strategy in the context of unequal subgoals, we identify conditions under which a concentrated strategy can lead to greater and lesser perceptions of progress, and we test our competing explanations for these effects.

Characterizing Debt Repayment Strategies

We seek to clearly define and quantify consumer debt repayment strategies on a continuum from entirely dispersed (the repayment amount is divided evenly across all debt accounts) to entirely concentrated (the full repayment amount is put into only one of the debt accounts). Given that consumer debts differ widely in the total amount of debt, in the number of accounts, and in the frequency and magnitude of repayments made, an adequate empirical measure of a consumer's debt repayment strategy should not only capture the variability in repayments made, thus allowing for comparison between consumers, but also be intuitive and invariant to the total magnitude and number of repayments made by the consumer.

With these criteria in mind, we construct a measure of debt repayment strategy using the following notation. Let i denote an index of consumers in the sample ($i = 1, \dots, I$), t denote month of repayment ($t = 1, \dots, T_i$), and a index

the accounts of consumer i at time t ($a = 1, \dots, A_{it}$). Then, let x_{iat} be the amount that consumer i pays during time t (the sum of all repayments in month t) on account a , and \dot{A}_{it} be the set of consumer i 's accounts at time t that have a nonzero debt balance at the beginning of the observation period. We calculate the consumer's total credit card debt ($debt_{it}$) based on accounts in \dot{A}_{it} and characterize a consumer's *concentrated debt repayment tendency* as follows:

$$conc_{it} = \frac{\left(\sum_{k \in \dot{A}_{it}} \frac{(x_{ikt} - \dot{x}_{it})^2}{n_{\dot{A}_{it}} - 1} \right)}{\dot{x}_{it} \times \sum_{k \in \dot{A}_{it}} x_{ikt}}, \quad (1)$$

where $n_{\dot{A}_{it}}$ is the cardinality of set \dot{A}_{it} and $\dot{x}_{it} = \frac{\sum_{k \in \dot{A}_{it}} x_{ikt}}{n_{\dot{A}_{it}}}$.

The measure $conc_{it}$ is based on the *index of dispersion* (Cox and Lewis 1966). For a set of numbers, the index of dispersion is the ratio of the variance to the mean (Cox and Lewis 1966). We use the ratio of the sample variance to the sample mean and further divide it by the sum of the repayments made to obtain the number bounded between 0 and 1. In our context, $conc_{it}$ measures the degree to which the distribution of repayments made by the consumer is clustered around one amount (i.e., fully concentrated) or dispersed. The variance component captures the variability in repayments. Once normalized, $conc_{it}$ is a continuous score bounded between 0 and 1, where 0 indicates that consumer i 's debt repayments are *completely dispersed* across accounts, and 1 indicates that the consumer's debt repayment are *completely concentrated* into a single account. Having a bounded continuous measure of the debt repayment strategy not only facilitates interpretation but also allows comparisons between consumers with different debt structures. Table 1 illustrates how the measure can be used to calculate a consumer's tendency to use a more concentrated or dispersed debt repayment strategy under various conditions.

Consider, for instance, repayment scenario 1, where a consumer has five accounts that she pays down equally with \$100 going into each account. There is no variability in her repayments across the accounts, which means that she is using a *completely dispersed* debt repayment strategy, as indicated by $conc_{it} = 0$. This same score is also observed under scenario 2, where a consumer who has only two accounts pays \$50 into each. This score is in sharp contrast with repayment scenarios 6 and 7, where the consumer pays down only one of the available debt accounts, resulting in $conc_{it} = 1$.

Further building on the index of dispersion (Cox and Lewis 1966), we can also obtain a measure of consumer i 's debt structure as either highly concentrated in one debt account or more evenly distributed across all her debt accounts. Just as we measure $conc_{it}$ for consumer i 's tendency to use a concentrated rather than dispersed strategy, we use the formula in equation 1 where x_{iat} is changed to capture the amount of debt consumer i owes on account

TABLE 1
VALUES OF DEBT REPAYMENT STRATEGY ($conc_{it}$) FOR HYPOTHETICAL DEBT REPAYMENT SCENARIOS

	Payments					$conc_{it}$
	Account A	Account B	Account C	Account D	Account E	
Scenario 1	100	100	100	100	100	0.00
Scenario 2	50	50				0.00
Scenario 3	5	10	15	20	25	0.06
Scenario 4	1,000	100	100	100	100	0.41
Scenario 5	10,000	0	0	100	100	0.97
Scenario 6	0	300	0			1.00
Scenario 7	500	0	0	0	0	1.00

a at time t , rather than the amount of repayment to the account. The result is computed into a variable called $acctconc_{it}$, which we use in our analyses of the field data.

We now turn to our large-scale field study of indebted consumers' credit card transactions. In this field study, we utilize our measure of debt repayment strategy to examine whether the use of a concentrated debt repayment strategy increases subsequent debt repayment success among actual indebted consumers.

FIELD STUDY

We obtained a large proprietary data set from a financial guidance company, HelloWallet, which serves Fortune 250 companies and their employees. Access to HelloWallet's online-based financial planning program is provided to clients by their subscribing employers as a workplace benefit. HelloWallet enables clients to track their bank accounts, including both savings and debt, to create financial goals and track progress toward those goals, and to receive customized financial guidance based on their salary, benefits, and spending behavior. Presumably, indebted consumers who enroll with HelloWallet have the long-term goal of paying off their debt or at least managing their debts more effectively.

Clients securely add their financial account information to HelloWallet by providing their account identification and password information for accounts they wish to monitor. HelloWallet checks account balances and transactions daily and automatically categorizes transactions to facilitate clients' financial management. HelloWallet is able to identify trends in a client's spending, to help generate and amend personalized budgets, and to assist clients in setting retirement, education, and other saving goals. Because HelloWallet's revenue is generated from employer subscriptions, the company does not permit advertising from companies of any kind, nor does it promote—or facilitate the use of—any particular financial services or products.

The field data span the period from January 1, 2010, to December 31, 2012 (36 months), and comprise monthly credit card information including spending, repayments made, and outstanding account balances. All personally

identifying information and all transaction-level information was removed from the data before it was provided to us. The original data set contained data on a total of 5866 HelloWallet clients, with a mean of 2.5 credit card accounts. Each of the 149,387 rows in the data set represented a month's data for a particular client. The observed density of the variable total debt ($debt_{it}$) is shown in the first quadrant of figure 1. The majority of consumers had moderate levels of credit card debt, and the median total balance across all accounts in a given month was \$3885. The density for the total repayments made had a similar shape; 87.9% of consumers' monthly payments across all their credit card accounts were less than \$5000 (median = \$1047). The difference between the median balance and median repayment illustrates the revolving nature of the credit card debt, such that participants typically do not fully pay off their accounts and thus leave unpaid balances on their cards between months.

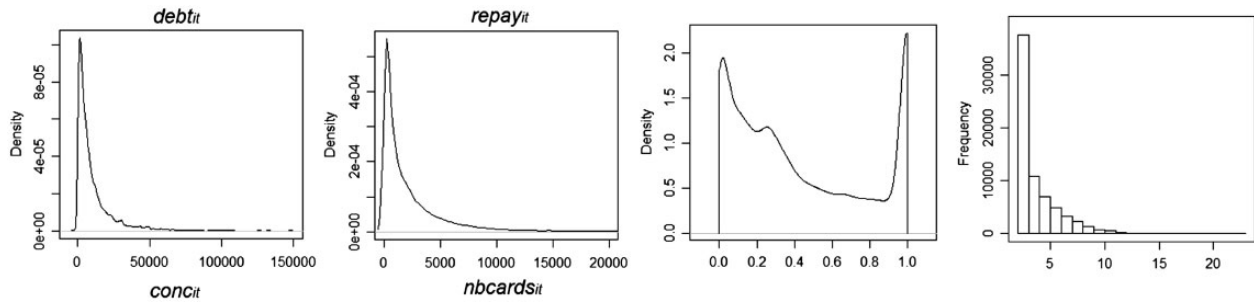
We obtained the proprietary data set for the express purpose of studying consumers with multiple credit card debts. We focused on consumers with multiple credit card accounts because the tendency for consumers to use a concentrated or dispersed strategy is unobservable when consumers have only one credit card account. Consequently we requested, and were only provided, data of HelloWallet clients with more than one credit card account and with a positive balance in a given month. We excluded observations for a client's first month of using the service because, given that clients typically did not register on the first day of the month, the first observation reflected less than a full month of information. We did not have interest rate information for the credit card accounts.

Measures

Debt Repayment Strategy. We use the measure of debt repayment strategy $conc_{it}$ as defined in equation 1. The observed density of the measure of debt repayment strategy, $conc_{it}$, shown in the third quadrant of figure 1, displays a multimodal shape. A large group of consumers used a highly concentrated repayment strategy (21% of $conc_{it}$

FIGURE 1

FIELD STUDY: DENSITY/HISTOGRAM PLOTS OF KEY VARIABLES



NOTE.— $debt_{it}$ represents consumer's i 's total credit card debt at the beginning of period t , $repay_{it}$ represents the repayments made to the cards, $nbcards_{it}$ represents the number of cards open, and $conc_{it}$ represents the tendency to repay accounts with a concentrated strategy (i.e., 1 is completely concentrated, 0 is completely dispersed).

values are between 0.9 and 1.0), whereas a similarly large group employed a very dispersed repayment strategy (23% of $conc_{it}$ values are between 0.0 and 0.1).

Other Measures and Control Variables

The structure of a consumer's debts possibly affects his or her perceived progress and subsequent motivation to repay debt. For instance, a consumer may have the vast majority of his debt in a single account and thus be constrained to a highly concentrated strategy. To account for this possibility, we also obtain a measure of consumer i 's debt structure as either heavily concentrated in one debt account or evenly distributed across all his debt accounts. Just as we measure $conc_{it}$ for consumer i 's tendency to use a concentrated rather than dispersed strategy, we use the formula in equation 1 where x_{iat} is changed to capture the amount of debt consumer i owes on account a at time t , rather than the amount of repayment to the account. The result is computed into a variable called $acctconc_{it}$, which we use as a control variable in our analyses. We also characterize the consumer's debt structure by controlling for the total number of credit cards open through $nbcards_{it}$ and for the total amount of debt owed across all accounts through $debt_{it}$.

We also include two control variables to account for factors that could influence one's repayment. First, we control for the consumer's total spending across all accounts in month t through variable $tspend_{it}$. Second, to account for the potential motivational effect of fully paying off a debt account (Gal and McShane 2012), we include the variable $acctrepaid_{it}$, defined as the number of accounts paid off in full in in month t . Although an account cannot have been closed without its balance having been brought to zero, it is possible that an account's balance is brought to zero and yet the account is not closed. This is a limitation of our

data. However, we note that in our data set we observe consumers bringing a debt account balance to zero only once every 20 months. Closing credit card accounts thus occurred very infrequently.

Model Specification and Estimation Procedure

We wish to analyze consumers' debt patterns across their credit card accounts over time, determine their tendency to engage in a concentrated versus dispersed debt repayment strategy, and examine whether that tendency has the hypothesized impact on subsequent debt repayment. We model the total debt repayments made by consumer i to all his or her credit card accounts in month t ($repay_{it}$) as follows:

$$\begin{aligned} repay_{it} = & \alpha + \beta_1 repay_{i(t-1)} + \beta_2 conc_{i(t-1)} + \beta_3 acctconc_{it} \\ & + \beta_4 debt_{it} + \beta_5 tspend_{i(t-1)} + \beta_6 nbcards_{it} \\ & + \beta_7 acctrepaid_{i(t-1)} + \nu_i + \epsilon_{it} \end{aligned}$$

where

$conc_{i(t-1)}$ is the measure of consumer i 's tendency to repay accounts with a concentrated strategy in the previous month ($t - 1$),

$acctconc_{it}$ is the measure of the concentration of consumer i 's credit card debts at the beginning of month t ,

$debt_{it}$ is the total debt at the beginning of month t for consumer i ,

$tspend_{i(t-1)}$ is the total spending by consumer i on the credit card accounts in the previous month ($t - 1$),

$nbcards_{it}$ is the number of open credit card accounts for consumer i during month t ,

$acctrepaid_{i(t-1)}$ is the number of credit card accounts for consumer i where the balance is less than or equal to zero at the beginning of month t , but greater than zero at the beginning of month ($t - 1$),

v_i are (unobserved) individual random effects, and ϵ_{it} is random error.

We include the repayments made by the consumer in the previous month ($repay_{i(t-1)}$) as a predictor to account for different initial conditions and inertia (Wooldridge 2005). Finally, indicators for month and year (not shown here for conciseness) are included to account for seasonality and period shocks that are consumer independent. We note that our random effects model assumes there are no unobserved time-invariant individual characteristics (e.g., personality traits) that may influence both the willingness to engage in a concentrated versus dispersed repayment strategy and repayment amounts—resulting in biased estimates of the effect of the repayment strategy on repayments. When evaluating our model via random effects, we found that unique unobserved errors v_i are indeed correlated with the regressors (Hausman test; $\chi^2(18) = 106.83, p < .01$) such that a random effect specification is not appropriate. As such, we instead estimated the fixed effect model whereby we use ordinary least squares to estimate the model where the individual mean across all time periods has been subtracted from each variable. Doing so allows us to investigate the effect of concentrated repayment strategies after also controlling for unobserved time-invariant individual differences. We note that our test statistics are based on robust standard errors.

Results

Consistent with our expectations, consumers who used a more concentrated repayment strategy ($conc_{i(t-1)}$) in the previous month contributed *more* to their card payments in month t ($\beta = 558.65, p < .01$). As shown in table 2, the effect of using a concentrated debt repayment strategy on subsequent repayments holds even when controlling for numerous other factors including the structure of the debt ($acctconc_{it}$) across the multiple open accounts ($\beta = -172.62, p = .57$), the total debt at the beginning of the month ($debt_{it} : \beta = 0.24, p < .01$), the total amount spent in the previous month ($tspend_{i(t-1)} : \beta = -0.29, p < .01$), and the number of open credit card accounts ($nbcards_{it} : \beta = -238.79, p = .10$). Having fully paid off one or more credit card accounts in the previous month did not have a significant impact on debt repayments ($accrepaid_{i(t-1)} : \beta = 36.61, p = .71$). Thus the field data provide preliminary evidence that consumers who used a more concentrated repayment strategy made greater debt repayments in the subsequent month than consumers who used a more dispersed strategy.

Robustness Checks

Given the dynamic nature of this monthly data, three other key methodological issues need to be addressed. First, it is possible that our effects do not hold based on

different choices of variable inclusions and exclusions. Second, the introduction of a lagged dependent variable may give rise to endogeneity and autocorrelation, both of which could affect our ability to make statements of causality. Third, just as we expect the use of a concentrated debt repayment strategy to influence repayment amounts, it is also possible that greater repayments influence the selection of which debt repayment strategy to pursue (e.g., consumers with greater repayments might be more likely to choose a concentrated debt repayment strategy).

In the technical online appendix, we address these causality concerns in multiple ways. First, we present three additional fixed effect specifications that show that our focal effect (relating a more concentrated debt repayment strategy to greater subsequent repayments) is robust to the inclusion or exclusion of various lags and exclusion of the key control variables. Second, we used Arellano and Bond’s (1991) differentiated generalized method of moments procedure to obtain consistent parameter estimates and asymptotic covariance. In addition to providing an alternative way of eliminating concerns for bias due to individual-specific but time-invariant omitted variables, this procedure uses second period lags of the key endogenous variables as a valid instrumental variable and helps protect against key threats to causal inference. Across these additional analyses, we continue to find strong evidence for the effect of making concentrated repayments on the magnitude of the repayments made in the following period.

Discussion

An analysis of a large data set from an online consumer financial guidance service indicates that the use of a concentrated debt repayment strategy increases subsequent debt repayment in the field. The indebted consumers in our field data varied widely in their choice of debt repayment strategy. We found that consumers who used a more concentrated debt repayment strategy made larger debt

TABLE 2

EFFECT OF CONCENTRATED DEBT REPAYMENT STRATEGY ($conc_{i(t-1)}$) ON SUBSEQUENT DEBT REPAYMENTS ($repay_{it}$)

Variable	Coefficient	t-stat	Sig.
<i>Lagged</i>			
1. $repay_{i(t-1)}$	0.23	3.78	***
<i>Repayment strategy</i>			
2. $conc_{i(t-1)}$	558.65	3.75	***
<i>Control variables</i>			
4. $acctconc_{it}$	-172.62	-0.57	
5. $debt_{it}$	0.24	4.99	***
7. $tspend_{i(t-1)}$	-0.29	-4.64	***
8. $nbcards_{it}$	-238.79	-1.53	*
9. $accrepaid_{i(t-1)}$	36.61	0.37	
N (Consumers)	8699 (1094)		
R^2	0.1418		

* $p < .10$, ** $p < .05$, *** $p < .01$.

repayments in the subsequent period, and that the effect is robust to varying levels of indebtedness and repayment amounts. We also found that having fully paid off a credit card account in the previous month did not impact debt repayments. We thus find evidence that the *partial* repayment of a single account affects motivation, and that the discrete event of paying off an account is not necessary for a concentrated debt repayment strategy to be effective.

Our key hypothesis is that a concentrated debt repayment strategy is more motivating than a dispersed strategy when consumers make their large payments to their smallest accounts because doing so leads to the greatest proportional balance reduction over any account. Unfortunately, the nature of the field data does not allow us to investigate whether the repayments made each month have been made to the largest or smallest accounts. Our unit of analysis is at the consumer-month level, but because repayments and spending all occur at different times in the month, we are not able to assess whether the effect of a concentrated debt repayment strategy is magnified (diminished) when the consumers make their large repayments to smaller (larger) accounts. As such, it is possible that the observed effect of concentrated debt repayment strategies on subsequent repayments occurs through consumers naturally making their large repayments to their smallest accounts.

Because we do not have interest rate data, we acknowledge it is also possible that the observed effect is a consequence of, or influenced by, different interest rates across debt accounts. For instance, consumers with greater differences in the interest rate across debt accounts may be more likely to concentrate repayments into the account with the highest interest rate. Such possibilities cannot be controlled in the field data, but they are tackled directly through random assignment and by keeping interest rates constant across debt accounts in experiments 1, 2, and 3. Importantly, the field data allow us to show that to the extent that consumers choose their repayment strategies and their allocations to their debt accounts, a more concentrated debt repayment strategy leads to greater subsequent repayments.

We next turn to our experimental evidence that allows us not only to replicate the effect in a more controlled setting, but also to investigate the underlying psychological mechanism. Specifically, in experiment 1 we investigate whether the effect of concentrating, versus dispersing, repayments increases consumers' motivation to work. In experiment 2, we show that a concentrated debt repayment strategy leads to greater perceptions of progress and motivation to get out of debt. Finally, in experiment 3, we show that the effect of concentrated repayments on perceived progress depends on the relative size of the accounts into which repayments are concentrated—the proportional balance reduction hypothesis.

EXPERIMENT 1

Experiment 1 was designed to examine the effect of different debt repayment strategies on consumers' willingness to work (harder) to repay their debt. Participants began the experiment in debt (divided into five accounts of equal value), which they had to pay off before they were able to keep any earnings. They could influence the outcome (i.e., repay their debt faster) by increasing the amount of work they put in. Using a between-subjects design, we manipulated whether participants' earnings were allocated to repay their debt accounts with a dispersed strategy (earnings allocated equally across accounts) or a concentrated strategy (earnings allocated to one account at a time). Our key dependent variable was the amount of work output produced during a set period of time.

Method

Participants and Design. A total of 65 undergraduate students (34 female) at Boston University participated in the experiment for partial course credit and an output-based monetary reward. A single factor (debt repayment strategy: dispersed, concentrated) between-subjects design was used.

Procedure. Participants completed the experiment in a laboratory, seated in a private cubicle equipped with a desktop computer. They were informed that they would begin the experiment with a debt of \$5 (500 cents), divided equally into five debt accounts (labeled "Account A" through "Account E"). No interest was charged on these debt accounts. Participants were randomly assigned to one of two repayment strategies: (1) "pay off the accounts equally, such that your earnings in each period will be distributed equally among the accounts until they are paid off," or (2) "pay off the accounts one at a time, such that Account A (the first debt account) will be paid off first, followed by Account B, and so on." Using our example in table 1, the dispersed strategy maps onto scenario 1, where $conc_{it} = 0$, and the concentrated strategy maps onto scenario 7, where $conc_{it} = 1$.

Participants were told that they would first have to work to repay their debt so they could earn extra money toward the end of the experiment. Consistent with prior motivation research that measured work effort through experimental tasks (Ackerman et al. 2009; Buehler, Griffin, and MacDonald 1997; Deci 1971; Heath et al. 1999; Locke and Latham 1990; Zhang and Huang 2010), we asked participants to work by generating as many English words (minimum length of four letters) as possible from a string of eight letters in one minute. Following a one minute practice period, participants were given the opportunity to work for nine periods of one minute each. In each work period, a different letter string was presented. Approximately

40 unique words could be generated from each letter string.

Participants earned 30 cents for each correct response. They received immediate feedback after each response as to whether or not it was a correct word. After each work period, they were shown the amount of money they had earned and were updated on how their debt accounts were repaid. Participants were required to pass a test of understanding before beginning the experiment to ensure that they understood how they would pay off their debt. Upon completion of the experiment, participants were paid in cash.

Results

Preliminary Analyses. None of the results in any of the experiments were qualified by participant gender or age. Therefore, we do not discuss these variables further.

Work Output. For each of the nine work periods, we analyzed work output in terms of the number of words generated. Because of the count nature of the dependent variable, we analyzed work output with a mixed-effects Poisson model (with crossed random effects for participant and letter string) that included an independent variable for the manipulation of debt repayment strategy, as well as two covariates—one for work period (to account for skill acquisition over time) and one indicating the number of years a participant had resided in North America (to account for differences in English language skills). This analysis reveals a significant effect for debt repayment strategy ($\beta = 0.13$, $t(431) = 2.01$, $p < .05$), which indicates that participants in the concentrated repayment condition produced significantly greater work output ($M_{\text{conc}} = 3.53$ words) than those in the dispersed repayment condition ($M_{\text{disp}} = 2.97$ words). As a consequence, participants in the concentrated repayment condition fully repaid their debt almost a full period more quickly than those in the dispersed repayment condition ($M_{\text{conc}} = 4.32$ periods; $M_{\text{disp}} = 5.10$ periods, $F(1, 63) = 3.79$, $p = .06$).

Supplemental Analysis. To gain deeper insight into this phenomenon, we also examined the effect of debt repayment strategy on work output for only the 350 work periods our participants began in debt. To account for the different number of times each participant appeared in this data set, we weighted each observation to be the inverse ($1/n$) of the number of times the participant appeared in the data set. This analysis reveals a marginally significant effect for debt repayment strategy ($\beta = 0.12$, $t(263) = 1.71$, $p = .08$). Our results are consistent with Brown and Lahey (2015), in that the faster the participants were able to complete the subgoals, the harder they worked at getting out of debt.

Discussion

The results of experiment 1 show that being randomly assigned to a concentrated (vs. dispersed) debt repayment strategy caused individuals to work harder and led them to repay their debt 15% more quickly. In experiment 2, we turn our attention to our hypothesized psychological mechanism underlying this effect: perceived progress toward the overarching goal of getting out of debt.

EXPERIMENT 2

Experiment 2 was designed to examine the effect of a concentrated (vs. dispersed) debt repayment strategy on perceived goal progress and motivation to repay debt in the context of equal-size debt accounts. Using a between-subjects design, we independently manipulated the amount of the prior repayment and how that amount was allocated across their debt accounts (table 3). Consistent with our findings in experiment 1, our key prediction was that consumers who had been assigned to a more concentrated debt repayment strategy would report that they had made greater progress toward repaying their debt and indicate greater motivation to get out of debt. We also predicted that perceived progress would mediate the effect of the debt repayment strategy on motivation and that these effects would be strong across different prior repayment amounts.

Method

Participants and Design. We recruited a total of 328 American participants (133 females) via Mechanical Turk (MTurk). They completed the experiment remotely in exchange for a payment of 50 cents. A 2 (repayment amount: \$500, \$1000) \times 8 (debt repayment strategy; table 3) between-subjects design was used. In our analyses, we use the measure $conc_{it}$ that (although manipulated) is treated like a continuous predictor as shown in table 3.

Procedure. We presented participants with a hypothetical debt repayment scenario: they were informed that they had five credit card accounts, each with a starting balance of \$1200, and their goal was to repay all of their credit card debt. We allocated equal amounts to each of the debt accounts because we wanted to control for account size and focus specifically on the differences in proportional balance reduction within accounts as a function of repayment amount.

Participants were told that in the past month they had repaid some of the debt: we independently manipulated the amount of the repayment (\$500 or \$1000) and how that amount was allocated across their five debt accounts (table 3). Using 10 point scales, participants were asked to indicate how much progress they perceived they had made toward repaying their overall debt (1 = Very little progress;

TABLE 3
DEBT REPAYMENT SCENARIOS IN EXPERIMENT 2

Scenario	Payments					Manipulated factors		Dependent measures	
	Acct A	Acct B	Acct C	Acct D	Acct E	Strategy(<i>conc_{it}</i>)	Repayment amount	Goal progress	Motivation
1	100	100	100	100	100	0.00	500	3.72	8.17
2	200	75	75	75	75	0.06	500	3.94	7.94
3	200	100	100	100	0	0.10	500	4.13	7.87
4	300	50	50	50	50	0.25	500	4.37	8.48
5	300	100	100	0	0	0.30	500	4.46	7.88
6	400	25	25	25	25	0.56	500	4.52	8.00
7	400	100	0	0	0	0.60	500	3.65	8.35
8	500	0	0	0	0	1.00	500	5.50	8.81
9	200	200	200	200	200	0.00	1000	5.33	8.11
10	400	150	150	150	150	0.06	1000	5.10	8.20
11	400	200	200	200	0	0.10	1000	5.86	7.67
12	600	100	100	100	100	0.25	1000	5.70	8.52
13	600	200	200	0	0	0.30	1000	4.79	7.37
14	800	50	50	50	50	0.56	1000	5.46	8.29
15	800	200	0	0	0	0.60	1000	4.79	8.64
16	1000	0	0	0	0	1.00	1000	6.12	8.28

NOTE.—All accounts had a starting balance of \$1200.

10 = A lot of progress), how difficult they thought it would be to pay off the entire debt in a year (1 = Not difficult at all; 10 = Very difficult), how motivated they would be to work at paying off the debt (1 = Not at all motivated; 10 = Very motivated), and how close they felt they were to paying off all of their debt (1 = Not close at all; 10 = Very close).

Results

Perceived Goal Progress. We analyzed perceived goal progress ($M = 4.87$, $SD = 2.47$) using a linear regression model, with repayment amount (\$500 = -1; \$1000 = 1), debt repayment strategy (*conc_{it}*), and their interaction as independent variables. A significant effect for repayment amount emerges ($\beta = 0.68$, $t(324) = 3.41$, $p < .01$), indicating that participants perceived greater progress if they had repaid \$1000 as compared to having repaid \$500. As predicted, debt repayment strategy also has a significant effect ($\beta = 0.85$, $t(324) = 2.00$, $p < .05$) such that consumers who had been assigned to a more concentrated strategy perceived greater progress toward their goal of getting out of debt. The repayment amount \times repayment strategy interaction is not significant ($\beta = -0.33$, $t(324) = -0.78$, $p > .40$), suggesting that the effect of a concentrated debt repayment strategy on perceived goal progress is strong across different amounts of prior repayment.

Motivation. We analyzed motivation to repay debt ($M = 8.15$, $SD = 1.76$) using a linear regression model, with repayment amount (\$500 = -1; \$1000 = 1), debt repayment strategy (*seq_{it}*), and their interaction as independent variables. A marginally significant effect for debt repayment strategy emerges ($\beta = 0.52$, $t(324) = 1.66$,

$p < .10$), such that participants who had been assigned to a more concentrated strategy reported a greater level of motivation to repay their debt. Neither the effect for repayment amount ($\beta = 0.02$, $t(324) = 0.12$, $p > .90$) nor the repayment amount \times debt repayment strategy interaction ($\beta = -0.13$, $t(324) = -0.42$, $p > .60$) are significant.

Mediation Analysis. Our theoretical account posits that a concentrated debt repayment strategy enhances perceived goal progress, which in turn enhances motivation to repay debt. To test this account, we conducted a mediation analysis, following the steps outlined by Preacher, Rucker, and Hayes (2007).

First, we examined the *a* path from the predictor (debt repayment strategy) to the proposed mediator (perceived goal progress). The model included repayment amount, debt repayment strategy, and their interaction as independent variables. Consistent with the analysis reported earlier, debt repayment strategy affects perceived goal progress ($\beta = 0.85$, $t(324) = 2.00$, $p < .05$). Next, we investigated the effect of the proposed mediator (perceived goal progress) on the dependent variable (motivation). The model included repayment amount, debt repayment strategy, their interaction, and the proposed mediator (perceived goal progress) as independent variables. The only model term to emerge as significant in this model is the effect of perceived goal progress ($\beta = 0.13$, $t(323) = 3.34$, $p < .01$). The conditional direct effect of debt repayment strategy on motivation is not significant ($\beta = 0.41$, $t(323) = 1.31$, $p = .19$). To provide more direct evidence of how perceived progress mediates the relationship between debt repayment strategy and motivation, we also obtained the indirect effect and a 95% bias-corrected and accelerated bootstrap confidence interval (CI) using

10,000 samples (mediation package in R; Imai et al. 2010). The interval for the indirect effect excludes 0, indicating a significant mediating effect (0.11, 95% CI [0.0022, 0.2685]).

Perceived Goal Proximity and Difficulty. Using linear regressions, we also analyzed the effects of repayment amount and debt repayment strategy on participants' perception of how close they were to getting out of debt ($M = 4.16$, $SD = 1.98$) and on how difficult they thought it would be to get out of debt ($M = 6.24$, $SD = 2.54$). As expected, consumers who had repaid \$1000 (as compared to \$500) in total felt closer to getting out of debt ($\beta = 0.34$, $t(324) = 3.23$, $p < .01$) and perceived it would be less difficult to get out of debt ($\beta = -0.37$, $t(324) = 2.66$, $p < .01$). However, debt repayment strategy does not have a significant influence on how close participants felt to getting out of debt ($\beta = 0.09$, $t(324) = 0.81$, $p > .40$) or how difficult they thought it would be to get out of debt ($\beta = -0.20$, $t(324) = -1.40$, $p > .15$).

Additional Controls for Perceived Goal Proximity and Difficulty. We also performed a parallel mediation analysis with perceived goal progress, goal proximity, and difficulty included as mediators. Motivation was not predicted by either perceived difficulty ($\beta = -0.03$, $t(321) = -0.59$, $p = .56$) or goal proximity ($\beta = 0.03$, $t(321) = 0.48$, $p = .63$), and neither conditional indirect effect approaches significance. Critically, even while controlling for goal proximity and perceived difficulty, we find evidence for a significant positive effect of perceived goal progress on motivation ($\beta = 0.12$, $t(321) = 2.50$, $p = .01$), and for a significant conditional indirect effect of a concentrated repayment strategy on motivation through perceived goal progress ($\beta = 0.10$, 95% CI [0.0001, 0.2439]). Thus although a concentrated debt repayment strategy may bring a consumer closer to paying off an individual debt account, our results suggest that the motivating effect of a concentrated strategy is explained by perceived goal progress, rather than by feelings of goal proximity as previously espoused (Gal and McShane 2012; Kivetz et al. 2006).

Discussion

The results of experiment 2 show that a concentrated (as compared to dispersed) debt repayment strategy enhances perceived progress toward the goal of getting out of debt, which in turn increases consumers' motivation to repay their debt. Experiment 2 has an important limitation. Because consumers began with five equal debt accounts, the effect of a concentrated repayment strategy on perceived goal progress could be due to the fact that concentrating large repayments (vs. dispersing smaller repayments) leaves smaller amounts remaining in particular debt accounts, which would be consistent with an explanation suggesting that a concentrated repayment strategy increases subgoal proximity. Although we measured

perceptions of goal proximity and failed to find that a more concentrated debt repayment strategy leads to greater perceptions of goal proximity (as predicted by prior research), it remains possible that a concentrated debt repayment strategy could still enhance motivation by bringing consumers closer to paying off an individual account. We address this limitation in experiment 3 by independently manipulating debt repayment strategy and the smallest amount remaining in any debt account. If the underlying mechanism is that perceived progress is inferred from the greatest proportional balance reduction of any single account, the efficacy of a concentrated (vs. dispersed) strategy should depend on whether the repayments are concentrated into smaller (vs. larger) debt accounts. If our theoretical account is correct, we should find that the use of a concentrated repayment strategy can lead to *lower* perceptions of progress (as compared to the use of a dispersed repayment strategy) when the large repayments are focused on large debt accounts.

EXPERIMENT 3

The objective of experiment 3 is twofold. First, we wish to provide evidence that the effect of a concentrated debt repayment strategy on perceived progress occurs because consumers using a concentrated strategy perceive greater proportional balance reduction. Second, we wish to rule out two alternative explanations for why consumers perceive greater progress when making concentrated repayments.

As stated previously, one alternative explanation (the payment magnitude hypothesis) is that consumers infer overall progress toward getting out of debt from the *largest repayment amount* they make toward a single debt account. In experiments 1 and 2 the use of a concentrated strategy is confounded with applying a large repayment, and thus it could be that progress is not inferred from the greatest proportional balance reduction, but rather from the magnitude of the largest repayment. Assuming that the payment magnitude hypothesis is true, then the use of concentrated repayments should lead to similar perceptions of progress (with respect to the overarching goal) irrespective of which account a large payment is applied to. For example, if perceived progress is determined by the magnitude of the repayment amount, consumers should infer just as much progress if they paid \$300 into a \$4500 debt account or if they paid \$300 into a \$500 debt account. To disentangle these two theoretical accounts, in experiment 3 we manipulate whether the largest repayment is made to the largest or to the smallest account.

Second, the subgoal proximity hypothesis predicts that consumers infer progress from the smallest amount of *debt remaining* in a single account after repayments have been made. Overall goal progress is thus inferred from

one's proximity to attaining the subgoal of closing any single account. In the preceding experiments, the debt account with the smallest balance remaining (after repayment) had a lower balance under a concentrated debt repayment strategy than under a dispersed strategy. Consequently, it could be that consumers' perceptions of goal progress under a concentrated debt repayment strategy are not determined by the proportional balance reduction, but rather because concentrated debt repayment strategies lead to debt structures that leave an account closer to zero. If this alternative explanation is true, then consumers should infer the same amount of progress if they paid \$300 into a \$500 debt account as they would if they paid \$200 into a \$400 debt account because each repayment strategy would result in an account with \$200 of remaining debt. To disentangle the subgoal proximity hypothesis from proportional balance reduction hypothesis, in experiment 3 we manipulate whether the account balances are equal at the start of the repayment period or at the end of the repayment period.

The proportional balance reduction hypothesis that we propose predicts consumers will perceive to have made more progress toward their goal of getting out of debt and will be more motivated to get out of debt when they see greater proportional balance reduction in any one account. This hypothesis implies that an important moderator of the effect of a concentrated debt repayment strategy will be whether the largest repayment is made to the smallest account or to the largest account. Consistent with our results thus far, when concentrated repayments are made into the debt account with the smallest outstanding balance, we expect that a concentrated (vs. dispersed) debt repayment strategy will lead to greater perceptions of progress. However, when concentrated repayments are made into the debt account with the largest outstanding balance, we expect that a concentrated (vs. dispersed) debt repayment strategy will lead to lower perceptions of progress.

Method

Participants and Design. We recruited total of 593 American participants (221 female) from the MTurk website. A 2 (*debt repayment strategy*: concentrated ($conc_{it} = 1$) versus dispersed ($conc_{it} = 0.11$) \times 2 (*repayment focus*: largest debt account vs. smallest debt account) \times 2 (*account balances equal*: start vs. end) between-subjects design was used. This design results in eight debt repayment conditions (table 4). In these eight conditions, we independently manipulate whether the debt repayment strategy is more concentrated or dispersed, whether the repayments are concentrated into the larger debt account or the smaller debt account, and whether the account balances are equal at the start of the repayment period or at the end of the repayment period.

The payment magnitude hypothesis is that consumers make progress inferences based on the amount of the largest repayment. If that is true, then conditions in which the largest possible repayment is made (\$300, other repayment \$0; Conditions 1, 4, 5, 8; $conc_{it} = 1$) should lead to greater perceived progress than conditions in which the largest repayment is smaller (\$200, other repayment \$100; conditions 2, 3, 6, 7; $conc_{it} = 0.11$). Under this explanation, perceived progress should not vary as a function of whether these largest repayments are made to the accounts with the largest remaining debt or to the accounts with the smallest remaining debt. Given our three manipulated factors, we would find support for this alternative explanation if we observe a significant effect for debt repayment strategy ($conc_{it}$) on perceived progress but fail to find evidence for any significant higher-order interactions.

The second competing explanation, the subgoal proximity hypothesis, is that consumers infer overall progress from the smallest remaining amount of debt they have in any single debt account. If this explanation is true, perceived progress will vary across conditions 1, 2, 3, and 4 (smallest remaining account balances are \$500, \$400, \$300, and \$200, respectively), with the lowest level of

TABLE 4

DEBT REPAYMENT SCENARIOS IN EXPERIMENT 3

Condition	Start balances		Payments		End balances		Manipulated factors				
	Acct A	Acct B	Acct A	Acct B	Acct A	Acct B	Strategy ($conc_{it}$)	Repayment focus	Account balances equal	Perceived progress	Motivation
1	4500	500	300	0	4200	500	1.0	Largest acct	Start	3.46	8.00
2	4500	500	200	100	4300	400	0.1	Largest acct	Start	3.77	7.90
3	4500	500	100	200	4400	300	0.1	Smallest acct	Start	4.00	7.97
4	4500	500	0	300	4500	200	1.0	Smallest acct	Start	4.33	7.69
5	4650	350	300	0	4150	350	1.0	Largest acct	End	3.33	7.85
6	4550	450	200	100	4150	350	0.1	Largest acct	End	3.96	7.89
7	4450	550	100	200	4150	350	0.1	Smallest acct	End	3.94	7.92
8	4350	650	0	300	4150	350	1.0	Smallest acct	End	4.62	8.11

perceived progress in condition 1 and the greatest level of perceived progress in condition 4 because in these conditions the smallest remaining account balance (at the end of the repayments) decreases from condition 1 through 4. Further, if this explanation is true, perceived progress should not vary across conditions 5, 6, 7, and 8 because in these conditions the smallest remaining account balances are identical (\$350). Given our manipulated factors, we would find support for this alternative explanation if we observe a significant three-way debt repayment strategy \times repayment focus \times account balances equal interaction, with a significant debt repayment strategy \times repayment focus interaction in conditions 1 to 4 (account balances equal: start), but no significant interactions or simple effects across conditions 5 to 8 (account balances equal: end).

Our proposed theoretical explanation, the proportional balance reduction hypothesis, predicts that perceptions of progress should be greatest when the largest repayment of the concentrated debt repayment strategy is applied to the smallest debt account because this creates the greatest proportional balance reduction in a single account. Specifically, we expect that when the *largest repayment* is applied to the account with the *smallest account balance* (from \$350 to \$650, depending on the condition), participants under a concentrated debt repayment strategy (paying \$300 to their smallest debt account, \$0 to their largest account) will perceive *greater* progress than participants under a dispersed debt repayment strategy (paying \$200 to their smallest debt account, \$100 to their largest account). In contrast, when the *largest repayment* is applied to the account with the *largest account balance* (from \$4350 to \$4650, depending on the scenario), participants under a concentrated debt repayment strategy (paying \$300 to their largest debt account, \$0 to their smallest account) will perceive *less* progress than participants under a dispersed debt repayment strategy (paying \$200 to their largest debt account, \$100 to their smallest account). If our account is true, we should find a significant debt repayment strategy \times repayment focus interaction but no other significant interactions.

Procedure. We presented participants with a hypothetical debt repayment scenario. They were told they had two credit card accounts and that their goal was to repay all of their credit card debt in a year. Consumers in all conditions began with a total of \$5000 in debt and were told that they had made a total of \$300 in repayments in the current period. Participants were then presented one of the eight scenarios based on the design in table 4. Afterward, using the same 10 point scales as in experiment 2, participants were asked to indicate how much progress they perceived they had made toward repaying their overall debt, how difficult they thought it would be to pay off the entire debt in a year, how motivated they would be to work at paying off the debt, and how close they felt they were to paying off all of their debt.

Results

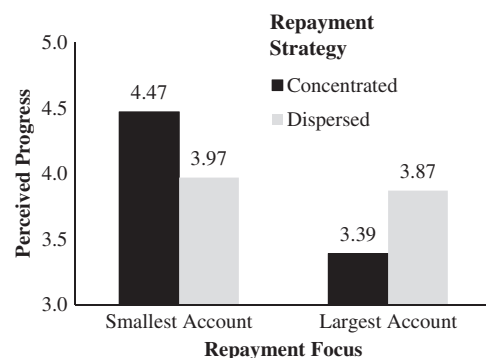
In our analyses, each factor was contrast coded ($-1, 1$). The descriptive results are summarized in table 4.

Perceived Goal Progress. We analyzed perceived goal progress ($M = 3.94$, $SD = 2.05$) using a linear regression model, with debt repayment strategy, repayment focus, account balances equal, and all two-way and three-way interactions as independent variables. The three-way debt repayment strategy \times repayment focus \times account balances equal interaction is not significant ($\beta = -0.16$, $t(585) = -0.47$, $p = .33$). The only significant two-way interaction to emerge is the debt repayment strategy \times repayment focus interaction ($\beta = -0.49$, $t(585) = -2.93$, $p < .01$). All other interactions are not significant (all p 's $> .60$), and the effect for account balances equal is also not significant ($\beta = 0.09$, $t(585) = 0.55$, $p = .58$).

We then explored the interaction between repayment focus and debt repayment strategy. Simple effects reveal that when the largest payment is applied to the smallest debt account, participants assigned to a concentrated debt repayment strategy perceived greater progress ($M = 4.47$) than those assigned to a dispersed strategy ($M = 3.97$, $\beta = 0.25$, $t(585) = 2.16$, $p < .05$). In sharp contrast, when the largest payment is applied to the largest debt account, participants assigned to concentrated debt repayment strategy perceived less progress ($M = 3.39$) than those assigned to a dispersed strategy ($M = 3.87$, $\beta = -0.24$, $t(585) = -1.98$, $p < .05$). Thus in support of our explanation, a concentrated debt repayment strategy enhances perceived progress when it implies that the greatest proportional balance reduction is larger, but decreases perceived progress when it implies the greatest proportional balance reduction is smaller. As seen in table 4, these conclusions are not conditional on how close the smallest account is to being fully repaid after repayments have been made. This result is illustrated in figure 2.

FIGURE 2

EXPERIMENT 3: EFFECT OF DEBT REPAYMENT STRATEGY AND REPAYMENT FOCUS ON PERCEIVED PROGRESS



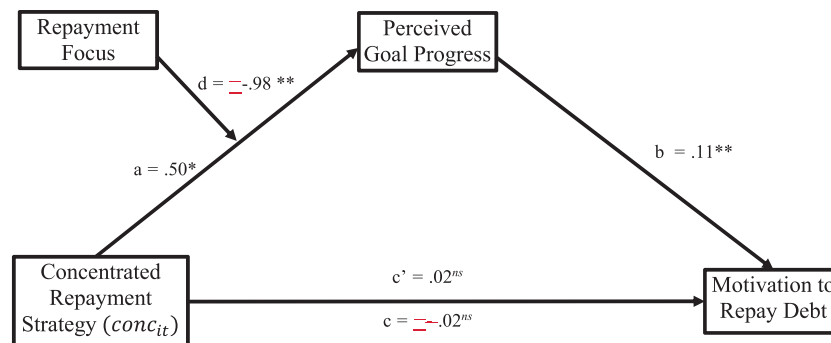
Process Evidence. Given that the effect of a concentrated debt repayment strategy on perceived progress depends on repayment focus, we then examined if the positive (negative) effect of a concentrated debt repayment strategy on small (large) debt account also explained differences in motivation to get out of debt. To do so, we analyzed participants' motivation to repay their debt via a moderated mediation model in which the focal mediator is perceived progress, the focal predictor is debt repayment strategy (concentrated vs. dispersed), the moderator is repayment focus (smallest vs. largest debt account), and account balances equal is a covariate. The results are presented in figure 3. To ease interpretation, we recoded debt repayment strategy (dispersed: 0, concentrated: 1) and repayment focus (small: 0, large: 1).

We find that a concentrated debt repayment strategy has opposite effects on motivation, both through perceived progress, depending on the focus of the repayment. Specifically, as shown earlier, a concentrated debt repayment strategy increases perceived progress when the largest repayment is focused on the smallest account ($\beta = 0.50$, $t(585) = 2.16$, $p < .05$). Given the positive relationship between perceived progress and motivation ($\beta = 0.11$, $t(589) = 3.22$, $p < .01$), we find that the conditional indirect effect is positive ($\beta = 0.50 \times 0.11 = 0.06$) and its CI excludes 0 (95% CI [0.0053, 0.1451]). In contrast, a concentrated debt repayment strategy decreases perceived progress when the largest repayment is focused on the largest account ($\beta = -0.48$, $t(585) = -1.98$, $p < .05$). We find that the conditional indirect effect is negative ($\beta = -0.48 \times 0.11 = -0.05$) and that its CI also excludes

0 (95% CI [-0.1429, -0.0102]). We indeed find evidence (index of moderated mediation; Hayes 2015) that the mediation is significantly moderated ($\omega = -0.11$, 95% CI [-0.2587, -0.0389]).

Additional Controls for Perceived Goal Proximity and Difficulty. We also performed the same analyses with perceived goal proximity and difficulty included as additional mediators. With respect to difficulty as mediator, none of the predictors influence difficulty (all p 's $> .40$), and difficulty has no significant effect on motivation after controlling for the other mediators ($\beta = -0.03$, $t(587) = -0.78$, $p = .44$). As to goal proximity, we find a negative effect of a concentrated debt repayment strategy on goal proximity when the payments are focused on the largest account ($\beta = -0.78$, $t(588) = -3.45$, $p < .01$) but fail to find a relationship between goal proximity and motivation ($\beta = -0.07$, $t(587) = -1.47$, $p = .14$) such that there is no evidence of a conditional indirect effect ($\beta = -0.05$, 95% CI [-0.1512, 0.0054]). Critically, despite the inclusion of both of these alternative mediators, we still find evidence for conditional indirect effects of a concentrated repayment strategy through perceived progress. Namely, when the concentrated debt repayment strategy is focused on the small account, even while controlling for goal proximity and perceived difficulty, we find evidence for a significant positive effect of a concentrated debt repayment strategy on motivation ($\beta = 0.04$, 95% CI [0.0005, 0.1216]). In contrast when the concentrated debt repayment strategy is focused on the large account, we find evidence for a significant negative effect of

FIGURE 3
MODERATED MEDIATION ANALYSIS FOR EXPERIMENT 3



NOTE.—When the repayment focus is on the smallest account (i.e., the largest repayment is applied to the *smallest* account), the 95% confidence interval (CI) for the indirect effect excludes 0 ($\beta = 0.50 \times 0.11 = 0.06$; 95% CI [0.0053, 0.1451]), indicating a significant mediation of the positive effect. In contrast, when the repayment focus is on the *largest* account (i.e., the largest repayment is applied to the *smallest* account), the 95% CI for the indirect effect excludes 0 ($\beta = -0.48 \times 0.11 = -0.05$, 95% CI [-0.1429, -0.0102]), indicating a significant mediation of the negative effect. Note that debt repayment strategy (dispersed: 0, concentrated: 1) and repayment focus were recoded (small: 0, large: 1) to ease interpretation.

Significance levels (two-tailed): ** indicates $p < .01$; * indicates $p < .05$; † indicates $p < .10$.

a concentrated debt repayment strategy on motivation ($\beta = -0.04$, 95% CI $[-0.1191, -0.0022]$).

Discussion

The results of experiment 3 provide strong evidence for the proposed psychological process underlying the motivating effect of a concentrated versus dispersed debt repayment strategy. Specifically, they show that perceived goal progress is a function of the greatest proportional balance reduction in any account, rather than the smallest amount remaining in any account or the magnitude of the largest repayment amount. In addition to identifying the psychological process, this result also demonstrates an important boundary condition for the motivating effect of a concentrated debt repayment strategy. Concentrated debt repayment strategies are most effective when the repayment strategy focuses on repaying a small account because doing so produces a larger proportional balance reduction in the account. When the focus of a repayment strategy is on paying down the account with the largest balance, however, a more concentrated repayment strategy leads to *lower* perceptions of progress and thus leads individuals to be less motivated to repay their debts.

GENERAL DISCUSSION

For consumers with deep financial troubles—those with multiple debt accounts they cannot fully repay each month—the ongoing struggle to get out of debt is compounded by having to decide how to allocate debt repayments across their multiple debt accounts (Bolton et al. 2011). Across three experiments and an analysis of actual credit card spending for indebted consumers, the present research shows that consumers who concentrate their repayments into fewer accounts (as opposed to dispersing them more equally across all accounts) generally make greater debt repayments in the following months. We show that consumers make larger repayments because more concentrated repayment strategies lead to a greater perception of progress with respect to their goal of managing their debt, which is motivating to consumers. This motivation is even reflected in a willingness to work harder to earn money to repay their debts (experiment 1). Yet we also demonstrate that concentrating repayments (vs. dispersing them) can be demotivating when repayments are concentrated into a consumer's largest debt account because consumers infer overall goal progress from the greatest proportional balance reduction made in a single account (experiment 3).

Theoretical Implications

This research contributes to the literature on goal pursuit by investigating how the selective pursuit of

nonordered subgoals, which can be pursued in any sequence or simultaneously, influences perceptions of progress toward, and the motivation to attain, a superordinate goal. Whereas prior research has examined how individuals perceive goal progress and allocate their efforts in the context of multiple competing goals (Fishbach and Dhar 2005; Louro et al. 2007), or in an ordered structure of goals (Bagozzi and Edwards 1998; Bandura and Simon 1977; Novemsky and Dhar 2005), our findings provide novel insights into settings where subgoals are nonordered. Although consumers could order the subgoals (e.g., by account, interest rate, balance amount, purpose, or history), paying off the first debt account entirely is not a necessary condition for paying down other debt accounts. Debt repayment thus represents a context in which consumers concurrently pursue multiple subgoals in order to achieve their overarching goal, and they are free to choose the degree to which they concentrate their efforts into one subgoal or disperse their efforts across multiple subgoals. This freedom to choose a subgoal pursuit strategy represents an additional complication that has important motivational consequences. Future research should extend our findings by examining these effects in other contexts involving concurrent subgoals, such as the completion of multiple ongoing work projects or retirement savings goals.

Prior research has spent considerable effort identifying how consumers infer progress toward attaining a superordinate goal based on progress made on individual subgoals. It has previously been posited that perceived progress on debt repayments is inferred from account closure (Brown and Lahey 2015; Gal and McShane 2012) or from proximity to account closure (Amar et al. 2011; Brown and Lahey 2015). Our results make an important contribution by showing the *partial* repayment of a single account is also motivating and that it is not necessary to fully pay off debt accounts to achieve the motivational benefits of subgoal activation.

We also show that the primary mental mechanism through which concentrated debt repayment strategies enhance perceptions of progress is that consumers infer their overall goal progress from the greatest proportional balance reduction in any account. We demonstrate that it is not because concentrated debt repayment strategies produce a larger single repayment amount or because they cause a single debt account to have a smaller remaining balance. Rather, consumers infer progress based on how much of a dent they are making on any debt account, based on the starting balance and the amount they allocate toward each account. Substantively, the amount of debt in the account when the payment is applied matters. Prior research could not distinguish between progress and motivational explanations, and we thus provide a novel mechanism (proportional balance reduction) through which goal progress is inferred.

Practical Implications

The insights gained from this research have important implications for the millions of consumers who carry balances on multiple revolving debt accounts (Bolton, Bloom, and Cohen 2011) and the organizations that help them monitor and/or repay their debts (e.g., HelloWallet). To the extent that a consumer's debt accounts have similar interest rates, indebted consumers should be encouraged to concentrate repayments into their *smallest account* to maximize motivation and the likelihood of achieving their goal of becoming debt free. This is a straightforward strategy that can be easily communicated and applied by consumers.

As suggested by an emerging literature on the importance of choice architecture in guiding consumer behavior (Johnson et al. 2012), providing consumers a default repayment allocation that is more concentrated could prove to be an effective intervention for indebted consumers. The effectiveness of such an intervention could also be enhanced by selectively framing each debt account with either a "to-date" or "to-go" frame. In their work, Bonezzi, Brendl and De Angelis (2011) argued that as people approach a goal, they switch from a "to-date" mindset to a "to-go" mindset. These findings suggest that the effectiveness of a concentrated debt repayment strategy could be further enhanced with the use of a "to-date" frame for debt accounts in which less than 50% of the debt is repaid in a period, and a "to-go" frame for debt accounts in which greater than 50% of the debt is repaid in a period. This intelligent choice architecture can be dynamically implemented in online-based financial planning programs, such as HelloWallet, to help motivate indebted consumers repay their debts more quickly.

Limitations and Future Research

Although our field study data from HelloWallet provided a large amount of information regarding the behaviors of indebted consumers, it presented several challenges. First, it is possible that we failed in the field study to find a positive effect of account closure because our measure is imperfect. Although we are confident that an account cannot have been closed without its balance having first been brought to zero, it is possible that an account's balance is brought to zero and yet the account is not closed. Our measure may thus have a significant number of false positives with respect to account closure and as such could be quite noisy. Yet given that such account closures were quite rare even if positively inflated (on average, once in 20 months of observation per consumer), researchers with better access to account closure information might be able to find more robust effects for the closure of a debt account. We thus caution against interpreting the lack of an effect for account closure in the field study.

With that in mind, our research suggests that much remains to be learned about what exactly motivates consumers to repay their debt faster. Whereas work by Gal and McShane (2012) and Brown and Lahey (2015) point to the importance of successfully completing subgoals in motivating greater effort in superordinate goal pursuit, the present research and work by Amir and Ariely (2008) suggest that subgoal completion may not be critical or could potentially have a negative impact under particular circumstances. For instance, completing a subgoal could lead to feelings of accomplishment that leads to complacency in superordinate goal pursuit (Amir and Ariely 2008; Fishbach and Dhar 2005) or it could license consumers to pursue alternative, unassociated, and even competing goals (Fishbach et al. 2006). Future research should investigate conditions under which repaying debt accounts partially versus completely leads to enhanced (vs. diminished) motivation to repay debt.

Second, it is possible that the inclusion of additional variables such as interest rates and account structure information could help explain why the consumers in our field study both concentrated their debt repayments in one month and repaid more debt in the month that followed. Unfortunately, debt repayment decisions are complex and occur throughout the month as opposed to a single point in time (e.g., paid card 1 on the 5th, paid card 2 on the 15th, and added expenses throughout the month). As such, it was not possible for us to know the exact structure of the debt accounts (e.g., sizes of loan, benefits, card limits) at any given point in time. We note, however, that for any omitted variable to be a plausible alternative explanation as to why concentrated debt repayments lead to greater subsequent debt repayments, it would need to (1) cause consumers to use a more concentrated debt repayment strategy, (2) be correlated (positively) with the magnitude of subsequent debt repayments, and (3) vary across time (i.e., be time variant because our analyses were done within subject). Because interest rates tend to be time invariant across months, and given that our analysis captures within-consumer effects, we do not believe that interest rate patterns can explain our effect.

That said, we do find evidence that debt account structure matters. Rationally (if their goal is to minimize total interest paid), consumers should concentrate their repayments into the debt account(s) with the highest interest rates, irrespective of the amount of debt in each account. Yet recent work suggests that indebted consumers often fail to make such rational decisions, and it points to the crucial role played by the structure of a consumer's debt accounts and individual debt repayments in motivating debt repayment (Amar et al. 2011; Brown and Lahey 2015; Gal and McShane 2012). What remains unclear is the extent to which the motivational effects of different debt structures and repayment strategies may be attenuated or enhanced by the distribution of different interest rates

across debt accounts, and the particular conditions under which interest rates (vs. repayment strategies) may have a greater impact on a consumer's motivation to repay his or her debt. Thus an important avenue for future research is to examine the interplay between interest rates, debt account size, and debt repayment strategies.

Third, as consumers themselves tend to choose the strategy they pursue *and* the magnitude of the debt repayments they make in the following month, our analyses for the field study are subject to concerns of endogeneity. Indeed, in the field study data we find that consumers vary substantially in the extent to which they use concentrated or dispersed debt repayment strategies, and we cannot control for the reasons that consumers might choose to concentrate their debt repayments into larger or smaller accounts. As suggested by Amar et al. (2011), it may be that indebted consumers naturally tend to concentrate their largest repayment to their smallest account, and thus their subsequent motivation to repay their debts is greater because they have maximized their proportional balance reduction. Finding predictors of one's preference to engage in a more (vs. less) concentrated strategy remains an interesting avenue for future research.

Fourth, in our field data, we could not assess precisely the proportional balance reduction as in our experiments. As such, we introduced a measure to categorize consumers' debt repayment strategies as more concentrated or more dispersed. Whereas the measure we proposed has several key advantages (easy to compute, bounded between 0 and 1, invariant to magnitude and size of the accounts), the measure remains an imperfect proxy for our interest in assessing the largest proportional balance reduction across the accounts. We thus urge caution in assigning labels (concentrated or dispersed) based on the midpoint value on this measure.

We hope that our work can stimulate other researchers to investigate debt repayment strategies that reflect more complex allocations than fully dispersed or fully concentrated. For instance, it is possible that our measure can be accommodated or improved to factor in some observations regarding the nature of the structure of debt accounts—such as the fact that most consumers make monthly minimum payments. We are therefore cautious in stating that fully concentrated debt repayment strategies are truly optimal in maximizing motivation. For example, it is possible that the effect of a concentrated debt repayment strategy is maximized when the largest repayment is made over the smallest account while still ensuring that a majority of individual accounts receive “something” (a measure of concentration slightly less than one). A cursory review of the results of experiment 2 (table 3) suggests that this might be the case and that the relationship between different debt repayment strategies and our measure could be more complex and nonlinear. Future research should investigate alternative measures and explore more detailed aspects of consumer debt repayment strategies.

DATA COLLECTION STATEMENT

The data for the field study were provided to us by Steve Wendel, the principal scientist at HelloWallet, in December 2012. The data were jointly analyzed by Keri L. Kettle and Simon J. Blanchard. Experiment 1 was conducted in November 2011 at Boston University. We predetermined that we would run this experiment for one day in the lab, with the goal of gathering at least 60 participants, and the sample size thus included every student who attended the sessions over the day. The data were collected by Remi Trudel and Keri L. Kettle, and were analyzed by Keri L. Kettle. Experiment 2 was conducted in February 2013 using an online sample recruited through MTurk. Sample size was targeted at 75 subjects per cell, owing to the complexity of the moderated mediation process model. The data were collected by Keri L. Kettle and analyzed jointly by Remi Trudel and Keri L. Kettle. Experiment 3 was conducted in October 2013 using an online sample recruited through MTurk. Sample size was targeted at 75 subjects per cell, owing to the complexity of the multiple mediation process model. The data were collected by Keri L. Kettle and were jointly analyzed by Simon J. Blanchard and Keri L. Kettle.

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