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Buy Now Pay Later: Impact of Installment Payments on Customer Purchases

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Buy Now Pay Later: Impact of Installment Payments on Customer Purchases

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Buy Now Pay Later: Impact of Installment Payments on Customer Purchases

Abstract

Buy Now Pay Later (BNPL) installment payments allow customers to pay for purchases in a series of interest-free installments over a short period of time. This research provides novel insights into how customer adoption of BNPL installment payments impacts spending. The authors leverage customer-level transaction data before and after the introduction of a BNPL installment payment service at a large US retailer. A difference-in-difference analysis indicates that the adoption of BNPL installment payments is associated with (1) an increase in purchase incidence, and (2) larger purchase amounts. These effects are statistically and economically significant over time. Moreover, this increase in spending is greater for smaller (vs. larger) basket shoppers, and for shoppers who relied more heavily on credit (vs. debit) cards before adoption. Three pre-registered experiments show that BNPL installment (vs. lump sum) payments increase spending by reducing perceived financial constraints. Specifically, BNPL installments alleviate perceived financial constraints by reducing perceived costs and facilitating budget control. These findings highlight the substantive role of BNPL installment payments in shaping purchase behavior and provide important implications for the management of BNPL payment schemes.

Keywords: retailing, installments, buy now pay later, temporal framing, perceived financial constraints, budget control

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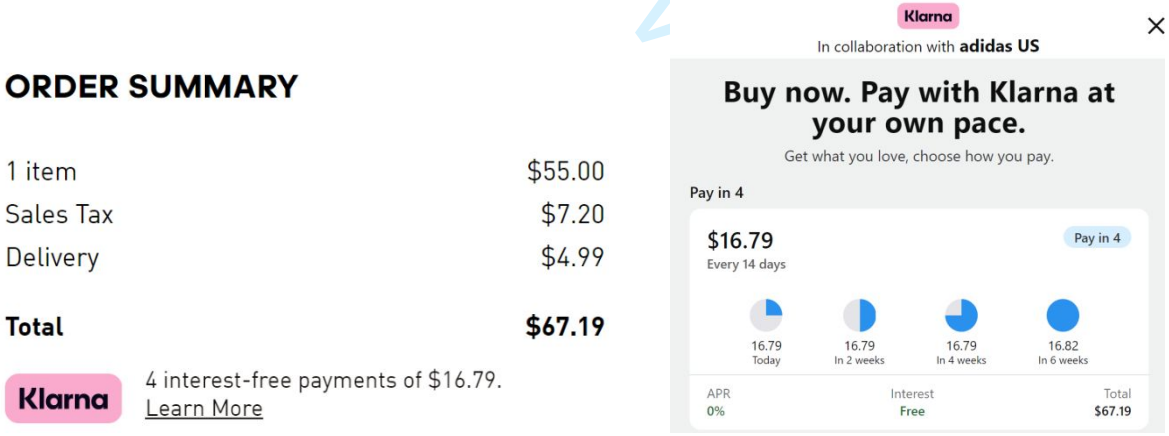
Buy Now Pay Later (BNPL) has become an increasingly popular payment method at retailers, allowing customers to pay for purchases in interest-free installments over a relatively short period of time, typically within six weeks (Accenture 2021). Over 45 million US customers and over 15 million UK customers have adopted this form of payment in recent years (BBC 2021, Accenture 2021). Globally, the number of BNPL users reached 380 million in 2024 and is projected to reach 670 million by 2028 (Juniper Research 2024). Worldwide BNPL spending equaled $316 billion in 2023 and is expected to grow to $450 billion by 2027 (Worldpay 2024). Most BNPL installment spending is realized via providers like Afterpay, Klarna, and Affirm (McKinsey & Company 2021). In recent years, a growing number of major retailers (e.g., ASOS, Adidas, H&M, Walmart, and Sephora) partnered with BNPL providers to allow customers to pay for purchases in installments. As illustrated in Figure 1, this enables customers to pay for purchases in installments, such as in 4 interest-free installments over 6 weeks ("Pay in 4")[1].

Figure 1
Example of BNPL Installments



Despite the growing popularity of BNPL installment payments, little is known about their impact on retail sales. Furthermore, retailers are uncertain about its long-term effects

[1] Figure 1 illustrates BNPL installments at Adidas (US). Web Appendix A provides additional examples from ASOS (UK), H&M (Australia), Walmart (Canada) and Sephora (US) who also partnered with BNPL providers to enable customers to pay in 4 interest-free installments over 6 weeks. Table WA1 indicates that the majority of leading online US retailers offers BNPL installment payments.

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(RFI Global 2022)[2]. Prior literature has not studied the effects of BNPL installments, focusing instead on how framing prices in segregated terms affects transaction evaluations (Gourville 1998; 1999; 2003; Bambauer-Sachse and Mangold 2009; Atlas and Bartels 2018). These existing studies on temporal reframing have examined the effects of prices framed in segregated ("$2 a day") or aggregated ("$60 a month") terms, *with payments remaining aggregate* (all customers "pay monthly"). In contrast, BNPL installments go beyond segregated frames and require customers to make *actual segregated payments* across a specified time ("Pay $60 in 4 payments of $15 over six weeks"). Thus, BNPL installments involve separate segregated payments ("4 payments of $15") rather than a single lump sum payment ("1 payment of $60").

Our research aims to provide retailers with an understanding of how BNPL installment payments influence retail sales. We propose that segregating payments alleviates perceived financial constraints, thereby increasing spending. We first analyze transactional data from a major retailer in the United States that introduced BNPL installment payments by partnering with a leading BNPL provider for the first time (Study 1). Our difference-in-difference analysis reveals that adoption of BNPL installment payment plans is associated with an increase in purchase incidence of approximately 9 percentage points and with a relative increase in purchase amounts of approximately 10 percent. These effects remain statistically and economically significant across the entire post-adoption period. An analysis of customer heterogeneity reveals that the effect is stronger among credit (vs. debit) card shoppers and among smaller (vs. larger) basket shoppers. Next, three pre-registered experiments provide causal evidence for the positive effect of BNPL installment payments on spending and explain why the effect occurs. Consistent with the transactional data, BNPL

[2] Less than half of retailers anticipate repeat purchases or continued increased purchase frequencies from customers using BNPL, with only 38% and 43% of retailers expecting these outcomes, respectively (Bain & Company 2023; RFI Global 2022).

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installment payments increase spending by reducing perceived financial constraints (Studies 2 and 3). Specifically, BNPL installment payments alleviate perceived financial constraints by reducing perceived costs and facilitating budget control (Study 4).

Our paper offers several contributions. Substantively, we provide novel empirical insights on the effects of BNPL installment payments on retail sales. Using transactional data, we show that adopting BNPL installment payments positively impacts customers' purchase incidence and amounts. In addition, we find that these effects remain statistically and economically significant over time. Furthermore, we offer key insights into the heterogeneous impact of BNPL installments across customers. Consistent with our theorizing, our findings imply that the effect of BNPL installments on spending is larger among customers who are likely to be more financially constrained (i.e., among customers who purchased smaller baskets and relied more heavily on credit cards before adoption; Bell and Lattin 1998, Borzekowski, Kiser and Ahmed, 2008).

Theoretically, we contribute to the temporal reframing literature (e.g., Gourville 1998; 1999; 2003). Prior work has focused on prices framed in segregated ("$1 a day") or aggregated terms ("$30 a month"), while payments remain aggregated ("monthly payment"; Gourville 1998). BNPL installments go beyond segregated price frames and segregate actual payment. We show that segregating payment works beyond existing temporal reframing mechanisms via perceived financial constraints. This happens, at least in part, because segregating payments makes customers feel more in control of their budget. By alleviating perceived financial constraints, segregating payment into BNPL installments is effective when the aggregate cost is salient. Furthermore, the effect occurs even when an aggregate payment is more delayed than the installment payments. It also applies to goods and services consumed on a recurring and one-off basis. Finally, we also contribute to work on perceived financial constraints. While existing research has examined its consequences on consumer

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behavior (e.g., Tully, Hershfield, and Meyvis 2015; Paley, Tully, and Sharma 2019; Dias, Sharma and Fitzsimons 2022), we illustrate an antecedent by showing that BNPL installment (vs. delayed lump sum) payments reduce perceived financial constraints.

Theoretical Background

Buy Now Pay Later

Buy Now Pay Later (BNPL) installments have become a common payment method in recent years (Worldpay 2021). Major players such as Afterpay, Klarna, and Affirm partner with retailers to enable customers to spread the cost of their shopping in interest-free installments (BBC 2021). When customers choose BNPL installments at the checkout of a participating retailer, the bill will be paid in full by the BNPL provider to the retailer. Customers pay the BNPL provider for the first installment at the time of purchase and repay the remaining interest-free installments over a short time period.

Prior research has shown that payment methods can affect spending. Customers tend to spend more on credit cards than cash (e.g., Hirschman 1979, Raghubir and Srivastava 2008). The higher spending with credit cards (vs. cash) has been attributed to temporal decoupling, where the purchase is separated from actual payment (Prelec and Loewenstein 1998). By also delaying payment, BNPL installments share payment decoupling characteristics with credit cards. However, in an online retail context, customers predominantly rely on credit cards that already delay payment (PYMNTS 2024). BNPL installment payments are distinct from credit cards in that payments are segregated into smaller installments at the point of sale. We argue that segregating payment into installments can impact spending. Specifically, building on the temporal reframing literature, we postulate that BNPL installment payments affect perceived financial constraints, increasing spending.

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Temporal Reframing

Temporal reframing refers to the presentation of prices over varying time periods (Gourville 1998; 1999; 2003). For instance, prices can be framed in aggregate terms ("$60 a month") or segregated terms ("$15 a week"). Objectively, framing equivalent prices in segregated terms ("$15 a week") or aggregate terms ("$60 a month") should not affect purchase intentions as the underlying cost remains the same (Kahneman and Tversky 1979). Nonetheless, the temporal reframing literature demonstrates that segregating vs. aggregating prices has consequential effects on perceptions and purchase intentions (Table 1). Gourville (1998) first showed that donation likelihood was higher when prices were framed in segregated ("$1 a day") than in aggregated terms ("$365 a year"). This effect has been generalized to different temporal frames (e.g., weekly instead of daily) and various recurring consumption contexts (e.g., a car lease, gym membership; Atlas and Bartels 2018; Bambauer-Sachse and Mangold 2009; Bambauer-Sachse and Grewal 2011; Shirai 2017).

The temporal reframing literature has identified several mechanisms explaining the effects of segregated prices on purchase intentions. Prior research has revealed how segregating prices affects perceptions of recurring costs and benefits. According to the "pennies-a-day" framework, segregating prices ("$1 a day") reminds customers of other small and trivial expenses (Gourville 1998). Thus, segregated prices are perceived as more palatable and attractive than aggregated prices (Bambauer-Sachse and Mangold 2009; Bambauer-Sachse and Grewal 2011; Gourville 2003). Gourville (1999) further theorizes that temporal reframing is particularly effective for products consumed on a recurring basis (e.g., subscriptions) due to the overlap between segregated prices and prototypical petty cash expenses. Segregating prices can also help customers appreciate the recurring benefits of a purchase, thereby increasing perceived benefits and purchase intentions (Atlas and Bartles 2018).

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Previous work has also identified mechanisms that attenuate the effects of temporal reframing. Bambauer-Sachse and Grewal (2009) revealed that customers found segregated (vs. aggregated) prices complex and became skeptical of the marketer's motives. Correspondingly, segregated (vs. aggregated) prices can elicit greater feelings of being misled, reducing product evaluations (Bambauer and Mangold 2011).

Our work differs from previous studies on temporal reframing in several ways. First, prior work frames prices in either segregated ("$15 a week") or aggregated terms ("$60 a month") with actual payments kept constant[3]. BNPL installments go beyond segregated price frames and require customers to make actual segregated payments across the specified time periods ("Pay $60 in 4 bi-weekly installments of $15"). Second, prior work examines the effects of temporal framing on purchase intentions using experiments. Our research leverages transactional retailer data to study how segregating payments into BNPL installments impacts customers' actual spending over time. This further enables us to answer managerially relevant questions on which shoppers will likely change their spending (i.e., depending on historical basket size and credit card use). Third, we show that segregating payment works beyond the existing temporal reframing mechanisms via perceived financial constraints. Specifically, we theorize that segregating payments makes customers feel more in control of their budget, alleviating perceived financial constraints. By working through additional mechanisms, our effects not only apply to recurring consumption (e.g., car leases) but also generalize to purchases consumed on a one-off basis (e.g., a flight).

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[3] Gourville (1998, p.399) ensured that "the requested donation would be prorated and automatically deducted from their monthly paychecks which thereby equated the timing of physical payments across PAD (segregated) and aggregate framings". In other words, participants are exposed to either segregated or aggregate price frames. However, the number and timing of payments are the same in both conditions. For example, a price is framed segregated ("$2 a day") or aggregated ("$60 a month"), but payment timing and frequency are the same ("$60 a month") in both conditions.

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Table 1. Overview of Key Studies on Temporal Reframing and Purchase Behavior

Author(s)	Focus	Data	Temporal reframing example	Segregation	Mechanism(s)	Moderator(s)	Dependent variable(s)	Relevant findings
Gourville (1998)	Donation likelihood when temporally reframing donation amounts from yearly to daily	Experiments	"$350 a year" (aggregate) vs. "$0.85 a day" (segregated)	Price frame	/	/	Donation likelihood	Temporally reframing price increases donation likelihood
Gourville (1999)	Perceived cost when temporally reframing prices from yearly to daily	Experiments	"$350 a year" (aggregate) vs. "$0.95 a day" (segregated)	Price frame	Perceived cost	Continuously (vs. immediately) consumed products, presence (vs. absence) of explicit comparison	/	Temporally reframing price reduces perceived cost of continuously consumed products.
Gourville (2003)	Perceived cost when temporally reframing prices	Experiments	"$365 a year" (aggregate) vs. "$1 a day" (segregated daily) vs. "$30 per month" (segregated monthly)	Price frame	Perceived cost	Level of temporal aggregation, dollar magnitude	/	Temporally reframing price reduces perceived costs for dollar magnitudes up to several hundred dollars, both for daily and monthly levels of temporal aggregation
Bambauer-Sachse and Mangold (2009)	Perceived complexity of the price structure, and feeling of being manipulated by the marketer when temporally reframing prices	Experiments	"€60 a month" (aggregate) vs. "€15 a week" (segregated weekly) vs. "€2 a day" (segregated daily)	Price frame	Price attractiveness, perceived price complexity of the price structure, feeling of being manipulated by the marketer	/	Product evaluation	Temporally reframing price improves product evaluations through increased price attractiveness, but reduces product evaluations through increased perceived complexity of the price structure and feelings of being manipulated by the marketer
Bambauer-Sachse and Grewal (2011)	Moderating role of price endings, price level, time periods of aggregate price, and calculation affinity when temporally reframing prices	Experiments	"€60 a month" (aggregate) vs. "€15 a week" (segregated weekly) vs. "€2 a day" (segregated daily)	Price frame	Price attractiveness, feeling of being misled	Price endings, price level, time periods of aggregate price, calculation affinity	Product evaluation, purchase intentions	Temporally reframing price improves product evaluations for high-priced products, in combination with even price endings, aggregate prices that refer to shorter time periods, and among customers with low calculation affinity
Shirai (2017)	Comparison of usage-based unit pricing relative to temporal reframing	Experiments	"$1.68 per cup if you drink a cup of tea every day" (usage-based unit pricing) vs. "$1.68	Price frame	/	/	Purchase intentions	Usage-based unit pricing increases purchase intentions, to a similar extent as temporally reframing of prices

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			per day if you drink a cup of tea every day" (temporal reframing)					
Atlas and Bartels (2018)	Perceived benefits when temporally reframing prices	Experiments	"$7,250 a year" (aggregate) vs. "$20 per day" (segregated)	Price frame	Perceived benefits, perceived discreteness of benefits, perceived cost	/	Purchase intentions	Temporally reframing prices increases donation likelihoods through reduced perceived costs, but also through increased perceived benefits because customers consider the benefits to be more discrete
Present study	Purchase incidence and amounts when adopting BNPL installment payments, and the role of perceived financial constraints and budget control	Observational (transactions) + experiments	"$60" (aggregate) vs. "$60 – 4 bi-weekly installments of $15" (segregated)	Payment method	Perceived financial constraints, budget control, perceived cost	Smaller (vs larger) basket shoppers, credit (vs. debit) card shoppers	Purchase incidence and purchase amount	BNPL installments increase customer spending (purchase incidence and amounts), especially among smaller (vs. larger) basket and credit (vs. debit) card shoppers, and the effects persist across time. BNPL installments reduce perceived costs and increase budget control, which in turn, reduces financial constraints, increasing spending

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The Effect of BNPL Installment Payments on Perceived Financial Constraints and Spending

We predict that segregating payment into BNPL installments decreases perceived financial constraints, increasing spending. Perceived financial constraints reflect "the extent to which people believe that their financial situation restricts desired consumption" (Tully, Hershfield, and Meyvis 2015, p.60). While customers can feel financially constrained if their income is insufficient to satisfy their consumption desires, perceived financial constraints reflect a "psychological state that does not necessarily imply poverty or a literal absence of money" (Paley, Tully, and Sharma 2019, p. 890). Even amongst customers of similar objective wealth, perceptions of financial constraints can differ (e.g., Sussman and Shafir 2012; Paley et al. 2019). Put differently, perceived financial constraints can occur among lower and higher-income customers[4].

We theorize that segregating payment into BNPL installments reduces perceived financial constraints for two reasons: (1) decreasing perceived costs and (2) increasing budget control. First, perceived costs reflect the extent to which people evaluate costs as small and trivial (Gourville 1998; Atlas and Bartels 2018). According to the "pennies-a-day" framework, segregating prices decreases perceived costs by reminding customers of other small and trivial expenses, such as a cup of coffee (Gourville 1998). Thus, prices framed in daily terms ("$1 a day") are perceived as less costly compared to monthly terms ("$30 a month"), which, in turn, are perceived as less costly compared to yearly terms ("$365 a year"; Gourville 2003). Similarly, Atlas and Bartles (2018) found that perceived costs were lower when prices were framed in segregated terms ("25¢ a day") compared to aggregated terms ("$90 a year"). While prior work frames prices in either segregated ("$15 a week") *or* aggregate terms ("$60 a month"), our

[4] Note that while use of BNPL installment payments may correlate with income, adoption is not limited to low-income customers (McKinsey & Company 2021). For instance, only a small share self-reports using installment payments because "they don't have access to credit" (5% of users) or because their "credit card limit has been reached" (5% of users) (Accenture 2021). Furthermore, seven in 10 US BNPL installment payment users reportedly earn more than $75,000 a year, and 97% of installment payment users have at least one credit card (Forbes 2020).

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payment context jointly presents the aggregate *and* segregated terms (e.g., "$60 in 4 installments of $15"). Thus, customers are typically aware of the total cost.

We argue that segregating payment can still reduce perceived costs in the presence of the aggregate term. According to the numerosity heuristic, people tend to infer a greater quantity from higher numerosity at the expense of relevant contextual information (Pelham, Sumarta, and Myaskovsky 1994). Numerosity refers to the number of units that a stimulus is quantified by (Pelham et al. 1994). For example, weight can be measured in kilos (e.g., 1kg; lower numerosity) or grams (e.g., 1000g; higher numerosity). The numerosity heuristic occurs when people focus on the number and consider 1000g heavier than 1kg. This heuristic also extends to costs, where people often focus on the sheer numerousness of cost information (Bagchi and Davis 2016).

In the context of BNPL installments, customers might focus on the segregated terms ("four installments of $15") and judge these as smaller than the aggregate term ("total cost of $60"). Furthermore, the numerosity heuristic is not due to the inability to understand and process numbers (Weller et al. 2013). Highly numerate people have been found to be more prone to this heuristic as they focus more on numeric information (Cadario, Parguel, and Benoit-Moreau 2016). Moreover, the effects generalize to highly educated and experienced customers. For instance, MBA students evaluated the cost of a magazine subscription more favorably when its price was segregated ("$1 per day") than aggregated ("$365 per year"; Atlas and Bartles 2018). Hence, we postulate that customers would evaluate payment more favorably when it is segregated into BNPL installments despite being cognizant of the aggregate term.

Prior work on partitioned pricing has shown that this segregation effect persists even when the total cost is clear (Carlson and Weathers 2008). Despite being aware of the total cost, customers had higher purchase intentions when costs were presented in segregated terms ("base price + shipping costs") than in aggregated terms ("total costs"; Xia and Monroe 2004). Thus, BNPL customers may focus on the segregated payment ("four installments of $2.50") at the

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expense of the aggregate payment ("$10") and perceive the amount to be less costly, even when they are aware of the total cost ("$10"). These findings suggest that segregating payments into BNPL installments lowers perceived costs.

By lowering perceived costs, BNPL installment payments should impact perceived financial constraints. Financially constrained customers perceive that their consumption desires exceed their financial means (Paley et al. 2019). Put differently, perceived financial constraints are a subjective assessment of wealth where customers evaluate the adequacy of their financial resources relative to one or more reference points (Tully et al., 2015). For instance, reminding participants of reference points such as mortgages, bills, and limited savings made people feel more financially constrained (Tully et al. 2015). Segregating payment into BNPL installments ("four installments of $2.50") could lower the reference point, where one evaluates their financial means against the installment payment ("$2.50") rather than the total cost ("$10"). By making the payment for desired consumption seem less costly, BNPL installments increase the likelihood that customers feel that their financial means are sufficient to fulfill their consumption desires, alleviating perceived financial constraints.

Second, we argue that BNPL installment payments increase budget control, reducing perceived financial constraints. Budget control refers to perceptions of control over allocating financial resources and tracking expenses against a budget (Kidwell and Turrisi 2004). By earmarking money for expenses, budgeting enables customers to assess if their income is sufficient to satisfy their consumption desire (Heath and Soll 1996). Prior work suggests that temporal frames affect how people budget (Ülkümen, Thomas and Morwitz 2008; Spiller 2011). Specifically, individuals found it easier to estimate budgets for shorter time frames ("next month") than for longer time frames ("next year"; Ülkümen et al. 2008). Unlike traditional credit card payments ("a single lump sum due at the end of the *month*"), installment payments are segregated into shorter time frames ("4 *weekly* payments"). Hence, we propose that BNPL installments make it easier for customers to estimate their budgets, increasing budget control.

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Consequently, BNPL installment payments should impact perceived financial constraints. For instance, prior work found that individuals with higher budget control felt less financially constrained than their counterparts with lower budget control, even when they shared the same income (Gasiorowska 2014).

In sum, by reducing perceived costs and facilitating budget control, we posit that segregating payment into BNPL installments alleviates perceived financial constraints. Subsequently, BNPL installments should increase spending, as past research has shown that lower perceived financial constraints increase purchases (Karlsson et al. 2004; 2005; Tully et al. 2015). For instance, households that felt less financially constrained reported more purchases (Karlsson et al. 2005). Next, we present evidence from the field in which we explore how adopting BNPL installment payments impacts spending, followed by experimental evidence providing stronger causal evidence and studying the proposed mechanism.

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Overview of Empirical Studies

We investigate the BNPL installment effect in four studies, as summarized in Table 2. Study 1 uses a difference-in-difference analysis to analyze observational data for a large sample of customers at a major US retailer. We also conduct a vast range of robustness checks for Study 1 (Web Appendix B) and explore customer heterogeneity in the effect. Study 2 is a randomized online experiment to validate Study 1, and tests the mediating role of perceived financial constraints. Study 3 examines the effect of BNPL installments on perceived financial constraints, and tests the role of alternative mechanisms. Study 4 examines the full model, whereby BNPL installments reduce perceived costs and facilitate budget control, reducing perceived financial constraints and, in turn, increasing purchase likelihood[5]. All stimuli, data,

[5] All experiments in the main manuscript were pre-registered with our hypotheses, conditions, measures, analyses, sample size, and rule(s) for excluding observations. No categories were omitted from the analysis. These studies were approved by the University of Leeds Research Ethics Committee (Ref. LTLUBS-0215 and 0496) on November 12, 2019, and April 19, 2023, respectively. All participants provided written informed consent prior to enrolment in the study.

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syntax, pre-registrations for Studies 2 to 4, and supplementary studies are available on JM's Dataverse.

Table 2
Overview of Studies

Study	Data	Product	Main results
Study 1	Observational transaction data	Apparel	BNPL installments increase purchase incidence and amounts across time. Stronger increase among large (vs. small) basket shoppers and among credit (vs. debit) card shoppers
Study 2	Experiment (https://aspredicted.org/tn7bs.pdf)	Party supplies	Perceived financial constraints mediate the effect of BNPL installments on spending
Study 3	Experiment (https://aspredicted.org/py9ai.pdf)	T-shirt	BNPL installments reduce perceived financial constraints. No evidence that BNPL installments significantly affect feelings of being misled, perceived benefits, or price attractiveness
Study 4	Experiment (https://aspredicted.org/ra49n.pdf)	Flight	BNPL installments reduce perceived costs and facilitate budget control, lowering perceived financial constraints, thereby, increasing purchase likelihood

Study 1 – The Impact of BNPL Installment Payments on Customer Spending in the Field

To examine how the adoption of BNPL installment payments impacts purchases, we leverage data on the introduction of BNPL installment payments by a reputable US retailer who prefers to remain anonymous. We exploit that after the retailer made BNPL installment payments available to its customers, only a selection of customers adopted the service. Our identification of the BNPL installment payment effect relies on the change in purchases by adopters of BNPL installment payments after the retailer's introduction of BNPL installment payments, relative to a control group of non-adopters in the same period. The objective of our analysis is to explore how purchase behavior differs between adopters and non-adopters in the period after the introduction of BNPL installment payments. To mitigate possible bias due to self-selection of adoption, we use matching on observable factors to increase the comparability of adopters and non-adopters. We estimate a difference-in-differences model on the matched sample to identify the effect of customers' adoption of BNPL installment payments on their spending.

Empirical Context and Data

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We obtained transaction data from a retailer that introduced BNPL installment payments for the first time during our sample period. Our dataset covers total weekly spending from a major apparel retailer at the customer level within the United States between April 2020 and April 2021. In October 2020, the retailer partnered with a leading BNPL installment payment service provider for the first time, which enabled customers to buy and pay later in a series of installments[6]. The availability of the new BNPL installment payment method was communicated on the retailer's webpage. Specifically, it indicated that customers could "pay in 4 installments" using the BNPL installment payment service provider immediately below the "add to bag" button on the retailer's website. In line with common practice in retail, the product's full price remained visible above the "add to bag" button. The possibility to pay in 4 installments was visible to all customers on the website. No targeting was involved around BNPL, and the retailer did not make any strategic price adjustments in response to the introduction of BNPL. The introduction of the BNPL installment payment method allowed customers to purchase products immediately and pay with four equal repayments for the first time at the focal retailer. The retailer receives the payment in full from the BNPL provider shortly after the transaction, while the customer repays the BNPL provider over four installments. The first installment must be paid at the time of purchase, and the three remaining installments are due 2, 4, and 6 weeks after the purchase, respectively. The installments the customer pays go to the BNPL provider and are interest-free. In exchange for the service, the retailer pays the BNPL installment payment provider an undisclosed flat transaction fee and a variable fee.

Our dataset spans 52 weeks of data, 22 weeks before and 30 weeks after the retailer's introduction of BNPL installment payments. To examine the change in customers' purchase behavior after adopting BNPL installment payments at the focal retailer, we focus on existing customers that made at least one purchase from the retailer's online store prior to the retailer's

[6] Note that customers did not have the possibility to pay in a BNPL lump sum payment (i.e., they could not pay the total amount later in a single BNPL payment).

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introduction of BNPL installment payments. In line with common practice, our main analysis focuses on a cohort of customers who adopt around the same time (Iyengar, Park, and Yu 2022). Specifically, from the retailer's pool of existing residential customers, we obtain a random sample of 25,000 customers that adopt within four weeks after the retailer's introduction of BNPL installment payments. In the robustness checks, we report similar effects across later cohorts of adopters. As a control group of non-adopters, we obtained a random sample of 200,000 existing residential customers that did not adopt during the entire study period, and made at least one purchase before the retailer's introduction of BNPL installment payments.

Matching

A potential concern is that our data lacks randomization on who adopts. If adopters differ systematically from non-adopters, this may lead to biased estimates in our difference-in-differences analysis. To improve the comparability of adopters and non-adopters, we match each customer that adopts BNPL to a similar customer that does not adopt based on observed characteristics. To assess whether non-adopters were similar to adopters before the introduction of BNPL installment payments, we compare both groups during the 22-week period prior to the retailer's introduction of BNPL installment payments.

BNPL may be more appealing to customers facing financial constraints. For example, higher income groups are less likely to adopt BNPL (CFPB 2023). Although customers' financial constraints are not directly observable, certain behavioral characteristics could serve as proxy variables. Previous studies indicate that individuals with lower incomes tend to purchase for smaller amounts and are more likely to use credit cards rather than debit cards (Bell and Lattin 1998, Noble, Lee, Zaretski and Autry 2017, Borzekowski, Kiser and Ahmed, 2008). Additionally, customers who shop more frequently at the focal retailer may have greater exposure to its introduction of BNPL, potentially increasing their likelihood of adoption. Therefore, we consider the following four observable measures: (1) credit card spending, (2) average purchase amount, (3) average number of items, and (4) number of purchases. 'Credit

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card spending' measures the percentage of total purchase amounts made using a credit card. 'Average purchase amount' measures the average weekly monetary value of purchases (in $) across weeks in which a purchase takes place. 'Average number of items' measures the average number of items purchased across weeks in which a purchase takes place. 'Number of purchases' measures the number of weeks in which a customer purchased from the retailer. All four characteristics are calculated over the 22 weeks before the retailer's introduction of BNPL installment payments. Based on these characteristics, we calculate the Mahalanobis distances among customers, and select the match with the smallest distance (Datta, Knox, and Bronnenberg 2018)[7]. This results in a sample of 25,000 adopting customers and 25,000 non-adopting customers. In the robustness checks, we report similar effects when using the entire sample of non-adopting customers (N=200,000) without matching.

To assess whether non-adopters were similar to adopters on these observable characteristics before the introduction of BNPL installment payments, we compare both groups on their purchase behavior during the 22-week period prior to the retailer's introduction of BNPL installment payments. Table 3 summarizes the averages before matching (Panel A) and after matching (Panel B) for the observed covariates used in the matching procedure. Most notably, adopters rely more heavily on credit cards to pay for purchases ($M_{adopter}$ = 86%, $M_{non-adopter}$ = 70%), and show a higher number of purchases ($M_{adopter}$ = 3.66, $M_{non-adopter}$ = 2.68). We also observe lower average purchase amounts ($M_{adopter}$ = 66.56$, $M_{non-adopter}$ = 72.54$) among adopters but not a lower number of items ($M_{adopter}$ = 4.83, $M_{non-adopter}$ = 4.46). Overall, these descriptive statistics are consistent with the intuition that adopters may be relatively more financially constrained than non-adopters and are, therefore, more likely to purchase for smaller amounts using credit cards. After matching, the groups of adopters and non-adopters are comparable in all characteristics (Table 3, Panel B).

[7] We use Mahalanobis Distance Matching in our main analysis because it results in smaller standardized mean differences between adopters and matched non-adopters compared to Propensity Score Matching (see Table WB2 in Web Appendix B). Using Propensity Score Matching however results in similar findings (Table WB4).

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Table 3
Comparison of Adopters and Non-Adopters Prior to the Introduction of BNPL Installment Payments Before and After Matching

	Non-adopter	Adopter	Std. mean difference
A: Before matching			
Credit card spending (%)	.70	.86	.51
Average purchase amount ($)	72.54	66.56	-.13
Average number of items (#)	4.46	4.83	.11
Number of purchases (#)	2.68	3.66	.33
B: After Mahalanobis Distance Matching			
Credit card spending (%)	.86	.86	-.001
Average purchase amount ($)	66.63	66.56	-.002
Average number of items (#)	4.83	4.83	.001
Number of purchases (#)	3.65	3.66	.004

Notes: 'Credit card spending' measures the share of total purchase amounts made using a credit card. 'Average purchase amount' measures the average monetary value of purchases (in $) across weeks in which a purchase takes place. 'Average number of items' measures the average number of items purchased across weeks in which a purchase takes place. 'Number of purchases' measures the number of weeks in which a customer purchases from the retailer. The statistics are calculated based on the 22-week data period prior to the retailer's introduction of BNPL installment payments.

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Difference-in-Differences Analysis

We employ a difference-in-difference specification to examine the impact of BNPL installment payment adoption on customer purchases:

$$(1)\ Y_{it} = \alpha_i + \delta_t + \beta_1 \text{Adoption}_{it} + \varepsilon_{it}\ ,$$

where Y_{it} is the outcome measure of customer i in time t. We include customer fixed effects, α_i, to control for all customer-level (time-invariant) heterogeneity. We also include time fixed effects, δ_t, to control for all time-period specific heterogeneity (across customers)[8]. In line with prior work (e.g., Gu and Kannan 2021, Iyengar, Park and Yu 2022), we do not include the month of adoption in our analysis to avoid potential simultaneity bias with the adoption itself. Thus, 'Adoption_{it}' is an indicator variable that equals 1 if the observation for customer i in time t is in the weeks after the week of adoption, and β_1 captures the effect of adoption on post-adoption spending[9]. Similar to prior work, the 'Adoption_{it}' measure is a step dummy that equals

[8] The two-way fixed effects difference-in-differences estimator is unbiased in settings with a single treatment period or when homogeneous treatment effects can be assumed, but significant variation in treatment timing suggests the possibility of bias (Baker, Larcker and Wang 2022). Because Equation 1 is estimated on a sample of customers adopting within the same month, we do not rely on estimators designed for settings with significant variation in treatment timing (e.g., Callaway and Sant'Anna 2021).

[9] Further decomposition of the effect of 'Adoption_{it}' indicates that the effect remains stable within the after-adoption period and persists across the after-adoption period (see Robustness Checks and Web Appendix B).

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1 throughout the entire post-adoption period (Gu and Kannan 2021; Manchanda, Xie, and Youn 2008), and reflects the difference in outcomes between an adopting vs. a non-adopting customer at the retailer. It does not reflect short-term experimentation with BNPL installment payments because we observe that adopters heavily rely on BNPL installment payments (i.e., 76% of post-adoption spending occurs on BNPL installment payments[10,11]). To account for within-customer correlation of the error term over time, we cluster the standard errors at the customer level (Bertrand, Duflo, and Mullainathan, 2004).

Our main analysis distinguishes between two outcome measures of customer purchases of key interest to retailers: whether a purchase is made in a given time period (purchase incidence) and how much is spent conditional on purchase incidence in a given time period (purchase amount in $). In line with prior work, we distinguish between these two measures because adoption may impact both metrics differently and because they have differing implications for retailers (Iyengar, Park, and Yu 2022). Similar to prior literature, we estimate a two-part model (Ailawadi and Harlam 2009; Chesnes, Dai and Jin 2017). The purchase incidence part captures the customer's decision to purchase from the retailer and is estimated as a logit model. The purchase amount part captures the customer's decision on how much to spend and is estimated as a log-linear model using observations in which the customer purchases from the retailer[12].

The identification assumption underlying difference-in-differences is that in the absence of adoption, there would have been no differential changes in purchase behavior between the treatment and control group (Angrist and Pischke 2008). Because post-introduction

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[10] After the introduction of BNPL by the retailer, adopters on average spend 76% using BNPL, 16% using credit cards and 9% using debit cards. Matched non-adopters spend 70% using credit cards and 30% using debit cards.

[11] 79% of purchasing adopters continue to use BNPL installment payments after adoption. To ensure that our results are not attributable to the inclusion of the 21% of adopters that we do not observe to use BNPL in the post-period, we estimated the models dropping these adopters (see Manchanda et al. 2008 for a similar check). We find similar effects as in our main analysis ($\beta_{1,PI} = .838$, $p < .01$; $\beta_{1,PA} = .137$, $p < .01$).

[12] Note that a two-part model is more flexible than a Tobit model, because it allows for different estimates of adoption for the two parts. While a type 2 Tobit also allows for different estimates for the two parts, the two-part model has been shown to be superior to the type 2 Tobit model due to collinearity between the inverse Mills ratio and the independent variables when the same independent variables appear in both stages like in our setting (Manning et al. 1987, Ailawadi and Harlam 2009).

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counterfactual trends are unobservable, we assess the presence of parallel trends in the pre-introduction period between adopters and non-adopters. In Figure 2, we provide visual verification that the trends in purchase behavior follow similar patterns between adopters and non-adopters prior to the introduction of BNPL installment payments. Specifically, we plot the percentage of adopting versus non-adopting customers making a purchase in each week to understand whether purchase incidences are on average similar between adopters and non-adopters (Figure 2, Panel A), and their average weekly purchase amount conditional on purchase incidence (Figure 2, Panel B). The results in Figure 2 indicate that behaviors were similar in the pre-period across adopters and non-adopters.

Model-Free Evidence

To gain an initial understanding of the effect of the adoption of BNPL installment payments on purchase incidence and purchase amounts, we calculate purchase incidences and average purchase amounts before versus after the retailer's introduction of BNPL installment payments among adopters and non-adopters. Table 4 summarizes the results of this before-and-after calculation. It reveals that adopters, on average, make about two purchases (M = 1.83) more than non-adopters across the period after adoption. It also reveals a differential increase in purchase amounts of $6.88 among adopters compared to non-adopters, which is an average increase of approximately 10% compared to the average purchase amounts of an adopter prior to adoption (i.e., $6.88/$66.56). In the next section, we discuss the estimation results from our difference-in-differences model that controls for potential customer- or time-varying confounders.

Table 4
Before-and-After Analysis of Adopters and Non-Adopters

	Adopters (N=25,000)			**Non-adopters (N=25,000)**			**Diff-in-Diff**
	Before	After	Diff	Before	After	Diff	
Purchase incidence (#)	3.66	4.09	+.43	3.65	2.25	-1.40	+1.83
Average purchase amounts ($)	66.56	94.26	+27.7	66.63	87.45	+20.82	+6.88

Notes: 'Before' refers to the 22-week period prior to retailer's introduction of BNPL installment payments, 'After' refers to the 26-week period after the retailer's introduction of BNPL installment payments.

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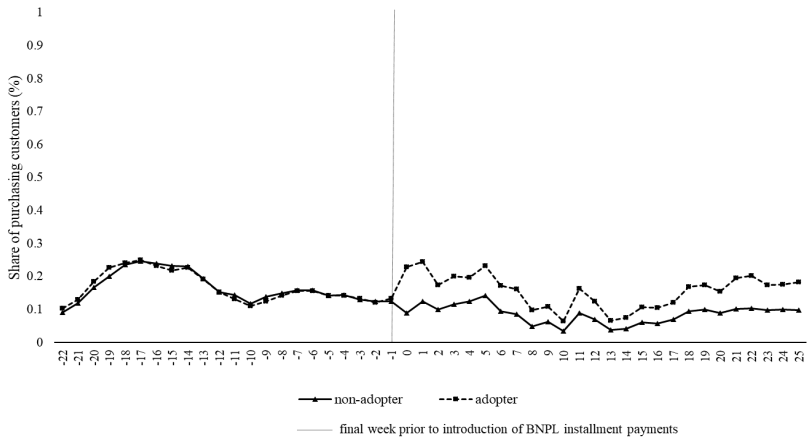
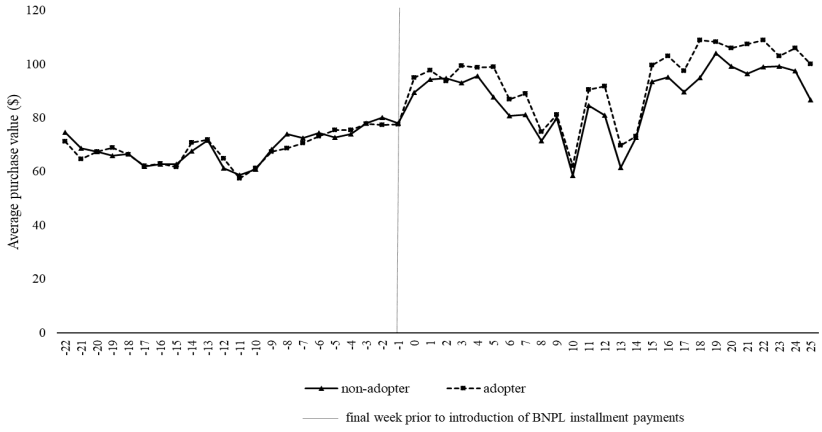
Figure 2
Comparison of Purchase Incidence and Average Purchase Amounts Between Adopters and Non-Adopters

A: Purchase incidence



B: Average purchase amounts



Notes: The horizontal axis indicates the number of weeks relative to retailer's introduction week of BNPL installment payments. The vertical axis reflects the percentage of customers purchasing from the retailer (Panel A - Purchase incidence) and the average purchase amount in dollars conditional on purchase incidence (Panel B – Average purchase amounts).

Main Estimation Results on the Impact of the Adoption of BNPL Installment Payments on Customer Purchases

Table 5 contains the estimates on the impact of adopting BNPL installment payments on customer purchases, obtained from the difference-in-differences model specified in Equation 1. In line with the model-free insights, the effect on purchase incidence (PI) is significantly positive ($\beta_{1,PI} = .778$, $p<.01$). This effect reflects the impact of adoption on purchase incidence after the first purchase. Thus, adopters are more likely than non-adopters to purchase from the retailer in the period after adopting the BNPL installment payment option. The effect of

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adoption on purchase amount (PA) is also significantly positive ($\beta_{1,PA}$ = .100, p<.01). In line with our model-free evidence, these results indicate that customers who adopt BNPL installment payments are more likely to make a purchase from the retailer and purchase for a larger amount after adoption compared to customers who did not adopt.

Table 5
Main Impact of BNPL Installment Payment Adoption on Purchase Incidence and Purchase Amount

	Purchase Incidence	Purchase Amount
Adoption	.778***	.100***
	(.011)	(.007)
Customer fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
N	2,400,000	341,052

Notes: Standard errors clustered at the customer level appear in parentheses. The Adj.R^2 for the purchase amount model equals .19. *** $p < .01$, ** $p < .05$, * $p < .10$

Effect Sizes

To understand the economic significance of our estimation results, we calculate the effect size based on the estimates. For the purchase incidence model, we calculate the average marginal effect. This indicates that the probability of purchase, on average, increases by 8.96 percentage points (i.e., the average purchase probability of 16.64% before adoption increases to an average of 25.60% after adoption). For the purchase amount model, because of the log-linear link between purchases amount (which is natural log-transformed) and the dummy capturing the adoption effect (which enters the model linearly), the effect size translates to an average increase of approximately 10.52% (i.e., exp(0.100)-1) in dollar value (i.e., the average purchase amount of $66.56 before adoption increases to an average of $73.56 after adoption).

Robustness Checks

We conduct a series of robustness checks to verify the robustness of our main effects (Goldfarb, Tucker and Wang 2022). We summarize and motivate these robustness checks in Web Appendix B and report detailed results. Overall, we find that our results hold up across a vast range of possible models, with evidence of robustness against (i) using alternative non-adopting (control customers), (ii) using alternative adopting (treatment) customers, (iii) using an

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alternative dependent variable (number of items purchased), and (iv) possible selection on unobservables[13]. In addition, we show that the effect persists over time and is not driven by short-term adjustments in spending. In Web Appendix C, we further illustrate that the effect was not significantly influenced by the number of COVID cases during our sample period.

Heterogeneity in the Effect of BNPL Installment Payments on Purchase Incidence and Amount

Our main analysis suggests a positive and significant effect of BNPL adoption on purchase incidence and amount. Now, we extend our analysis by exploring heterogeneity in the effect. Heterogeneous effects can be used to shed light on behavioral mechanisms (Goldfarb, Tucker and Wang 2022). Specifically, a moderation analysis can provide initial insights into the proposed mechanism by "identifying which groups would be affected by a certain mechanism that would display the causal effect of interest" (Goldfarb, Tucker and Wang 2022, p.15). Furthermore, a moderation analysis can provide managerially relevant insights into which customer groups may be more responsive to BNPL installment payments.

By segregating costs, we proposed that BNPL installment payments reduce perceived financial constraints, increasing spending. Because well-off customers are less sensitive to financial constraints, we would expect that financially constrained customers will perceive more benefits from BNPL installment payments. Hence, the effect of BNPL installment payments may be stronger among financially constrained customer groups. As customers' financial constraints are unobserved, we draw on prior literature to identify two possible observable proxy variables. First, previous research suggests that reliance on credit (vs. debit) can serve as a proxy variable for customers' financial constraints. Specifically, more financially constrained households are more likely to use credit (vs. debit) cards than less financially constrained

[13] Our main effects are positive and significant ($p < .01$) in all robustness checks (see Table WB1 in Web Appendix B). It is unlikely that every robustness check will yield the same-sized point estimate (Goldfarb et al. 2022, p.14). Across robustness checks, the average effect sizes (i.e., +6.78 percentage points for purchase incidence and +13.5 percent for purchase amount) are of similar magnitudes as our main estimates (i.e., +8.96 percentage points for purchase incidence and +10.5 percent for purchase amount).

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households (Borzekowski, Kiser and Ahmed 2008). Second, prior research suggests that a customer's typical basket size can also serve as a proxy for financial constraints. For instance, Bell and Latin (1998) examine differences between small and large basket shoppers, and find that small basket shoppers are significantly more financially constrained. Similarly, average basket sizes tend to be smaller for more financially constrained customers (Noble et al. 2017). Thus, financial constraints can possibly be proxied by credit card spending and basket size (Borzekowski, Kiser and Ahmed 2008, Bell and Latin 1998, Noble et al. 2017). Empirically, we examine whether the adoption of BNPL installment payments has a differential impact on purchase incidence and purchase amount depending on two customer characteristics: (1) heavier (vs. lighter) credit card shoppers, and (2) smaller (vs. larger) basket size shoppers. We construct the first measure based on a customer's historical reliance on credit (i.e., their share of historical spending by credit versus debit, 'average credit share$_i$', M = 83.76, SD = .33) across the pre-introduction window. We construct the second measure based on a customer's historical basket sizes (i.e., the average dollar value of their basket, 'average basket size$_i$', M = 66.59, SD = 45.54) across the pre-introduction window[14].

We investigate whether BNPL installment payments have a significantly differential impact between customers by estimating Equation 1 with additional interaction terms (Goldfarb, Tucker and Wang 2022). Specifically, we estimate Equation 2, in which we allow interactions between the focal parameter of interest and a customer's historical average credit share and purchase amount:

$$(2)\ Y_{it} = \alpha_i + \delta_t + \beta_1\,\text{Adoption}_{it} + \beta_2\,\text{Adoption}_{it} \times \ln(\text{Average credit share}_i) + \beta_3\,\text{Adoption}_{it} \times \ln(\text{Average basket size}_i) + \beta_4\,\text{Post}_t \times \ln(\text{Average credit share}_i) + \beta_5\,\text{Post}_t \times \ln(\text{Average basket size}_i) + \varepsilon_{it}$$

[14] Our results are robust against using an alternative measure of basket size (i.e., the average number of items in their basket, M = 4.83, SD = 3.33). Specifically, we still find a negative and significant moderating effect of basket size in both the purchase incidence and amount models ($\beta_{3,PI}$ = -.212, p<.01, $\beta_{3,PA}$ = -.023, p<.10), and a positive and significant moderating effect of credit share in the purchase incidence model ($\beta_{2,PI}$ =.031, p<.01) and a positive insignificant moderating effect of credit share in the purchase amount model ($\beta_{2,PA}$ =.003, p=.28).

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Note that the main effects of 'average credit share$_i$' and 'average basket size$_i$' are absorbed by the customer fixed effects. We mean-center the natural logarithm of ' average credit share$_i$' and 'average basket size$_i$' for ease of interpretability[15]. Therefore, β_1 reflects the adoption effect for customers with average levels of credit share and basket size. β_2 and β_3 are the coefficients of interest. β_2 captures the moderating effect of credit share on the outcome variable after adoption, and β_3 captures the moderating effect of average basket size. β_4 and β_5 are two lower-order interaction terms for control that are not absorbed by the customer and time fixed effects[16]. In the purchase amount model, the dependent variable is the natural logarithm of purchase amounts (in $).

Table 6 reports the results, indicating negative and significant interaction effects between adoption and average basket size in the purchase incidence model ($\beta_{3,PI}$ = -.211, p<.01), and in the purchase amount model ($\beta_{3,PA}$ = -.071, p<.01). In line with our expectations, this indicates that the positive effects of adoption on purchase incidence are less pronounced among larger basket shoppers than among smaller basket shoppers. The results also confirm an expected positive and significant interaction of adoption and average credit share in the purchase incidence model ($\beta_{2,PI}$ = .031, p<.01), and a positive but insignificant interaction effect in the purchase amount model ($\beta_{2,PA}$ = .003, p=.29). A simple slope analysis further reveals that the effects remain statistically significant at high and low level of average basket size and credit share (see Web Appendix D).

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Table 6
Moderating Impact of Average Credit Share and Average Basket Size

	Purchase Incidence	Purchase Amount
Adoption (β_1)	.791***	.082***
	(.011)	(.006)
Adoption × average credit share (β_2)	.031***	.003
	(.004)	(.003)
Adoption × average basket size (β_3)	-.211***	-.071***

[15] Because 'average credit share$_i$' can equal zero, we added a small value (.0001) prior to the log-transformation.
[16] Recall that Adoption$_{it}$ equals 1 among adopters in the post period. In other words, it reflects an interaction between a dummy variable that equals 1 among adopters (Adopter$_i$) and a dummy variable that equals 1 in the post period (Post$_t$) (i.e., Adopter$_i$ × Post$_t$). In Equations 1 and 2, the main effect of Adopter$_i$ is absorbed by the customer fixed effects, and the main effect of Post$_t$ is absorbed by the time fixed effects. When allowing for heterogenous customer effects in Equation 2 (e.g, Adopter$_i$ × Post$_t$ × Average credit share$_i$), the lower-order interaction term 'Post$_t$ × Average credit share$_i$' is not absorbed by the fixed effects.

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	(.020)	(.013)
Post × average credit share (β_4)	-.041***	.003
	(.003)	(.002)
Post × average basket size (β_5)	.127***	-.449***
	(.015)	(.010)
Customer fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
N	2,400,000	341,052

Notes: Standard errors clustered at the customer level appear in parentheses. The Adj.R^2 for the purchase amount model equals .21.*** $p < .01$, ** $p < .05$, * $p < .10$

Study 1 Discussion

Study 1 indicates that the adoption of BNPL installment payments is associated with increases in customer's purchase incidence and purchase amount. The effect is economically and statistically significant over time, and is robust against using alternative groups of adopters and non-adopters. Our analysis of heterogeneity shows that the effect is more pronounced among smaller (vs. larger) basket size shoppers and credit (vs. debit) credit card shoppers.

Although the analyses in Study 1 indicate that BNPL installment payments are associated with increased spending, Study 1 is subject to two key limitations that we seek to address in subsequent studies. First, in an ideal setting, the retailer would have randomly assigned a customer to a single payment condition, which was infeasible in this context. Therefore, Study 1 relied on matching on observables to improve the comparability between adopting and non-adopting customers. The absence of unobservable characteristics (e.g., income) in the matching may bias our results if such characteristics affect both adoption and purchase behavior. Matching on behavioral characteristics may in part mitigate this concern (e.g., due to correlation between behavior and income). To alleviate concerns about selection on unobservables, we conducted a robustness check that replicates the analysis using within-adopter variation, where late adopters (instead of non-adopters) act as a control for early adopters (Yan, Millar, and Skiera 2022; Iyengar, Park, and Yu 2022). This can mitigate possible selection on unobservable customer characteristics that are shared by early and late adopters. A potential solution to deal with an unexplained part of the adoption decision related to our outcome measures would be to estimate a selection model. However, this is "only useful for

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causal inference in the presence of a strong credible exclusion restriction" (Goldfarb, Tucker and Wang 2022 p.13). We were unable to implement a selection model because we do not have strong and credible observables that only affect adoption but not the outcome variable. Thus, we lack exogenous variation in the adoption decision, which we note as a caveat of this study. Second, Study 1 provides limited insight into the impact of BNPL installment payments on customers' perceived financial constraints.

Our experiments address these limitations through (i) random assignment of payment methods and (ii) testing the underlying mechanisms. By independently manipulating payment methods, the experiments test the causal effect of BNPL installment payment on spending in a more controlled setting. We also shed more light on the mechanism proposed in our conceptual framework (see Figure 3). Specifically, the experiments show that perceived financial constraints mediate the effect of BNPL installments on spending (Studies 2 and 4) while addressing alternative explanations (e.g., price attractiveness, feelings of being misled, perceived benefits, construal level; Studies 3 and 4). We also demonstrate that BNPL installments alleviate perceived financial constraints by reducing perceived costs and boosting budget control (Study 4). The experiments indicate that the effect of BNPL installments is robust across different products (e.g., party supplies, apparel, flights) and number of installments (e.g., three installments, four installments, six installments).

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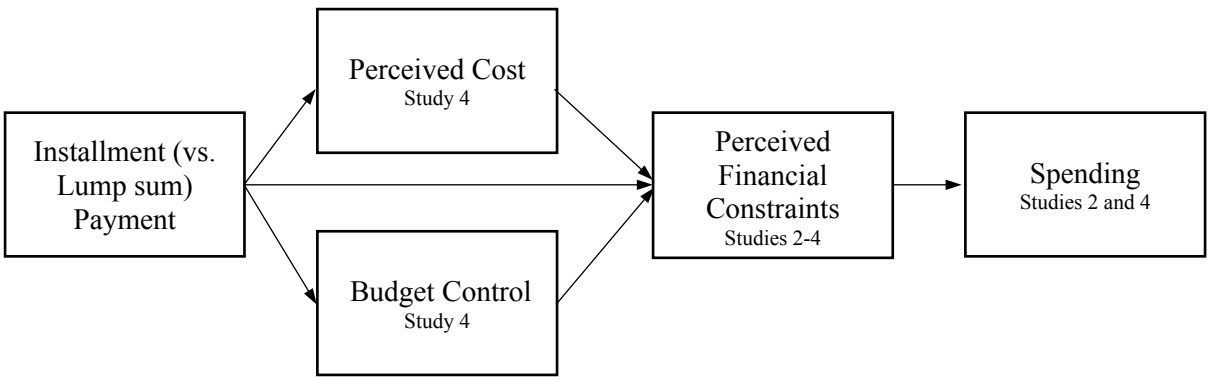
Figure 3
Conceptual Framework and Overview of Experiments



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Study 2 – The Mediating Role of Perceived Financial Constraints

We propose that BNPL installment (vs. lump sum) payments reduce perceived financial constraints, increasing spending. To test these predictions in a more controlled setting, we created a shopping task where participants were randomly assigned to an installment or lump sum payment condition. In the lump sum payment condition, payment was delayed such that full payment was due at the end of six weeks. Prior research has shown that delaying payment increases spending (Raghubir and Srivastava 2008). If delaying payment is the sole driver for our effect, we would expect participants in the delayed lump sum payment condition to spend more than their counterparts in the installment condition since payments need to be made earlier in the installment than in the delayed lump sum payment condition. However, if segregating vs aggregating costs contributes to the effect, we would expect participants in the installment condition to spend more than those in the delayed lump sum condition.

Method

We pre-registered this experiment using AsPredicted (https://aspredicted.org/tn7bs.pdf). Four hundred participants were recruited on CloudResearch in exchange for a small monetary payment. Participants who failed the attention checks were excluded from the analysis, leaving a final sample of n = 391 (52.4% male, 47.6% female, M_{age} = 40.59). We randomly assigned participants to one of two payment conditions: lump sum or installment payment.

All participants were given a shopping task where they imagined that they were planning a Halloween party and needed to get some supplies. In the lump sum condition, participants adopted a payment method where they paid for the entire amount in six weeks. In the installment condition, participants paid in four bi-weekly installments where they paid the fourth installment in six weeks. In both conditions, the payment methods incurred no interest and no fees if they were paid on time.

Next, participants made five decisions where they could purchase several items for each product category (e.g., decorations, games, sweet treats). To mimic a real-life shopping

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environment, participants had four to six items to choose from and could pick more than one item for each decision. Prices were shown for every item. In the installment condition, these prices were also split into four installments (e.g., Halloween Party Deco Kit $10 – 4 installments of $2.50). All participants indicated the items they wished to purchase. After the shopping task, participants in the lump sum condition were shown the total cost of the selected items. In the installment condition, we also showed the total cost split across four bi-weekly installments. The manipulations are included in Web Appendix E.

After completing the shopping task, we measured perceived financial constraint with the following three items adapted from Paley, Tully, and Sharma (2019): (1) "To what extent does this payment method make you feel financially constrained" (1 = not at all financially constrained, 9 = very financially constrained), (2) "To what extent does this payment method allow you to spend as much as you like" (reverse-coded, 1 = not at all, 9 = very much), (3) "To what extent does the payment method help with your financial situation" (reverse-coded, 1 = does not help at all, 9 = very helpful). Finally, participants responded to an attention check and completed the manipulation check and the demographic measures.

Results

Manipulation checks. Consistent with our manipulations, participants in the installment condition described the payment more as 'ongoing installments' compared to their counterparts in the lump sum conditions ($M_{installment}$ = 8.00, SD = 1.96 vs. $M_{lump\ sum}$ = 2.22, SD = 2.32, t(389) = -26.56, p <.001, cohen's d = -2.69). Participants in the lump sum condition regarded the payment as more deferred than their counterparts in the installment condition ($M_{installment}$ = 7.53, SD = 1.92 vs. $M_{lump\ sum}$ = 8.12, SD = 1.91, t(389) = 3.03, p <.001, cohen's d = .31). This is consistent with the manipulations, as the installment condition required payments to be made sooner than the lump sum condition.

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Perceived financial constraints. The three items assessing financial constraints were averaged such that a higher number indicated greater perceived financial constraints (α =.58)[17]. As predicted, participants in the installment condition felt less financially constrained than their counterparts in the lump sum condition ($M_{installment}$ = 4.09, SD = 1.69 vs. $M_{lump\ sum}$ = 4.83, SD = 1.79, t(389) = 4.14, p <.001, cohen's d = .42).

Spending. As predicted, participants in the installment condition purchased more items than their counterparts in the lump sum condition ($M_{installment}$ = 9.92, SD = 4.18 vs. $M_{lump\ sum}$ = 9.27, SD = 3.07, t(389) = -1.74, p =.082, cohen's d = -.18). We also examined the effect of the payment method on the total amount of money participants spent in the shopping task. As expected, participants in the installment condition spent more money than those in the lump sum condition ($M_{installment}$ = \$89.42, SD = \$40.95 vs. $M_{lump\ sum}$ = \$77.46, SD = \$30.86, t(389) = -3.27, p =.001, cohen's d = -.33).

Mediation. We then examined if perceived financial constraints mediated the effect of payment method on the number of items purchased using PROCESS Model 4 (Hayes 2017). Consistent with our predictions, perceived financial constraints mediated the effect of installment payment on the number of items purchased (indirect effect = .31, 95% CI [.12 .57], 10,000 resamples). We also examined if perceived financial constraints mediated the effect of payment method on the total amount spent using PROCESS Model 4 (Hayes 2017). Consistent with our predictions, perceived financial constraints mediated the effect of installment payment on the total amount spent (indirect effect = 3.31, 95% CI [1.27 6.05], 10,000 resamples). These results show that perceived financial constraints are an underlying mechanism for the effect of BNPL installments on spending.

Study 2 Discussion

[17] The Cronbach's alpha of .58 was lower than expected in this study. Studies 3-4 use another 4-item scale as described in Study 3 and demonstrate high reliability (α=.85 in Study 3, and α=.93 in Study 4).

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Study 2 provided causal evidence that BNPL installment payments increased spending compared to an equivalent lump sum payment[18]. Moreover, differences in perceived financial constraints explained the effect of BNPL installment payments on spending. Specifically, participants who paid in installments (vs. lump sum) felt less financially constrained and spent more. In this experiment, both payment methods did not incur any interest, limiting the possibility that participants thought they had more money to spend in the installment payment condition due to the lack of interest. Furthermore, both payment methods were deferred. Participants perceived the installment condition (i.e., four installment payments over six weeks) as less deferred than the lump sum condition (i.e., one lump sum payment in six weeks). This mitigates the possibility that participants spent more in the installment (vs. lump sum) condition due to the delay in payment.

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Study 3 – The Effect of BNPL Installment Payments on Perceived Financial Constraints and Alternative Mechanisms

Study 2 demonstrated that BNPL installment payments (vs. a delayed lump sum payment) are perceived to be less financially constraining. The goal of Study 3 is to examine alternative mechanisms for the effect of segregating payment. First, segregating prices has been shown to increase perceived benefits and, in turn, purchase intentions (Atlas and Bartles 2018). Correspondingly, segregating payments into BNPL installments could have a similar effect. Second, segregated prices have been found to elicit feelings of being misled as customers find segregated prices more complex and become skeptical of the marketer's motives (Bambauer-Sachse and Mangold 2009; Bambauer-Sachse and Grewal 2011). Similarly, segregating payments into BNPL installments could be deemed complex and misleading. Third, segregating prices into smaller terms has been found to enhance price attractiveness. Specifically, segregated

[18] A pre-registered supplementary study in Web Appendix F replicates the findings of Study 2 using causal chain experiments. The first experiment examines the impact of BNPL installments on perceived financial constraints, and the second experiment manipulates perceived financial constraints to examine its causal impact on spending (see Web Appendix F for details on the method and results).

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prices ("€2 per day") were deemed as more well-priced and a better deal than aggregated prices ("€60 per month"; Bambauer-Sachse and Grewal 2011). Although the aggregate term was present, segregating payment into smaller installments could increase price attractiveness. Therefore, we measured perceived benefits, feelings of being misled, and price attractiveness to explore whether they might play a role in our context.

Furthermore, prior research has shown that consumers prefer payment schemes that match the pattern of benefits they gain from purchases (Auh, Shih, and Yoon 2008). Since Study 2 used supplies for an upcoming party, its pattern of benefits could be relatively short. Thus, BNPL installments might increase purchase likelihood as it requires an upfront payment, aligning the benefits of the purchase with its payment scheme. Therefore, Study 3 uses a product for which consumption should exceed the payment period (i.e., a T-shirt, which on average lasts about 2.20 years; The Guardian 2019).

Method

As pre-registered on AsPredicted.org (https://aspredicted.org/py9ai.pdf), six hundred participants were recruited on Prolific in exchange for a small monetary payment. Participants who failed the attention checks were excluded from the analysis, leaving a final sample of n = 599 (35.6% male, 64.1% female, .3% others, M_{age} = 41.50). All participants read a hypothetical scenario where they bought a T-shirt with a price of $24. Spending was kept constant across conditions to isolate the impact of installment payments on the mechanisms (i.e., without possible influence of spending on the mechanisms). They were randomly assigned into one of three payment conditions: (i) an upfront lump sum condition (i.e., pay $24 now), (ii) a delayed lump sum condition (i.e., pay $24 in 30 days), or (iii) an installment condition (i.e., pay in 3 installments of $8). All payment conditions incurred no interest and fees if they were paid on time.

Next, perceived financial constraints were measured using four items: To what extent does the payment method (1) make you feel less financially constrained, (2) allow you to spend

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as you like, (3) improve your financial situation over others, (4) help with your financial situation (1 = Not at all, 9 = Very much; α = .85; adapted from Paley et al. 2019). These items were reverse-coded and averaged such that a higher number indicated higher perceived financial constraints.

To examine alternative mechanisms, we also measured perceived benefits of the purchase on the following four items: (1) I would get a lot of pleasure from this purchase, (2) I would miss out on benefits if I did not have this purchase, (3) I would benefit a lot from having this purchase, (4) This purchase would not be very beneficial for me [reverse-scored] (1 = strongly disagree, 9 = strongly agree, Atlas and Bartels 2018; α = .77). We assessed feelings of being misled on five items: (1) The presentation of the price is unclear, (2) I cannot understand the price at a glance, (3) The price information is quite complex, (4) My friends would judge this price as an unfair price, (5) This seller has the intention of misleading customers (1 = strongly disagree, 9 = strongly agree; Bambauer-Sachse and Grewal 2011; α =.79). Price attractiveness was also measured on the following three items: (1) In general, this product is well-priced, (2) The product price is attractive, (3) Compared to similar products' prices, this price is a good deal (1 = strongly disagree, 9 = strongly agree, Bambauer-Sachse and Grewal 2011; α = .95).

As manipulation checks, participants also indicated how they regarded the payment method on two items (1 = lump sum, 9 = ongoing installments; 1 = now, 9 = deferred). Cost awareness was also measured by asking participants to indicate the price of the T-shirt on a slider scale, ranging from $0 to $50. Finally, participants responded to an attention check and reported their demographic details (see Web Appendix G for stimuli and measures).

Results

Manipulation checks. A one-way ANOVA revealed a significant difference across payment conditions on the perceptions of ongoing installments ($F(2, 595) = 601$, $p < .001$, $\eta^2 =$

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.67). Consistent with our manipulations, participants in the installment condition described the payment more as ongoing installments than their counterparts the lump sum conditions ($M_{installment}$ = 8.31, SD = 1.33 vs. $M_{upfront\ lump\ sum}$ = 1.43, SD = 1.50, $M_{delayed\ lump\ sum}$ = 3.09, SD = 3.00, t(596) = -32.10, p <.001, cohen's d = -2.78). As expected, there are also significant differences across payment conditions on whether the payment is deferred (F(2, 595) = 1349, p <.001, η^2 = .82). Post-hoc comparisons using a Tukey HSD test indicated that the installment condition was regarded as significantly more deferred than the upfront lump sum condition ($M_{installment}$ = 7.67, SD = 1.64 vs. $M_{upfront\ lump\ sum}$ = 1.33, SD = 1.19, p <.001), but less deferred than the delayed lump sum condition ($M_{installment}$ = 7.67, SD = 1.64 vs. $M_{delayed\ lump\ sum}$ = 8.30, SD = 1.57, p <.001). These findings were consistent with the manipulations. Participants did not differ significantly across conditions on cost awareness (F(2, 595) = 0.07, p = .935, η^2 = .00), with participants indicating an average of $24 in all three conditions ($M_{installment}$ = $24.00, SD = 2.60, $M_{delayed\ lump\ sum}$ = $24.00, SD = 0.76, $M_{upfront\ lump\ sum}$ = 24.00, SD = 0.24).

Perceived financial constraints. As predicted, there were significant differences in perceived financial constraints across payment conditions (F(2,595) = 12.19, p <.001, η^2 = .039). Participants in the installment condition felt less financially constrained than their counterparts in the lump sum conditions ($M_{installment}$ = 5.48, SD = 2.29 vs. $M_{delayed\ lump\ sum}$ = 6.05, SD = 2.23 and $M_{upfront\ lump\ sum}$ = 6.51, SD = 1.71, t(596) = 4.42, p <.001, cohen's d = .38). Post-hoc comparisons using a Tukey HSD test also indicated that participants in the installment condition felt less financial constrained than their counterparts in the delayed lump sum condition ($M_{installment}$ = 5.48, SD = 2.29 vs. $M_{delayed\ lump\ sum}$ = 6.05, SD = 2.23, p = .018) and upfront lump sum condition ($M_{installment}$ = 5.48, SD = 2.29 vs. $M_{upfront\ lump\ sum}$ = 6.51, SD = 1.71, p <.001).

Alternative mechanisms. There were no significant differences across payment conditions on feelings of being misled (F(2,595) = 2.35, p =.096, η^2 = .008), perceived benefits

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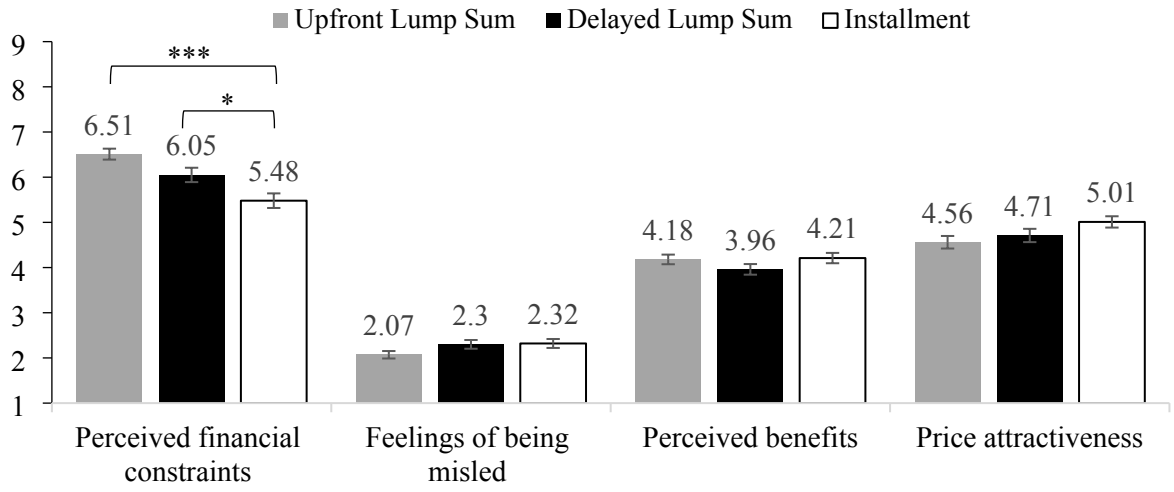
($F(2,595) = 1.50$, $p = .224$, $\eta^2 = .005$) and price attractiveness across payment conditions ($F(2,595) = 2.83$, $p = .060$, $\eta^2 = .009$). Post-hoc comparisons using a Tukey HSD test revealed no significant differences between the installment condition and the delayed lump sum condition in feelings of being misled ($M_{installment} = 2.32$, SD = 1.40 vs. $M_{delayed\ lump\ sum} = 2.30$, SD = 1.36, $p = .983$), perceived benefits ($M_{installment} = 4.21$, SD = 1.62 vs. $M_{delayed\ lump\ sum} = 3.96$, SD = 1.65, $p = .246$), or price attractiveness ($M_{installment} = 5.01$, SD = 1.77 vs. $M_{delayed\ lump\ sum} = 4.71$, SD = 2.06, $p = .269$). There were also no significant differences between the installment condition and the upfront lump sum condition on feelings of being misled ($M_{installment} = 2.32$, SD = 1.40 vs. $M_{upfront\ lump\ sum} = 2.07$, SD = 1.17, $p = .122$), perceived benefits ($M_{installment} = 4.21$, SD = 1.62 vs. $M_{upfront\ lump\ sum} = 4.18$, SD = 1.51, $p = .973$), or price attractiveness ($M_{installment} = 5.01$, SD = 1.77, vs. $M_{upfront\ lump\ sum} = 4.56$, SD = 1.97, $p = .052$)[19].

Figure 4
Perceived Financial Constraints, Feelings of Being Misled, Perceived Benefits, and Price Attractiveness by Payment Condition (Study 3)



Notes: * $p < .05$, ** $p < .01$, *** $p < .001$. There were no significant differences between payment conditions on feelings of being misled, perceived benefits, and price attractiveness.

[19] While our main comparison of interest is delayed lump sum vs. installment, it is noteworthy that the difference for price attractiveness between upfront lump sum vs. installment is marginally significant ($p = .052$). This suggests that segregation of payments could also influence perceived price attractiveness compared to upfront lump sum payments. We also conducted an ANCOVA to test for the effect of payment conditions on perceived financial constraints, controlling for perceived benefits, feelings of being misled, and price attractiveness. BNPL installment payment decreased perceived financial constraints, even with these covariates (see Web Appendix G for details).

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Study 3 Discussion

Study 3 showed that segregating payment into BNPL installments alleviated perceived financial constraints. This study also explored several potential alternative mechanisms. Customers might have failed to understand how BNPL payments worked and felt misled. We did not find evidence for this alternative explanation. Participants were aware of the purchase cost and did not differ in feelings of being misled across payment conditions. This finding suggests that participants were just as cognizant of the costs in BNPL payments as lump sum payments. We also did not find significant differences in price attractiveness between the delayed lump sum and the installment condition. This implies that segregating payment does not significantly affect price attractiveness.

Moreover, segregating payment did not significantly impact perceived benefits. Prior work on temporal reframing has partly attributed its effectiveness to perceived benefits. Atlas and Bartles (2018) found that framing prices in segregated terms ("25¢ a day") helped customers appreciate the recurring benefits of the contract than if the same price was framed in aggregated terms ("$90 a year"). Since BNPL is restricted to a specific number of payments for a short time ("6 weeks"), segregating payment into BNPL installments could have a limited impact on perceived benefits.

BNPL installment payment decreased perceived financial constraints, even after controlling for these alternative mechanisms (see Web Appendix G for details). Overall, our findings suggest that segregating payment alleviates perceived financial constraints, even when participants know the purchase cost, are not misled, and perceive similar benefits from the purchase.

Study 4 – Testing the Full Model

While Studies 2 and 3 demonstrated that BNPL installment payments reduced financial constraints, Study 4 aimed to unpack the link between BNPL installment payments and perceived financial constraints by examining two plausible underlying constructs. We proposed

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that segregating payment into BNPL installments lowers perceived financial constraints by making purchases seem less costly and facilitating control over one's budget[20]. Thus, Study 4 was designed to examine the full model, whereby BNPL installment payments reduce perceived cost and increase budget control, thereby reducing perceived financial constraints and, in turn, increasing purchase likelihood.

Study 3 demonstrated the effect of BNPL installments for products whose benefits exceed the payment period. Study 4 aimed to generalize the effect of BNPL installment payments on purchase intentions when benefits do not exceed the payment period (i.e., for a flight booked six weeks in advance).

Study 4 also aimed to examine two alternative explanations for our effect. One alternative explanation is the pattern alignment hypothesis: "consumers prefer payment schemes that match the pattern of benefits and payments in each period, rather than a scheme that encompasses an entire financing period" (Auh et al., 2008, p. 292). To examine if the pattern alignment hypothesis drives our effects, Study 4 utilized a flight booked six weeks in advance as it offers a one-off benefit six weeks later. Since BNPL requires an upfront payment with additional installment payments before consumption, some payments are made before the benefits occur. In contrast, the pattern of benefits is more aligned with delayed lump sum payment as both the flight and payment are due in six weeks. By showing that BNPL installment still works in this context, we illustrate that our effects are not just driven by a preference to align payment with the pattern of consumption benefits (Auh et al. 2008). Second, we also investigated the possibility that installment (vs. delayed lump sum) payments could induce different mental construals to influence spending (Chen, Xu and Shen 2017).

Method

[20] A pre-registered supplementary study in Web Appendix H provides additional evidence for installment (vs. lump sum) payments reducing perceived costs and increasing budget control to reduce perceived financial constraints (see Web Appendix H for details on the method and results).

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As pre-registered on AsPredicted.org (https://aspredicted.org/ra49n.pdf), four hundred participants were recruited on Prolific for a small monetary payment. Participants who failed the attention checks were excluded from the analysis, leaving a final sample of n = 399 (50.6% male, 48.6% female, .8% others, M_{age} = 42.50). All participants read a hypothetical scenario where they were planning for an upcoming trip that was happening in six weeks and found a flight for $59.10. They were randomly assigned to either a delayed lump sum (i.e., pay $59.10 in 6 weeks) or installment (i.e., pay 6 installments of $9.85) payment condition.

Next, purchase likelihood was assessed on two questions on an 11-point scale (0 = Not at all, 10 = Very much; adapted from Atlas and Bartels 2018; α =.86). We then measured perceived financial constraints using four questions (e.g., To what extent does the payment method make you feel less financially constrained, reverse-coded, 0 = Not at all, 10 = Very much; α =.93; adapted from Paley et al. 2019), perceived cost using four questions (e.g., To what extent does the payment method make the cost of the product trivial, reverse-coded, 0 = Not at all, 10 = Very much; α = .89; adapted from Atlas and Bartles 2018), and budget control using four questions (e.g., To what extent does the payment method give you the ability to maintain a budget, 0 = Not at all, 10 = Very much; α = .98; adapted from Kidwell and Turrisi 2004). Participants also completed the Behavioral Identification Form to test for the role of construal level (Chen, Xu and Shen 2017; adapted from Vallacher, Robin and Wegner 1989). Finally, they completed the manipulation checks regarding the payment methods and reported their demographic details (see Web Appendix I for stimuli and measures).

Results

Manipulation checks. Consistent with our manipulations, participants in the installment condition described the payment as more ongoing installments than their counterparts in the lump sum condition ($M_{installment}$ = 9.37, SD = 1.43 vs. $M_{delayed\ lump\ sum}$ = 3.58, SD = 4.28, t(397) = -18.09, p <.001, cohen's d = -1.81). As expected, participants in the delayed lumpsum condition regarded their payment as more deferred than their counterparts in the installment condition

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($M_{delayed\ lump\ sum}$ = 9.13, SD = 1.79 vs. $M_{installment}$ = 8.54, SD = 2.23, t(397) = 2.90, *p* =.004, cohen's d = .29).

Purchase likelihood. As predicted, purchase likelihood was higher in the installment condition than in the delayed condition ($M_{installment}$ = 6.35, SD = 3.30 vs. $M_{delayed\ lump\ sum}$ = 5.67, SD = 3.55, t(397) = -2.00, *p* =.046, cohen's d = -.20).

Perceived financial constraints. In line with our predictions, participants in the installment conditions felt less financially constrained than their counterparts in the delayed lump sum condition ($M_{installment}$ = 4.50, SD = 3.09 vs. $M_{delayed\ lump\ sum}$ = 5.19, SD = 3.21, t(397) = -3.69, *p* =.028, cohen's d = .22).

Perceived cost. As expected, participants in the installment condition perceived payment as less costly than their counterparts in the delayed lumpsum condition ($M_{installment}$ = 4.51, SD = 2.94 vs. $M_{delayed\ lump\ sum}$ =5.54, SD = 3.01, t(397) = 3.43, *p* <.001, cohen's d = .34).

Budget control. Participants in the installment condition perceived higher budget control than their counterparts in the delayed lumpsum condition ($M_{installment}$ = 6.57, SD = 3.12 vs. $M_{delayed\ lump\ sum}$ = 5.60, SD = 3.36, t(397) = -3.00, *p* =.003, cohen's d = -.30).

Construal level. There were no significant differences between payment conditions on construal level ($M_{installment}$ = 8.65, SD = 6.08 vs. $M_{delayed\ lump\ sum}$ = 9.21, SD = 6.42, t(397) = 0.91, *p* =.37, cohen's d = .09), suggesting that participants perceived both installment and delayed lump sum payment just as concretely.

Serial mediation. As pre-registered, we used the serial mediation bootstrapping methodology (Hayes 2017; Model 80) with payment conditions as the independent variable, perceived cost and budget control as the first mediators, perceived financial constraints as the second mediator, and purchase likelihood as the dependent variable (Figure 5). The serial mediation was significant. BNPL installment payments made costs seem more trivial, reducing perceived financial constraints, and increasing spending (indirect effect $_{perceived\ costs}$ = .16, 95% CI [.06 .28]. BNPL installment payments also increased budget control, reducing perceived

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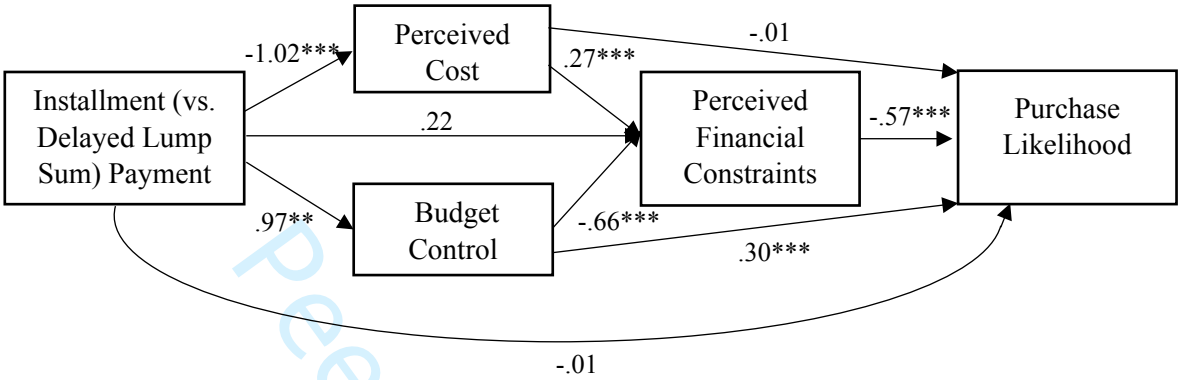
financial constraints, and increasing spending (indirect effect $_{\text{budget control}}$ = .37, 95% CI [.12 .65]) (see Web Appendix I for additional details on the analysis).

Figure 5
Serial Mediation Model (Study 4)



Notes: * p <.05, ** p <.01, *** p<.001.

Study 4 Discussion

Study 4 provided evidence for our full model. We showed that BNPL installment payments reduced perceived costs and facilitated budget control, thereby reducing perceived financial constraints, which in turn, increased purchase likelihood. This effect emerged with a product whose benefits would only materialize in six weeks. Hence, this study showed that the effect of BNPL installment generalized to purchases where the benefits and payment period were not aligned. We also examined if installment payments affected construal level and found no differences across payment conditions on how customers construed their purchases.

General Discussion

A growing number of retailers, such as ASOS, Adidas, Walmart, and Sephora, have introduced BNPL installment payments in recent years. However, the impact on customers' spending remains unclear (Bain & Company 2023; Digital Commerce 360 2023; RFI Global 2022). Our research takes the first step to examine the effects of BNPL installment payments on customers' spending. A difference-in-difference analysis indicates that BNPL installment payments increase purchase incidence and purchase amounts. These effects remain statistically and economically significant over time. Moreover, this increase in spending is greater for smaller

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(vs. larger) basket shoppers, and for shoppers who relied more heavily on credit (vs. debit) cards before adoption. Three pre-registered experiments elucidate the underlying mechanisms, showing that BNPL installments decrease perceived costs and increase budget control, alleviating perceived financial constraints and thereby increasing spending.

Practical Implications

Our findings provide several novel insights to retailers and address uncertainties about the impact of BNPL installments on customer spending (Bain & Company, 2023; Digital Commerce 360, 2023). We demonstrate that retailers benefit because adoption of installment payments leads to more frequent purchases and larger basket amounts. These effects are economically significant, with an increase in purchase incidence of approximately 9 percentage points and a relative increase in purchase amounts of approximately 10 percent in our context. In addition, we find that these effects persist over time, extending across the entire 26-week post-adoption period observed in our study. By documenting continued increased spending among customers after adopting BNPL installments, we alleviate retailer concerns about the longer-term effects of BNPL (RFI Global 2022). This finding is significant for retailers as (i) the introduction of BNPL installment payments typically incurs costs, and (ii) fees on installment transactions are higher than those on credit card payments (Bain & Company 2021).

Moreover, our studies provide retailers with insights into why these effects occur. Specifically, customers perceive paying in segregated installments ("Pay $60 in 4 bi-weekly installment payments over 6 weeks") as less financially constraining than paying in an interest-free delayed lump sum ("Pay $60 in 6 weeks"). This is, at least in part, because BNPL installments make customers feel more in control of their budget. We reveal that BNPL installments alleviate perceived financial constraints across a broad range of goods and services, irrespective of whether consumption occurs on a recurring (e.g., clothing) or a one-off (e.g., a flight) basis.

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Furthermore, our analysis of customer heterogeneity illustrates how retailers can leverage BNPL installment payments to maximize gains. Basket size and credit card usage are two behavioral characteristics commonly observed by retailers. Previous research suggests that smaller basket shoppers and heavier credit card users are, on average, more financially constrained (Bell and Latin 1998, Borzekowski, Kiser and Ahmed 2008, Noble et al. 2017). Consistent with our theorizing, we find that increases in spending are larger among customers who tend to purchase smaller (vs. larger) baskets and tend to rely more heavily on credit (vs. debit) cards. Retailers could, for example, target communication about the availability of BNPL installment payments to customers who typically purchase smaller amounts. Such a targeted approach could help optimize the financial impact of BNPL offerings.

Finally, our insights may also be of practical relevance to policymakers. Regulators are increasingly concerned about the potential impact of BNPL installment payments on customers' purchase behavior. However, there is a lack of research on the topic that can inform regulators about the effects of BNPL on actual spending. We observe that BNPL installment schemes can substantially impact customers' spending. Furthermore, our secondary data analysis suggests that more financially constrained customer groups (e.g., small basket shoppers and credit card shoppers) are more likely to rely on BNPL and increase their spending. Regulators and responsible retailers should ensure that BNPL installment payments do not have adverse implications for customers by ensuring that the provided credit is affordable.

Theoretical Implications

Our research offers novel theoretical insights into the impact of payment segregation on customers' purchase behavior. Prior literature on temporal reframing has considered the impact of framing prices in segregated terms while keeping payments aggregated (e.g., Gourville 1998; 1999; 2003). In contrast, our research examines the effects of segregating actual payments into

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installments. We show that segregating payment works beyond existing temporal reframing mechanisms by affecting perceived financial constraints[21].

By alleviating perceived financial constraints, segregating payment is effective in various contexts. First, segregating payment into BNPL installments impacts behavior even when aggregate terms are salient to customers. Whereas prior research presented segregated vs. aggregate frames independently, our findings apply to real-world contexts where both terms are presented together. Second, previous studies on temporal reframing of price primarily found effects in ongoing consumption contexts (e.g., subscriptions) but not for one-off consumption (Gourville 1999). We demonstrate that segregating payment is effective for products and services, including one-off consumption (e.g., a flight in Study 4). Third, our research shows that the effect persists even when aggregate payments are perceived to be more delayed than installment payments. Fourth, while prior work focused on cross-sectional effects using experiments, we leveraged transactional data to show that the impact of segregating payments remains statistically and economically significant over time. Fifth, we find consistent support for our effect across various categories, including durable and non-durable purchases (e.g., party supplies, flights, clothing). We also find support across varying numbers of payments (e.g., three, six) and different repayment periods (e.g., 30 days, 6 weeks).

Finally, we contribute to work on perceived financial constraints. While existing research has examined its consequences on consumer behavior (e.g., Tully, Hershfield, and Meyvis 2015; Paley, Tully, and Sharma 2019; Dias, Sharma and Fitzsimons 2022), we illustrate an antecedent by showing that segregated installment (vs. delayed lump sum) payments reduce perceived financial constraints.

Limitations and Future Research

[21] A third pre-registered supplemental study in Web Appendix J replicates the effect of BNPL installments on perceived financial constraints and purchase likelihood, and shows this effect occurs across both segregated and aggregate price frames. The results further indicate that segregated installment payments, but not segregated price frames, reduce perceived financial constraints (see Web Appendix J for details on the method and results).

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Our research takes a first step towards understanding the impact of BNPL installment payments. Future research should examine to what extent our results generalize across (i) retailers and industries, (ii) later adopters of BNPL installment payments, and (iii) time periods[22]. More research is needed to determine how the magnitude of the effect is moderated by financially constraining times such as economic recessions and periods of high inflation. As BNPL grows in popularity, future work could examine how the maturity of installment payments affects its impact. For example, research on cashless (vs. cash) payments has shown that the positive effect on spending has diminished in size over the years (Liu and Dewitte 2021; Schomburgk, Belli, and Hoffmann, in press). The impact of BNPL maturity might also depend on (1) the extent to which BNPL decreases spending from other retailers in the same category (i.e., substitution between retailers) and (2) the extent to which BNPL increases total category spending across retailers (i.e., expansion). Access to data from multiple retailers could help identify potential substitution versus expansion effects.[23] Another promising research area would be to investigate the impact on the types of products customers purchase. For instance, prior work on perceived financial constraints suggests that financially constrained customers are more likely to spend their money on material rather than experiential purchases (Tully et al. 2015).

Moreover, we do not observe the costs of the BNPL program. While sales revenues increase, the profitability of BNPL installment payment services depends on whether the increase in revenue outweighs the additional cost of the service. Future work should also examine whether and how BNPL installments may impact return behavior. Additionally, while adopters heavily rely on BNPL installment payments at the focal retailer, future work could identify what drives customers to use a given payment method at a particular point in time. For

[22] We acknowledge that Study 1 covers transactional data during the Covid pandemic. However, we use a control group of BNPL non-adopters that were similarly affected by the pandemic and our estimation includes time fixed effects (see Web Appendix C for a detailed discussion). Furthermore, all the experiments were conducted post-pandemic.

[23] Anecdotal evidence suggests a possible expansion effect, with 10% of 50,000 consumers in over 50 markets reporting to have used BNPL to make purchases they would have otherwise not made (Mastercard World Payments Advisory 2022). While the presence of a substitution effect might lead to smaller effects if BNPL matures, the presence of an expansion effect would suggest that the BNPL effect might not disappear fully even if offered more widely across retailers.

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instance, this may depend on customers' credit card billing cycle, available credit, and the nature of the purchase (e.g., its necessity and its alignment with the timing of benefits obtained from consumption; Auh et al. 2008).

Future research could examine the roles of alternative mechanisms and theories, including those related to mental accounting (Thaler 1985; 1999; 2008), liquidity constraints (Beltramo et al. 2015), and net present value[24]. Additionally, future work should investigate whether BNPL has adverse implications for customers by exploiting financial decision-making biases. For instance, future research could examine whether people are overly optimistic about future payments by studying the role of intertemporal discounting (Prelec and Loewenstein 1998).

Despite the benefits of BNPL for retailers, concerns have emerged about its possible adverse effects on financial well-being, especially for vulnerable customers. For instance, the Dutch Authority for Financial Markets has expressed fears about BNPL usage among minors, with customers under 35 most likely to face debt collection (AFM 2024). The issue of unsecured debt is further compounded by customers charging BNPL payments to credit cards, which is most prevalent in younger individuals and those living in deprived areas (Guttman-Kenney, Firth, and Gathergood, 2023). BNPL usage also increases the likelihood of incurring overdraft fees (deHaan et al. 2024; Di Maggio, Williams, and Katz 2022). As such, BNPL can create financial pressure on vulnerable customers (Sheth 2024, Solá 2024) and lower perceived financial well-being (Schomburgk and Hoffmann 2022). Moreover, BNPL credit often does not appear in credit reports, leading to a "phantom debt" estimated at approximately $46 billion (Sheth 2024). In response to these concerns, policymakers are implementing regulations (Mandell and Lawrence; Soni 2023), such as increasing cost transparency through billing statements to protect customers (Sheth 2024). Future research should examine whether and to

[24] The role of net present value was likely limited in Study 1 due to consistently low interest rates during our sample period in the United States and considering the relatively short repayment period (6 weeks).

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what extent regulatory measures affect spending, debt, and financial well-being, particularly among vulnerable customers.

Finally, while Study 1 captures actual spending, the experiments rely on intentions to spend. Future work should use incentive-compatible designs and experimentally induced budget constraints to study the impact of BNPL.

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WEB APPENDIX

Buy Now Pay Later: Impact of Installment Payments on Customer Purchases

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These materials have been supplied by the authors to aid in the understanding of their paper. The AMA is sharing these materials at the request of the authors.

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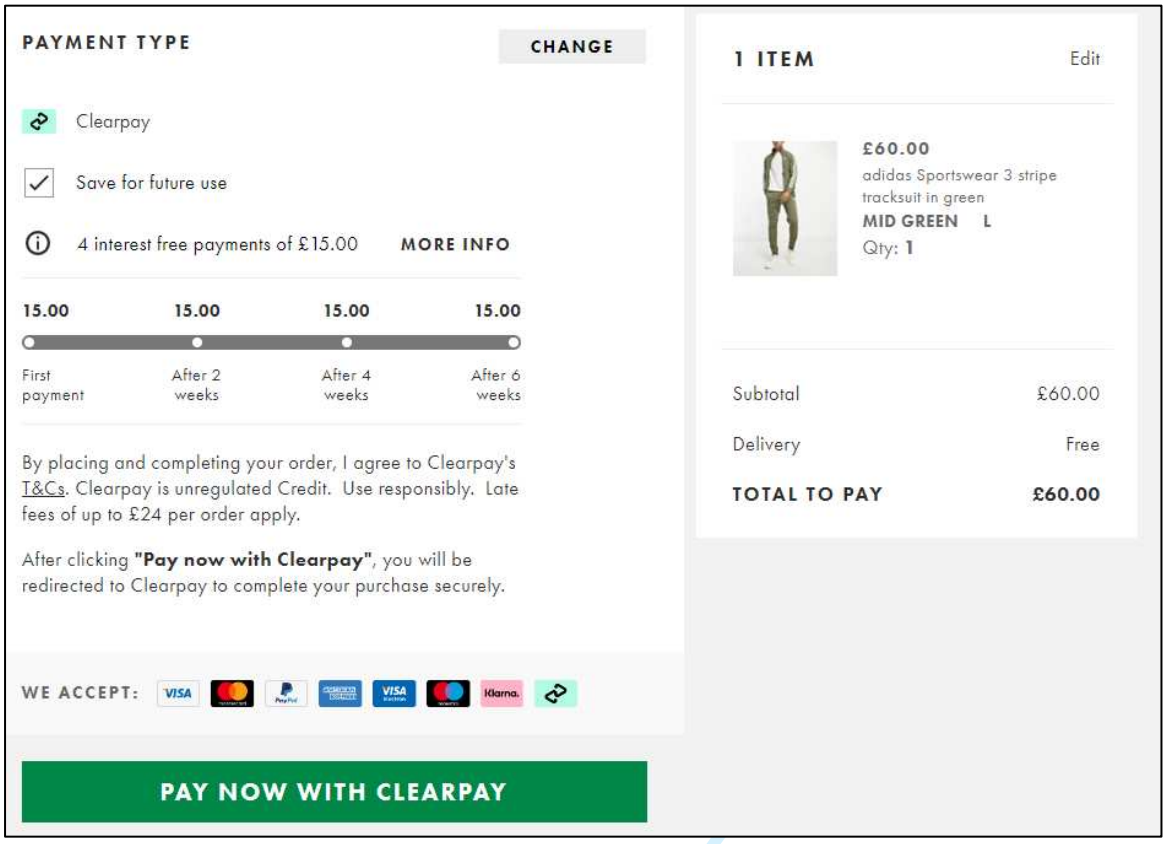
Web Appendix A: Illustration of BNPL installment payments at retailers

Asos (UK)



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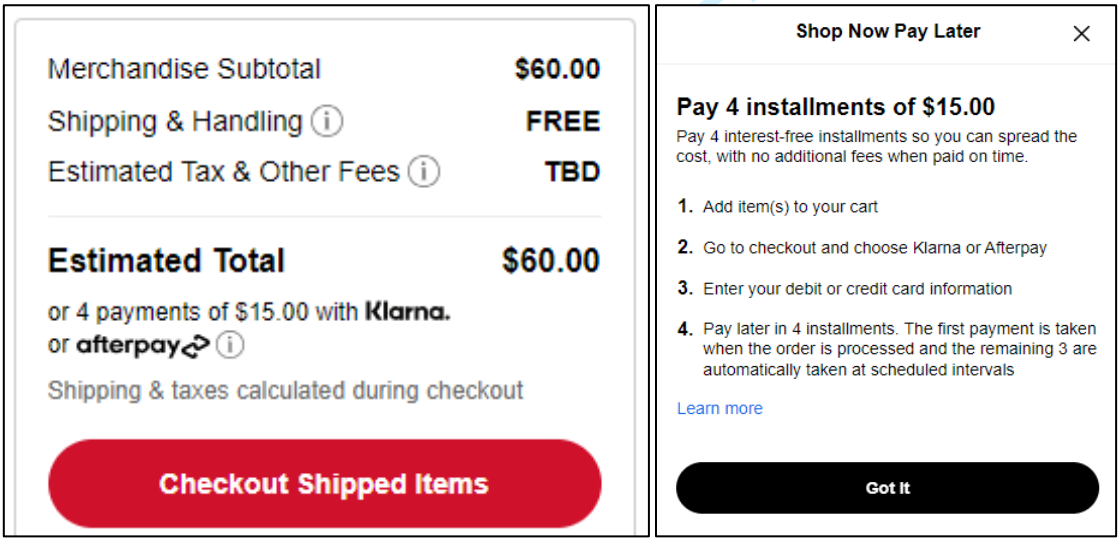

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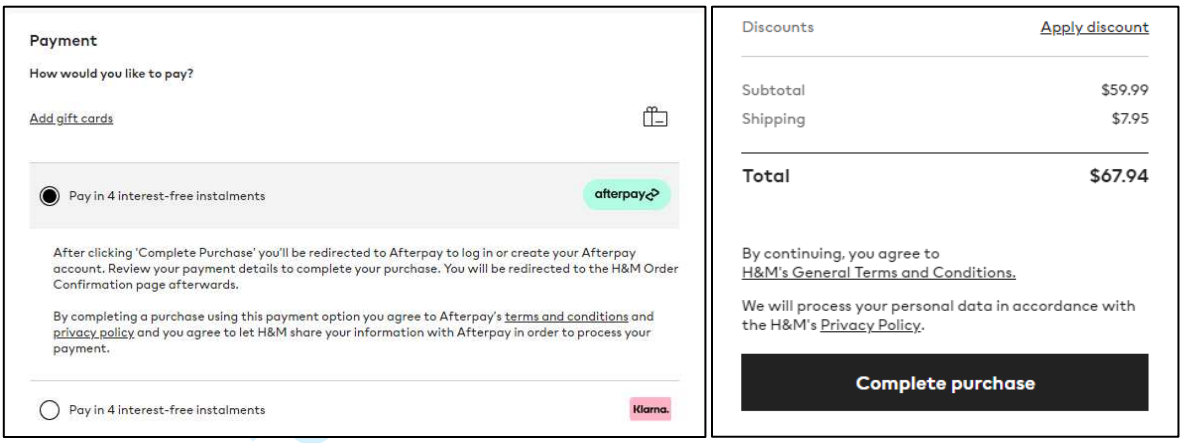

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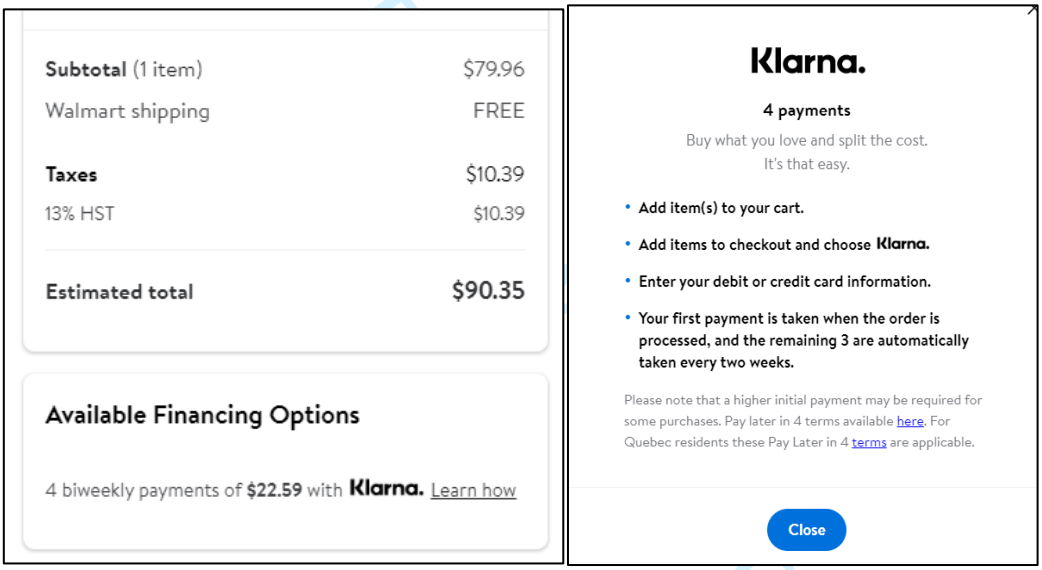

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Table WA1

BNPL installments at top 30 online retailers in the US in 2024[a]

Rank	Retailer	BNPL installment provider(s)[b]
1.	Amazon	Affirm, Amazon Monthly Payments *(monthly installments)*
2.	Walmart	Affirm *(monthly installments)*
3.	The Home Depot	PayPal Pay in 4 *(bi-weekly installments)*
4.	Target	Affirm, Sezzle, PayPal Pay in 4, Afterpay, Klarna, Zip *(bi-weekly or monthly installments)*
5.	eBay	Not Available
6.	Etsy	Klarna *(bi-weekly installments)*
7.	Macy's	Klarna (*bi-weekly installments*)
8.	Nike	Klarna (*bi-weekly installments*)
9.	Sam's Club	Not Available
10.	Kohl's	Paypal Pay in 4 (*bi-weekly installments*)
11.	Samsung	Klarna, Affirm (*bi-weekly installments*)
12.	Wayfair	Afterpay, Klarna (*bi-weekly installments*)
13.	Walgreens	Not Available
14.	KAYAK	Affirm (*monthly installments*)
15.	New York Post	Not Available
16.	T-Mobile	Not Available
17.	Bath & Body Works	Paypal Pay in 4 (*bi-weekly installments*)
18.	Shutterstock	Not Available
19.	DoorDash	Not Available
20.	DICK'S Sporting Goods	Afterpay, Affirm (*bi-weekly installments*)
21.	Lulus	Klarna, Afterpay (*bi-weekly installments*)
22.	Architectural Digest	Not Available
23.	Urban Outfitters	Afterpay, Klarna (*bi-weekly installments*)

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24.	PlayStation	Klarna (*bi-weekly or monthly installments*)
25.	Taco Bell	Not Available
26.	Ticketmaster	Not Available
27.	West Elm	Affirm (*monthly installments*)
28.	Spirithalloween	Klarna, Paypal Pay in 4 (*bi-weekly installments*)
29.	Saks Fifth Avenue	Klarna (*bi-weekly or monthly installments*)
30.	The Michaels Companies	Not Available

[a] Source: AfterShip (https://www.aftership.com/store-list/top-100-us-ecommerces-stores).
[b] Based on accepted payment methods available on retailer's website in the US in July 2024.

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Web Appendix B: Study 1 Robustness Checks

To assess the robustness of our estimates, we compare our main results to alternative estimations based on (i) using Propensity Score Matching, (ii) using non-adopters that make a purchase in the adoption window, (iii) using the full sample of non-adopters without matching, (iv) using different cohorts of later adopters (vs. a single cohort of early adopters in our main analysis), and (v) using late adopters as control for early adopters (Table WB1).

In addition to these checks, we estimate the effect separately for each time period in the post-period. The results reveal that the effect persist over time and is not driven by short-term adjustments in spending (Table WB9). Furthermore, estimating the effect using the total number of items purchases as an alternative dependent variable indicates a significant and positive impact on the number of items purchased (Table WB10).

Next, we motivate these robustness checks and additional analyses in more detail and report the results.

Table WB1
Overview of robustness checks

Type	Specification	PI[a]	PA[b]
Main results	Mahalanobis Distance Matching (Table 5 in main text)	.778*** (.011)	.100*** (.007)
Robustness against using alternative non-adopting (control) customers	Propensity Score Matching (Table WB2 and WB4)	.759*** (.011)	.102*** (.007)
	Using matched non-adopters that make a purchase in the adoption window (Table WB3 and WB4)	.346*** (.010)	.114*** (.006)
	Using the full sample of non-adopters without matching (Table WB4)	.573*** (.008)	.124*** (.005)
Robustness against using alternative adopting (treatment) customers	Using a cohort of adopters in the second month (Table WB5 and WB6)	.732*** (.011)	.109*** (.007)
	Using a cohort of adopters in the third month (Table WB5 and WB6)	.642*** (.012)	.115*** (.008)
Robustness against possible selection on unobservables	Using late adopters as control for early adopters (Table WB7 and WB8)	.717*** (.012)	.193*** (.008)

[a] PI = Purchase Incidence
[b] PA = Purchase Amount

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Robustness against alternative non-adopting (control) customers

In our main analysis, we used Mahalanobis Distance Matching (MDM) to select a control group of non-adopters. As a robustness check, we estimate the effect (i) using an alternative matching approach to deal with selection concerns, namely Propensity Score Matching (PSM), and (ii) using non-adopters that make a purchase in the adoption window. We also present the estimation results without matching.

Propensity Score Matching (PSM). PSM estimates a score such that the distribution of the observables among adopters is similar to non-adopters. We use a logistic regression to model the probability of adoption given our set of observables. The binary dependent variable in the model is adoption (i.e., adoption equals 1 for the 25,000 adopting customers in our sample, and 0 for the 200,000 non-adopting customers). The independent variables are the same four observed covariates used the Mahalanobis Distance Matching procedure (i.e., credit card spending, average purchase amount, average number of items, and number of purchases). The results of the model indicate a positive effect of credit card spending ($\eta_{\text{credit share}} = 1.382$, SE = .021, $p < .01$), a negative effect of average purchase amount ($\eta_{\text{purchase amount}} = -.008$, SE = .0002, $p < .01$), a positive effect of number of items ($\eta_{\text{number of items}} = .112$, SE = .003, $p < .01$), and a positive effect of number of purchases ($\eta_{\text{number of purchases}} = .187$ SE = .003, $p < .01$). Based on these estimation results, we match each adopter to its nearest neighbor based on the distance in the estimated propensity score. Table WB2 indicates that PSM substantially improves the balance between adopters and non-adopters. The estimation results in Table WB4 (Column 1) confirm a significant and positive effect of adoption in the purchase incidence model ($\beta_{1,PI} = .759$, $p < .01$) and purchase amount model ($\beta_{1,PA} = .102$, $p < .01$).

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Table WB2. Comparison of adopters and non-adopters after Propensity Score Matching (PSM)

	Matched non-adopter	Adopter	Std. mean difference
Credit card spending (%)	.85	.86	.02
Average purchase amount ($)	66.56	66.56	.00
Average number of items (#)	4.87	4.83	-.01
Number of purchases (#)	3.66	3.66	-.01

Using non-adopters that make a purchase in the adoption window. Adopters by definition make a purchase in the adoption window, whereas non-adopters might or might not make a purchase in the adoption window. While we excluded the adoption window from the analysis, one might wonder whether the results are driven by the group of adopters having purchased in the adoption window. Therefore, we replicate the analysis using matched non-adopters that also make a purchase in the adoption window (Table WB3). The results in Table WB4 (Column 2) confirm the positive and significant results on purchase incidence and amount ($\beta_{1,PI} = .346$, $p<.01$; $\beta_{1,PA} = .114$, $p<.01$).

Table WB3. Comparison of adopters and non-adopters purchasing in the adoption window after Mahalanobis Distance Matching (MDM)

	Non-adopter	Adopter	Std. mean difference
Credit card spending (%)	.86	.86	-.0018
Average purchase amount ($)	66.55	66.56	.0002
Average number of items (#)	4.83	4.83	.0013
Number of purchases (#)	3.66	3.66	.0013

Without matching. We also estimate our model without matching to understand the impact of using a subsample of non-adopters that is close to the group of adopters (Goldfarb, Tucker, and Wang 2022). The estimation results in Table WB4 without matching (Column 3) also indicate a significant and positive effects ($\beta_{1,PI} = .573$, $p<.01$; $\beta_{1,PA} = .124$, $p<.01$).

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Table WB4. Estimation results using PSM, non-adopters purchasing in the adoption window, and without matching

	(1) Propensity Score Matching (PSM)		(2) Non-adopters purchasing in adoption window		(3) Without matching	
	PI	**PA**	**PI**	**PA**	**PI**	**PA**
Adoption	.759*** (.011)	.102*** (.007)	.346*** (.010)	.114*** (.006)	.573*** (.008)	.124*** (.005)
Customer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the customer level appear in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$

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Robustness against using alternative adopting (treatment) customers

In our main analysis, we defined the treatment group as a single cohort of customers that adopt within the first month (i.e., within the first four weeks) after the retailer's introduction of BNPL installment payments ("Cohort 1"). To rule out the possibility that our effects only hold for the earliest adopters, we replicate the analysis for customers that adopted in other periods (Iyengar, Park, and Yu 2022). Specifically, we estimate our model for two additional cohorts of adopters based on their timing of adoption. The two additional cohorts are defined as customers that adopt within the second ("Cohort 2") and third ("Cohort 3") month. As in our main analysis, we randomly draw 25,000 customers from each cohort. Table WB5 compares the purchase behavior across the three cohorts of adopters, based the same pre-adoption window as in our main analysis for all cohorts to facilitate comparisons across cohorts. The cohort used in our main analysis (Cohort 1) is highly comparable to the other cohorts in terms of average purchase amount, average number of items, and credit spending. We observe that Cohort 1 purchases slightly more often from the retailer compared to Cohort 2 and Cohort 3. To understand the potentially differential impact between cohorts, we estimate our model for each cohort. The result in Table WB6 indicates that the effect is

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positive and significant for all cohorts of adopters. Thus, the effect is not restricted to the earliest adopters.

Table WB5. Comparison of customers adopting in different periods

	N	Credit share	Average purchase amount	Average number of items	Number of purchases
Cohort 1 adopters	25,000	.86	66.56	4.83	3.66
Cohort 2 adopters	25,000	.86	65.18	4.77	3.20
Cohort 3 adopters	25,000	.84	65.99	4.87	2.99

Notes: The statistics represent averages over the 22-week data period prior to the retailer's introduction of BNPL installment payments for all cohorts of adopters.

Table WB6. Estimation results of first versus later cohort of adopters

	Cohort 1 adopters (main analysis)		Cohort 2 adopters		Cohort 3 adopters	
	PI	**PA**	**PI**	**PA**	**PI**	**PV**
Adoption	.778*** (.011)	.100*** (.007)	.732*** (.011)	.109*** (.007)	.642*** (.012)	.115*** (.008)
Customer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the customer level appear in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$

Selection on unobservables

While pre-introduction trends are parallel, and despite controlling for unobservable customer factors using customer fixed effects, there may be unobservable characteristics not accounted for in the matching procedure that affect adoption and purchase behavior. To alleviate this concern, we conduct the analysis using within-adopter variation, where late adopters (instead of non-adopters) act as a control for early adopters (Yan, Millar, and Skiera 2022; Iyengar, Park, and Yu 2022). This can mitigate possible selection on unobservable customer characteristics that are shared by early and late adopters. As late adopters, we randomly select 25,000 customers that adopt in the final eight weeks of our analysis window. Table WB7

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indicates that these late adopters do not differ substantially from early adopters in terms of characteristics used in the matching procedure. We remove the final eight weeks of the sample before estimation to prevent that customers in the control group (late adopters) do not adopt within the sample period used for estimation. The results are shown in Table WB8, indicating significant and positive effects on purchase incidence and amount.

Table WB7. Comparison of late and early adopters

	Late adopter (N=25,000)	**Early adopter (N=25,000)**
Credit card spending (%)	.83	.86
Average purchase amount ($)	66.30	66.56
Average number of items (#)	4.79	4.83
Number of purchases (#)	3.03	3.66

Table WB8. Estimation results using late adopters as control group

	Purchase Incidence	**Purchase Amount**
Adoption	.717***	.193***
	(.012)	(.008)
Customer fixed effects	Yes	Yes
Time fixed effects	Yes	Yes

Notes: Standard errors clustered at the customer level appear in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$

Robustness of the effect over time

One might wonder whether the effects persist throughout the post-adoption period. We further examine temporal variation in the effect by estimating the effect for each week separately. Table WB9 reports the results and Figure WB1 visualizes the estimated coefficients, indicating that the effects remain positive across all post-introduction weeks, with 49 out of the 53 estimates being statistically significant. Thus, we conclude that the effect persists over time and is not driven by short-term adjustments in spending.

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Table WB9. Effect across post-adoption periods

Time periods (weeks) since adoption	Purchase Incidence		Purchase Amount	
	Estimate	**SE**	**Estimate**	**SE**
Period 1	1.248***	.029	.105***	.021
Period 2	.938***	.027	.048***	.019
Period 3	.726***	.030	.004	.022
Period 4	.734***	.028	.095***	.020
Period 5	.624***	.028	.054***	.020
Period 6	.692***	.027	.138***	.018
Period 7	.776***	.030	.087***	.022
Period 8	.824***	.031	.129***	.023
Period 9	.843***	.039	.068**	.032
Period 10	.670***	.036	.052*	.027
Period 11	.697***	.045	.054	.037
Period 12	.778***	.030	.087***	.022
Period 13	.728***	.034	.153***	.025
Period 14	.633***	.044	.082**	.036
Period 15	.666***	.042	.013	.034
Period 16	.678***	.035	.106***	.026
Period 17	.733***	.036	.112***	.026
Period 18	.679***	.034	.107***	.026
Period 19	.750***	.030	.144***	.021
Period 20	.731***	.029	.103***	.021
Period 21	.709***	.031	.112***	.023
Period 22	.873***	.029	.167***	.023
Period 23	.883***	.029	.136***	.022
Period 24	.754***	.030	.088***	.021
Period 25	.736***	.029	.105***	.022
Period 26	.800***	.029	.150***	.021
Customer fixed effects	Yes		Yes	
Time fixed effects	Yes		Yes	

Notes: Standard errors are clustered at the customer level. *** $p < .01$, ** $p < .05$, * $p < .10$

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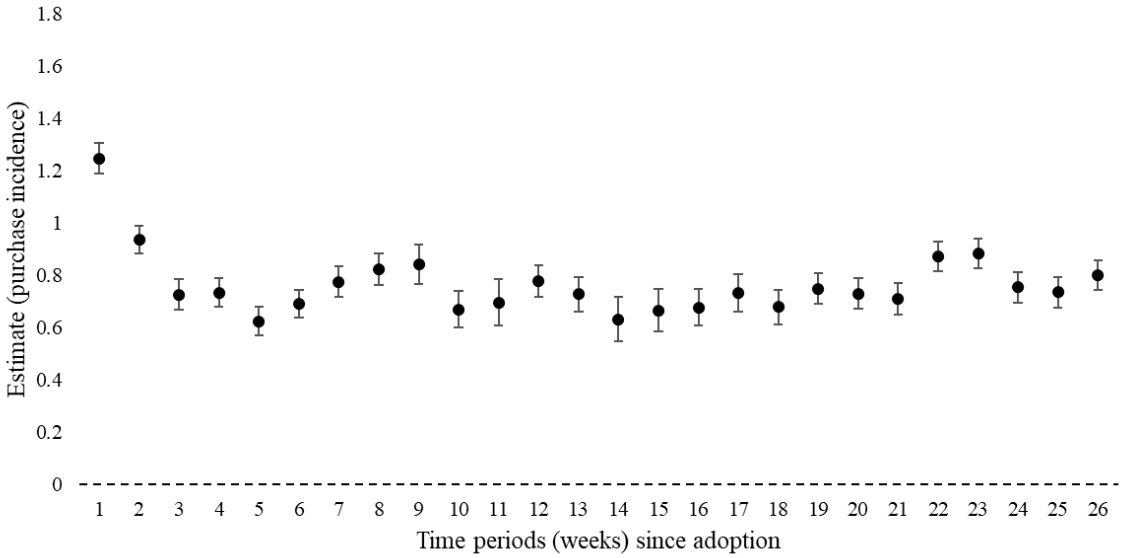
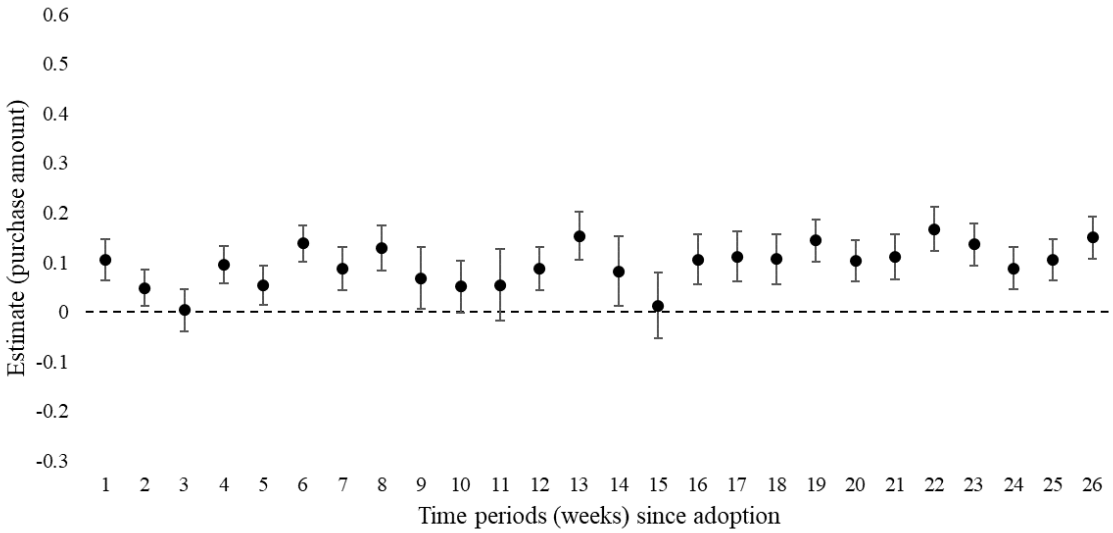
Figure WB1. Visualizing the effect across post-adoption periods

A: Purchase Incidence



B: Purchase Amount



Notes: Plots indicate point estimates and lower and upper CI.

Robustness against using an alternative dependent variable

Our main analysis established a positive and significant effect of adoption on customers' purchase amounts in dollars. While we do not have data available on which types of items or categories customers purchase, we have aggregated data on the total number of items a customer purchases in a given time period. Therefore, we can examine the effect of adoption on the total number of items a customer purchases in a given time period. To examine the

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impact of adoption on the number of items, we estimate our model using the natural logarithm of the number of items a customer purchases as the dependent variable. Similar to the purchase amount model, we estimate this conditional on customers making a purchase. The results in Table WB10 indicate a significant and positive impact on the number of items purchased ($\beta_1 = .083$, $p<.01$).

Table WB10. Estimation results using items as dependent variable

	Items
Adoption	.083***
	(.006)
Customer fixed effects	Yes
Time fixed effects	Yes

Notes: Standard errors clustered at the customer level appear in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$

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Web Appendix C: Study 1 Role of the COVID pandemic

Our sample period in Study 1 coincides with the COVID pandemic, which could affect (i) identification and (ii) generalizability of our results.

Regarding *identification*, our observed BNPL effect could be biased in the presence of unobserved factors related to the pandemic that correlate with BNPL adoption as well as purchase behavior. These pandemic-related unobservables can come from three sources (Papies, Ebbes and Van Heerde 2017):

a) *Unobserved factors that vary across time but not customers*. There might be unobserved temporal variation in the sample related to the pandemic, such as the degree of remote working in the population or possible inventory shortages. Our estimation strategy mitigates identification concerns arising from this unobserved component by including time fixed effects in the model (i.e., a dummy for each time period), which avoids correlation between the estimated BNPL effect and unobservable characteristics of the pandemic that vary across time but not across customers.

b) *Unobserved factors that vary across customers but not across time.* There could also be cross-sectional variation in the sample related to the pandemic. For example, customers with certain demographic characteristics (e.g., elderly customers at higher risk) might have adjusted their behavior differently from younger customers. The customer fixed effects in our model control for all time-invariant customer characteristics, avoiding correlation between the BNPL effect and unobservable customer characteristics that vary between customers but not across time.

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c) *Unobserved factors that vary across customers and time*. There could also be unobserved factors that vary across customers and time. Our difference-in-difference approach can help mitigate such concerns by comparing two similar groups of customers that were both affected by the COVID pandemic. The identifying assumption of our difference-in-difference analysis is that time-varying factors related to the pandemic do not affect adopters differently than non-adopters. While this cannot be tested in the post-period, our comparison of purchase behavior in the pre-period revealed that adopters did not purchase differently from non-adopters before the introduction of BNPL (Figure 2 in the main text). Thus, even though the number of COVID cases varied throughout the period before the introduction of BNPL, there is no evidence that this affected adopting versus non-adopting customers differently within our sample. Put differently, if time-varying characteristics of the pandemic had affected adopters differently from non-adopters, one could have expected to see differences between the two groups in the before period. Reassuringly, we do not find evidence of such differences.

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Regarding *generalizability*, one might still wonder to what extent the size of the identified effect of BNPL adoption on purchase behavior might be influenced by the pandemic. To explore the impact of variation in the state of the pandemic within our sample period, we obtained data from the World Health Organization on the number of COVID cases in the US[1]. The data capture the daily number of cases in the United States. Because our data are at the weekly level, we calculate the sum of weekly cases and merge this with our data. To examine the impact on our BNPL effect, we interact our adoption indicator with the

[1] Data are downloaded from https://covid19.who.int/data. Under 'Data Download', we downloaded the daily cases by date reported to the World Health Organization, and used the data reflecting the number of new cases (i.e., the column "New_cases") in the US (i.e., where the column "Country" equals "United States of America").

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natural logarithm of the number of COVID cases (Covid cases$_t$) in the purchase incidence and amount models. Specifically, we estimated the following model:

$$(WC1)\ Y_{it} = \alpha_i + \delta_t + \beta_1 \text{Adoption}_{it} + \beta_2 \text{Adoption}_{it} \times \ln(\text{Covid cases}_t) + \varepsilon_{it}$$

Note that the main effect of the number of covid cases (which varies at the weekly level) is absorbed by the time fixed effects[2]. The results do not indicate a significant moderating effect of the number of covid cases on the BNPL effect in the purchase incidence ($\beta_{2,\,PI}$ = -.033, SE = .023, p = .15) or amount ($\beta_{2,\,PA}$ =.016, SE = .014, p = .26) models, suggesting that the effect of BNPL on purchase behavior was not significantly influenced by the number of COVID cases within our sample.

In summary, the impact of the pandemic on our ability to identify the BNPL effect within our sample is mitigated through (a) the presence of time and customer fixed effects in our model, and (b) the use of matched sample of adopters and non-adopters that were both affected by the pandemic. We also observe that adopters and non-adopters did not adjust their purchase behavior differently even though the number of COVID cases varied in the pre-period. Furthermore, an additional analysis did not reveal evidence that the effect of BNPL on purchase behavior was significantly influenced by the number of COVID cases within our sample, suggesting the effect generalizes across periods with smaller and larger number of covid infections within our sample. Moreover, as our experiments were all conducted post-pandemic, we believe that the pandemic alone cannot entirely account for our observed effect. Nevertheless, we recommend future research to investigate the generalizability of our effects across different time periods (see 'Limitations' in the main text).

[2] Recall that Adoption$_{it}$ equals 1 among adopters in the post period. In other words, it reflects an interaction between a dummy variable that equals 1 among adopters (Adopter$_i$) and a dummy variable that equals 1 in the post period (Post$_t$) (i.e., Adopter$_i$ × Post$_t$). In equation WC1, the main effect of Adopter$_i$ is absorbed by the customer fixed effects, and the main effect of Post$_t$ is absorbed by the time fixed effects. In estimating equation WC1 with heterogeneity as a function of the number of COVID cases (i.e., Adopter$_i$ × Post$_t$ × Covid Cases$_t$), we control for 'Adopter$_i$ × Covid Cases$_t$'.

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Web Appendix D: Study 1 Simple Slope Analysis

To understand to what extent the significant effects remain significant at low and high levels of average basket size and credit share, we conducted a simple slope analysis based on the main results presented in our manuscript.

Table WD1 reports the results of this simple slope analysis, where 'Low' denotes the 10th percentile of the sample distribution (i.e., low average basket sizes or credit shares), and 'High' the 90th percentile (i.e., high average basket sizes or credit shares). The results indicate that the purchase incidence and amount effects are statistically significant and positive at both low and high levels of average basket size and credit share.

Table WD1. Simple slope analysis

	Value	Purchase incidence	Purchase amount
A: Average basket size			
Low (small basket shopper)	$27.38	.941***	.132***
		(.018)	(.011)
High (large basket shopper)	$117.87	.633***	.029**
		(.018)	(.011)
B: Average credit share			
Low (light credit card shoppers)	13.95%	.759***	.079***
		(.011)	(.007)
High (heavy credit card shoppers)	100.00%	.820***	.084***
		(.011)	(.006)

Notes: 'Low' denotes the 10th percentile of the sample distribution (i.e., low average basket sizes or credit shares), and 'High' the 90th percentile (i.e., high average basket sizes or credit shares). *** $p < .01$, ** $p < .05$, * $p < .10$

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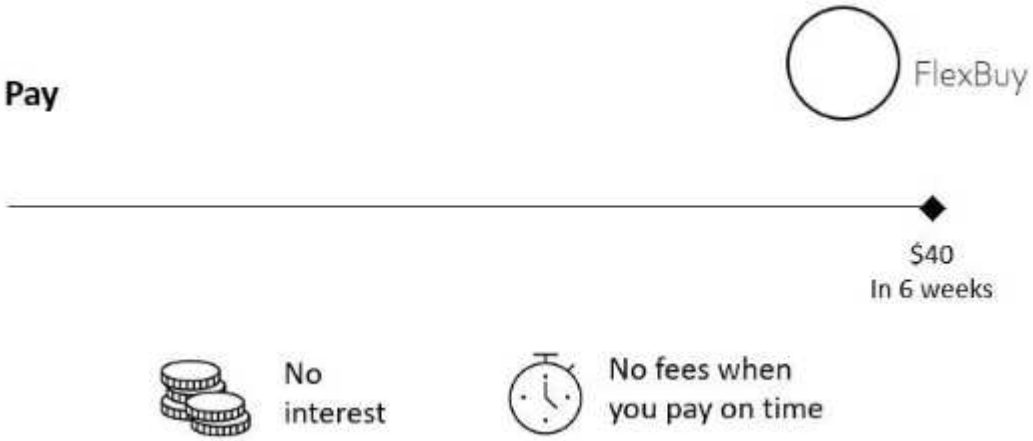
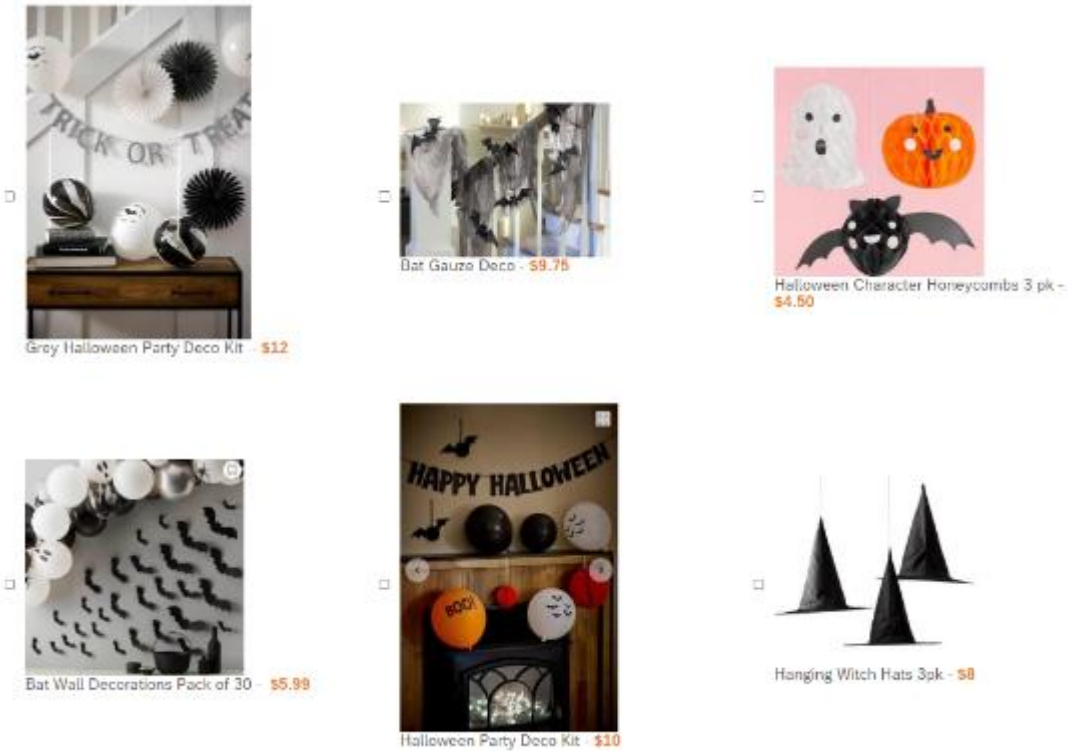
Web Appendix E: Study 2 Stimuli

Lump Sum Condition

You are hosting a Halloween party, and need to get some supplies.
You have decided to adopt a new form of payment with FlexBuy, where you can defer payment till 6 weeks later.
For example, if your total spend is $40, you can pay the amount 6 weeks later.



Example of a decision in the shopping task:
Which of the following indoor decorations will you buy?
(You can pick more than 1 item).



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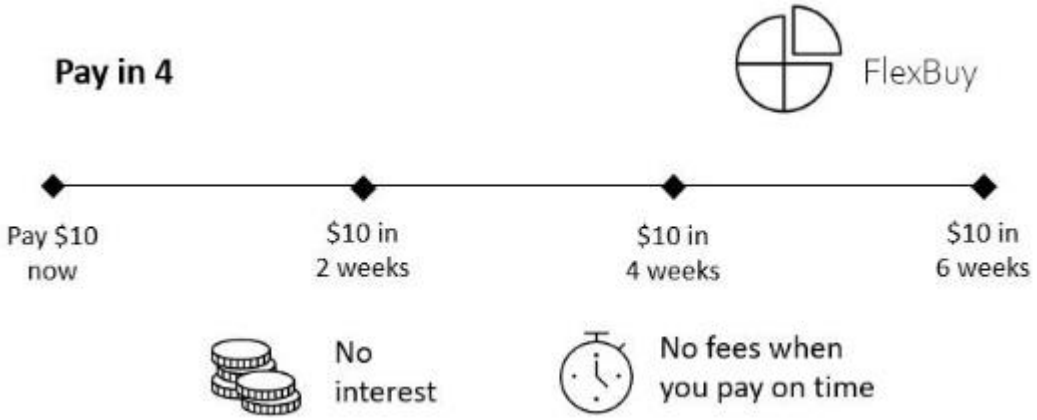
Installment Condition

You are hosting a Halloween party, and need to get some supplies.
You have decided to adopt a new form of payment with FlexBuy, where you can split the cost into 4 installments.
For example, if your total spend is $40, you can pay $10 now, the rest over 3 bi-weekly installments.



Review

Example of a decision in the shopping task:
Which of the following indoor decorations will you buy?
(You can pick more than 1 item).

Grey Halloween Party Deco Kit - $12
4 installments of $3

Bat Gauze Deco - $9.75
4 installments of $2.44

Halloween Character Honeycombs 3 pk - $4.50
4 installments of $1.12

Bat Wall Decorations Pack of 30 - $5.99
4 installments of $1.49

Halloween Party Deco Kit - $10
4 installments of $2.50

Hanging Witch Hats 3pk - $8
4 installments of $2

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Web Appendix F: Supplementary Study 1 – Causal Chain Experiments

To provide further evidence for perceived financial constraints as an underlying mechanism of the effect of BNPL installment payments on spending, we use a causal-chain design (Spencer, Zanna, and Fong 2005). Part A establishes a causal link between installment (vs. lump sum) payments and perceived financial constraints, while Part B replicates the causal relationship between perceived financial constraints and spending that has been demonstrated in prior research (Tully et al. 2015). Specifically, we predict that BNPL installment payments reduce perceived financial constraints compared to upfront and delayed lump sum payments (Part A). Subsequently, we expect lower financial constraints to increase spending (Part B). In other words, a causal-chain experiment tests the mechanism in two parts: the first experiment establishes the link between the independent variable (i.e., payment method) and the mediator (i.e., perceived financial constraints), and the second experiment establishes the effect of the mediator on the dependent variable (i.e., spending).

The causal-chain mediation design is widely used in consumer research (e.g., Basu and Ng 2021; Dias, Sharma, and Fitzsimons 2022; Touré-Tillery and Kouchaki 2020). This design is recommended as "it utilizes the power of experiments to demonstrate causality, and often does a better job of demonstrating the proposed psychological process than does the measurement-of-mediation design" (Spencer et al. 2005, p. 846). Since Study 2 in our manuscript adopts a measurement-of-mediation design where the mediator and the dependent variable were measured, it partly implies correlational evidence between financial constraints and spending. The causal-chain design in this Supplemental Study addresses this limitation by leveraging experiment process evidence. We experimentally manipulated payment methods, revealing that BNPL installments lowered financial constraints (Part A). Next, we directly manipulated the mediator, perceived financial constraints, showing that lower

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financial constraints increase spending rather than the reverse (Part B). Collectively, these studies provide additional empirical support for perceived financial constraints as an underlying mechanism.

Part A – The Effect of BNPL Installments on Perceived Financial Constraints

The purpose of Part A is to demonstrate that segregating costs into installments reduces perceived financial constraints compared to lump sum payments. We predict participants in the installment condition to feel less financially constrained than their counterparts in the lump sum conditions.

Method. We pre-registered this experiment using AsPredicted (https://aspredicted.org/ff9ef.pdf). Three hundred and sixty participants were recruited on CloudResearch in exchange for a small monetary payment. Participants that failed the attention checks are excluded from the analysis, leaving a final sample of n = 341 (51.9% male, 48.1% female, M_{age} = 40.50). Participants read a hypothetical scenario in which they are planning to purchase a $68 duvet set that fits their budget of $100. The purchase cost mimicked the average spend in Study 1, which was below the given budget to minimize the effects of objective financial constraints. They were randomly assigned to one of three payment conditions: (i) pay the entire $68 upfront (upfront lump sum), (ii) pay the entire $68 in six weeks (delayed lump sum), or (iii) pay $68 in four installments of $17 every two weeks over six weeks (installments).

To assess financial constraints, we use the following items adapted from Paley, Tully, and Sharma (2019) and average the items such that a higher number indicates greater perceived financial constraints: (1) “How financially constrained does this payment method make you feel” (1 = not at all financially constraints, 9 = very financially constrained), (2)

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"Does this payment method help you to spend as much as you like" (1 = not al all, 9 = very much).

As manipulation checks, participants also indicated how they regarded the payment method on three scales (1 = lump sum, 9 = ongoing installments; 1 = now, 9 = deferred; 1 = interest-free, 9 = with interest), and answered a question on cost awareness ("How much does the item cost"). Finally, participants responded to an attention check and reported their demographic details (see end of this Web Appendix for stimuli).

Results. To check our manipulations, a one-way ANOVA reveals a significant difference across payment conditions on the perception of ongoing installments ($F(2, 338) = 55.24$, $p < .001$, $\eta^2 = .25$). Consistent with our manipulations, participants in the installment condition describe the payment more as ongoing installments compared to their counterparts in the lump-sum conditions ($M_{installment} = 8.27$, $SD = 1.44$ vs. $M_{upfront\ lump\ sum} = 4.36$, $SD = 3.38$, $M_{delayed\ lump\ sum} = 6.07$, $SD = 3.17$, $t(339) = -9.18$, $p < .001$, *cohen's d* = -1.06). There are also significant differences across payment conditions on whether the payment is delayed ($F(2, 338) = 67.50$, $p < .001$, $\eta^2 = .29$). Post-hoc comparisons using a Tukey HSD test indicate that the installment condition was regarded as significantly more deferred than the upfront lump sum condition ($M_{installment} = 7.45$, $SD = 1.91$ vs. $M_{upfront\ lump\ sum} = 4.49$, $SD = 3.43$, $p < .001$), but not more than the delayed lump sum condition ($M_{installment} = 7.45$, $SD = 1.91$ vs. $M_{delayed\ lump\ sum} = 7.96$, $SD = 1.53$, $p = .26$). Participants do not differ significantly across conditions on cost awareness ($F(2,338) = 1.04$, $p = .35$), nor on amount of interest incurred ($F(2,338) = 2.44$, $p = .09$), suggesting they were similarly aware of the costs and interest accured.

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As predicted, there were significant differences in perceived financial constraints across payment conditions ($F(2, 337) = 8.63$, $p < .001$, $\eta^2 = .05$)[3]. As predicted, participants in the installment conditions felt less financially constrained that their counterparts in the lump-sum conditions ($M_{installment} = 3.45$, $SD = 1.70$ vs. $M_{delayed\ lump\ sum} = 4.07$, $SD = 1.69$ and $M_{upfrontlump\ sum} = 4.38$, $SD = 1.76$, $t(338) = 3.91$, $p < .001$, *cohen's d* $= .45$). Post-hoc comparisons using a Tukey HSD test also indicated that participants in the installment condition felt less financially constrained than their counterparts in the lump-sum conditions ($M_{installment} = 3.45$, $SD = 1.70$ vs. $M_{delayed\ lump\ sum} = 4.07$, $SD = 1.69$, $p=.02$, vs. $M_{upfront\ lump\ sum} = 4.38$, $SD = 1.76$, $p<.001$).

Discussion Part A. Part A demonstrates that segregating costs into installments reduces perceived financial constraints compared to upfront and delayed lump sum payments. Furthermore, by showing that installments differ from the delayed payment condition, we further demonstrate that the delay between the time of purchase and actual payment cannot fully account for our effects.

Part B – The Effect of Perceived Financial Constraints on Spending

Following Part A, Part B aims to show a causal link between perceived financial constraints and spending. Part A revealed that installment (vs. lump sum) payments lowered perceived financial constraints. In Part B we directly manipulated perceived financial constraints and aim to show that lowering financial constraints increases spending.

Method. As pre-registered (https://aspredicted.org/6fs6w.pdf), we recruited two hundred and twenty participants on CloudResearch in exchange for a small monetary payment. Participants that failed the attention checks were excluded from the analysis, leaving a final sample of $n = 212$ (43.4% male, 54.7% female, 1.8% others, $M_{age} = 44.01$).

[3] There was one missing value for financial constraints.

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Participants were randomly assigned to one of two conditions (control vs. financial constraints). First, we manipulated the salience of their financial constraints using a writing task from Tully et al. (2015; Experiment 5). Participants in the financial constraints condition highlighted the factors contributing to their financial constraints using the following instructions:

> "Everyone has financial constraints in their lives, but the factors that contribute to these constraints tend to vary. What are the factors that require you to be careful with how you spend your money? What limits your monthly discretionary income? Include the aspects of your current situation that most contribute to your financial constraints (e.g., mortgage or rent, family expenses, uncertainty of future income, health care costs, student loans, lack of income, limited savings, bills that need to be paid, expensiveness of entertainment…). Please be as detailed as possible, and write at least a couple of sentences."

In contrast, participants in the control condition completed a similarly demanding task by listing ten facts. Next, participants completed a hypothetical shopping task where they had to get bedding for their new king-size bed. Participants in the financial constraints (vs. control) condition were asked to make their decisions "given your financial constraints" (vs. "given your current situation"). Four pairs of items were presented, each pair consisting of a similar but lower versus higher priced item. Details on the four pairs of items are included in Web Appendix C. Participants indicated whether they would purchase one of the two items (no vs. yes). The order of the four pairs was randomized. Similar to Tully et al. (2015), spending was measured by the number of items customers purchased (ranging from zero to four) and their preference for the lower versus higher-priced item on an unnumbered 9-point scale (1 = more likely to buy the lower-priced option, 9 = more likely to buy the higher-priced option). As a manipulation check, participants indicated the extent they thought about

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their financial constraints while making their choices and the extent they felt financially constrained (1 = Not at all, 9 = Very much; Tully et al. 2015). Finally, participants answered an attention check question and completed demographic questions.

Results. Two questions measuring perceived financial constraints were averaged (α = .87). As intended, participants who wrote about their financial constraints felt more financially constrained than participants in the control condition ($M_{financialconstraint}$ = 7.42, SD = 1.84 vs. $M_{control}$ = 5.99, SD = 2.53, t(210)=-4.73, p <.001, cohen's d = -.65).

We summed the number of items that each participant chose to purchase (forming a possible score of zero to four). As predicted, participants that felt less financially constrained selected more items for purchase than those who felt more financially constrained ($M_{control}$ = 3.00, SD = 1.28 vs. $M_{financialconstraint}$ = 2.58, SD = 1.34, t(210)=2.33, p =.02, cohen's d = .32). A repeated-measures ANOVA also revealed that participants who felt less financial constrained had a stronger preference for higher-priced items ($M_{control}$ = 3.99, SD =2.54 vs. $M_{financialconstraint}$ =2.81, SD = 2.32, F(1,210)=12.50, p <.001, η^2 = .06). This pattern of results did not differ across pairs (F(3,208)=.70, p =.55, η^2 = .01).

Discussion Part A and Part B

Part A and B provide further causal evidence for our proposed mechanism – perceived financial constraints. Part A showed that segregating costs into installments felt less financially constraining than upfront and delayed lump sum payments. Building on Part A, Part B showed that customers who felt less financially constrained spent more. Thus, these findings support the notion that perceived financial constraints explains the positive effect of BNPL installment payments on spending.

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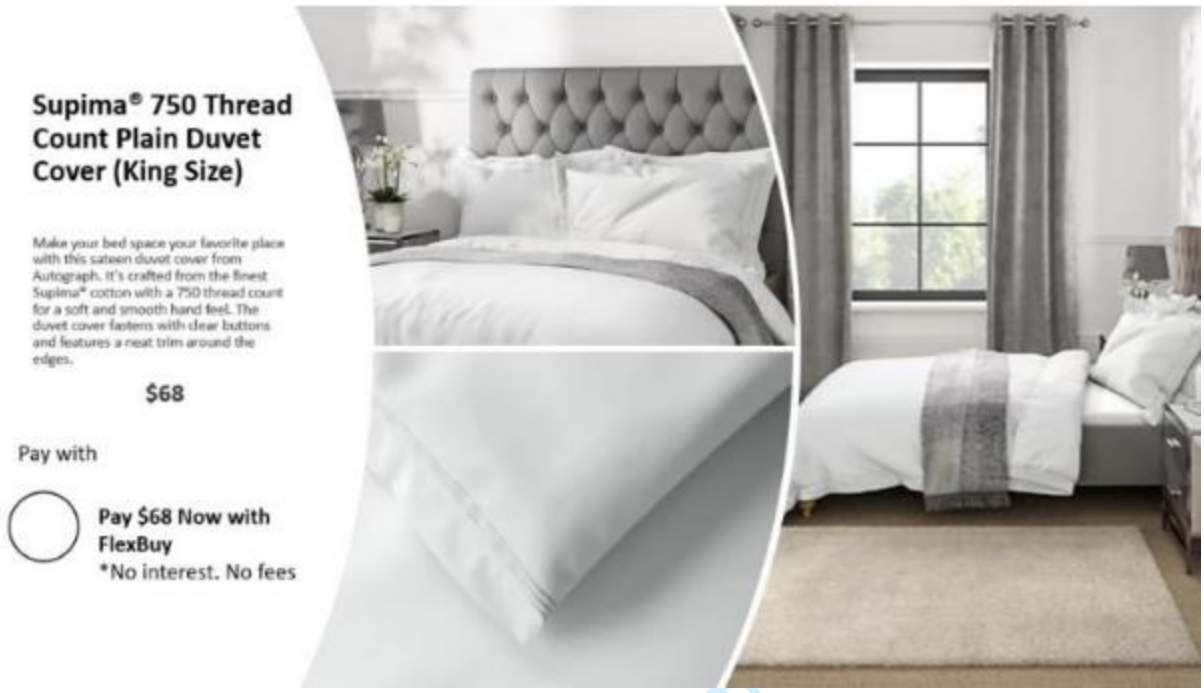
Stimuli Part A

Upfront Lump Sum Condition

Imagine that you've just bought a new king size bed and in need of bedding.
After searching online, you've found the following duvet cover that fits your budget of $100.



You decided to pay for the item using the buy-now-pay-later method.
Click on "Pay" to proceed.

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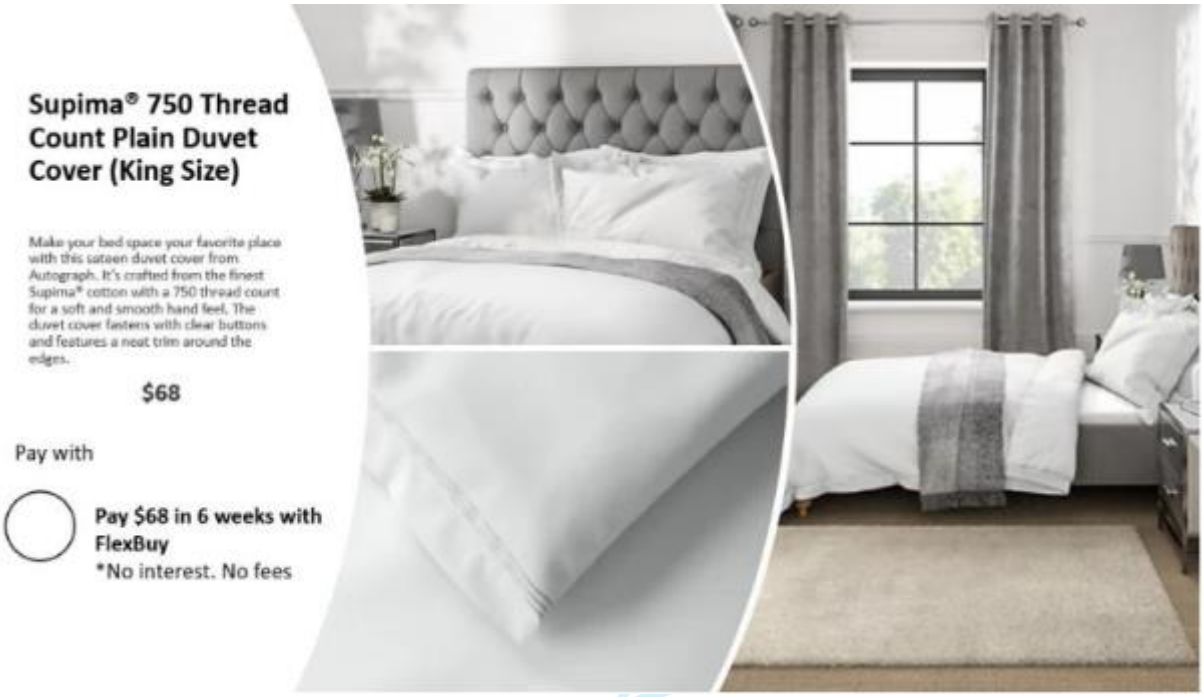
Delayed Lump Sum Condition

Imagine that you've just bought a new king size bed and in need of bedding. After searching online, you've found the following duvet cover that fits your budget of $100.



You have decided to pay for the item using the buy-now-pay-later method. Click on "Pay" to proceed.

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Installment Condition

Imagine that you've just bought a new king size bed and in need of bedding. After searching online, you've found the following duvet cover that fits your budget of $100.

You have decided to pay for the item using the buy-now-pay-later method. Click on "Pay" to proceed.

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Stimuli Part B

Shopping Task

Pair 1

- Basic Pillowcase- $3
- Premium Pillowcase - $25

Pair 2

- Cotton Rich Percale Cover - $24
- Supima 750 Thread Count Duvet - $68

Pair 3

- Basic Fitted Sheet - $7
- Deluxe Fitted Sheet - $59

Pair 4

- Essentials Mattress Protector - $29.50
- Luxury Mattress Protector - $85

The order in which the pairs were presented was randomized.

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Web Appendix G: Study 3 Stimuli, Measures & Additional Analysis

Stimuli

Upfront Lump Sum Condition

Imagine that you need to buy a new T-shirt today with a price of $24.

The payment method is:

Pay $24 now

Delayed Lump Sum Condition

Imagine that you need to buy a new T-shirt today with a price of $24.

The payment method is:

Pay $24 in 30 days

*No interest *No fees when you pay on time

Installment Condition

Imagine that you need to buy a new T-shirt today with a price of $24.

The payment method is:

Pay in 3 installments of $8

*No interest *No fees when you pay on time

Measures

Perceived financial constraints

To what extent does this payment method… (1 = Not at all; 9 = Very much)

- make you feel less financially constrained
- allow you to spend as you like
- improve your financial situation over others
- help with your financial situation

(adapted from Paley et al. 2019; α = .85)

Cost awareness

What is the price of the T-shirt? (Price in $, slider from 0-50)

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Feelings of being misled

To what extent do you disagree/agree with the following statements about this price? (1 = Strongly disagree; 9 = Strongly agree)

- The presentation of the price is unclear
- I cannot understand the price at a glance
- The price information is quite complex
- My friends would judge this price as an unfair price
- This seller has the intention of misleading customers

(Bambauer-Sachse and Grewal 2011; α =.95)

Perceived benefits

To what extent do you disagree/agree with the following statements about your purchase? (1 = Strongly disagree; 9 = Strongly agree)

- I would get a lot of pleasure from this purchase
- I would miss out on many benefits if I did not have this purchase
- I would benefit a lot from having this purchase
- This purchase would not be very beneficial for me

(Atlas and Bartels 2018; α = .77)

Price attractiveness

To what extent do you disagree/agree with the following statements about the product's price? (1 = Strongly disagree; 9 = Strongly agree)

- In general, this product is well-priced
- The product price is attractive
- Compared with similar products' prices, this price is a good deal

(Bambauer-Sachse and Grewal 2011; α =.79)

Additional Analysis

We conducted a one-way analysis of covariance of perceived financial constraints by payment condition, with feelings of being misled, perceived benefits, and price attractiveness as covariates (Table WG1 and WG2).

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Table WG1. ANCOVA – Effect of payment conditions on perceived financial constraints

	Sum of Squares	df	Mean Square	F	p
Overall model	608.5021	5	121.7004	47.2150	< .001
Payment conditions	97.0420	2	48.5210	14.8070	< .001
Covariates					
Feelings of being misled	.0362	1	.0362	.0110	.916
Perceived benefits	508.5147	1	508.5147	155.1823	< .001
Price attractiveness	2.9092	1	2.9092	.8878	.346
Payment condition	97.0420	2	48.5210	14.8070	< .001
Residuals	1939.9170	592	3.2769		

Table WG2. Estimated marginal means of perceived financial constraints by payment condition

			95% Confidence Interval	
Payment Condition	**Mean**	**SE**	**Lower**	**Upper**
Upfront lump sum	6.54	.129	6.28	6.79
Delayed lump sum	5.95	.129	5.69	6.20
Installments	5.55	.128	5.30	5.80

Notes. Controlling for feelings of being misled, perceived benefits, and price attractiveness.

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Web Appendix H: Supplementary Study 2 – Stimuli, Measures & Analysis

Studies 2 and 3 in the main text demonstrated that BNPL installment payments reduce perceived financial constraints. This supplementary study aimed to unpack the link between BNPL installment payments and perceived financial constraints by examining two plausible underlying constructs that could explain customers' lower perceived financial constraints. Specifically, we proposed that BNPL installments reduce perceived cost and increase budget control, lowering perceived financial constraints. In this study, we measured perceived cost and budget control and examined their mediating role in the effect of BNPL installments (vs. a delayed lump sum) on perceived financial constraints.

Method

As pre-registered on AsPredicted.org (https://aspredicted.org/58mv3.pdf), six hundred participants were recruited on Prolific for a small monetary payment. Participants who failed the attention checks were excluded from the analysis, leaving a final sample of n = 597 (38.9% male, 60.3% female, .8% others, M_{age} = 41.60). All participants read a hypothetical scenario where they bought a set of coffee mugs with a price of $27. They were randomly assigned to either a delayed lump sum (i.e., pay $27 in 21 days) or installment (i.e., pay 3 installments of $9) payment condition.

Perceived financial constraints (α =.88), perceived costs (α = .88), and budget control (α = .98) were measured on a 9-point scale (1 = not at all, 9 = very much; see Table WH1).

Finally, participants completed manipulation checks regarding the payment method and reported their demographic details (see end of this Appendix for stimuli).

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Table WH1. Definitions of constructs

Construct	Definition	Operationalization
Perceived financial constraints	The extent to which people believe that their financial situation restricts desired consumption (Tully, Hershfield, and Meyvis 2015)	To what extent does this payment method (1) make you feel less financially constrained, (2) allow you to spend as you like, (3) improve your financial situation over others, (4) help with your financial situation (lower anchor = not at all, upper anchor = very much; adapted from Paley, Tully and Sharma 2019)
Perceived cost	The extent to which people perceive costs as small and trivial (Gourville 1998; Atlas and Bartels 2018)	To what extent does this payment method make (1) the cost of the product trivial, (2) the cost of the product less noticeable, (3) the product cost little money, (4) you purchase the product without much serious consideration (lower anchor = not at all, upper anchor = very much; adapted from Atlas and Bartels 2018)
Budget control	The extent to which people perceive control over the allocation of financial resources and tracking of expenses against a budget (Kidwell and Turrisi 2004)	To what extent does this payment method (1) give you the ability to maintain a budget, (2) make you see yourself as capable of maintaining a budget, (3) enable you to maintain a budget, (4) increase your confidence about maintaining a budget (lower anchor = not at all, upper anchor = very much; adapted from Kidwell and Turrisi 2004)

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Results

Manipulation checks. Consistent with our manipulations, participants in the installment condition described the payment as more ongoing installments than their counterparts the lump sum condition ($M_{installment}$ = 8.28, SD = 1.59 vs. $M_{delayed\ lump\ sum}$ = 3.74, SD = 3.25, t(595) = -21.70, p <.001, cohen's d = -1.78). As expected, participants in the delayed lumpsum condition regarded their payment as more deferred than their counterparts in the installment condition ($M_{delayed\ lump\ sum}$ = 8.05, SD = 1.68 vs. $M_{installment}$ = 7.47, SD = 1.86, t(595) = 4.00, p <.001, cohen's d = .33).

Perceived cost. As expected, participants in the installment condition perceived payment to be less costly than their counterparts in the delayed lumpsum condition ($M_{installment}$ = 5.73, SD = 2.17 vs. $M_{delayed\ lump\ sum}$ = 6.38, SD = 2.10, t(595) = -3.69, p <.001, cohen's d = -.30).

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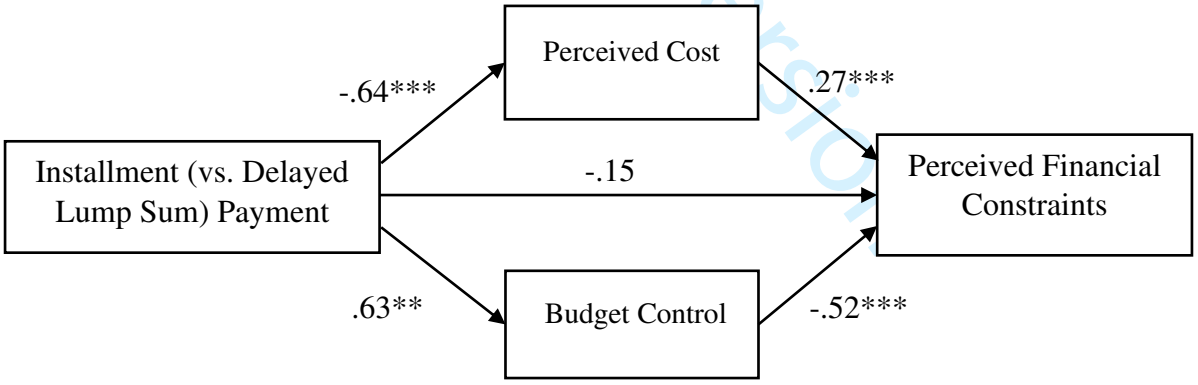
Budget control. Participants in the installment condition perceived more budget control than their counterparts in the delayed lumpsum condition ($M_{installment}$ = 4.92, SD = 2.41 vs. $M_{delayed\ lump\ sum}$ = 4.30, SD = 2.50, t(595) = -3.12, p =.002, cohen's d = -.26).

Perceived financial constraints. As predicted, participants in the installment condition felt less financially constrained than their counterparts in the delayed lumpsum condition ($M_{installment}$ = 5.77, SD =2.14 vs. $M_{delayed\ lump\ sum}$ = 6.12, SD = 2.20, t(595) = -1.98, p =.048, cohen's d = -0.16).

Mediation. As pre-registered, we conducted a parallel mediation with the payment condition as the independent variable, perceived cost and budget control as the mediators, and perceived financial constraints as the dependent variable (Hayes 2022, PROCESS Model 4). Consistent with our predictions, the parallel mediation model (Figure 4) was significant. Installment payments decreased perceived costs and increased budget control, reducing perceived financial constraints (indirect effect $_{percieved\ cost}$ = .17, 95% CI [.08 .29], indirect effect $_{budget\ control}$ = .33, 95% CI [.12 .53], 10,000 resamples).[4]

Figure WH1. Parallel Mediation Model



Notes: * p <.05, ** p <.01, *** p<.001.

[4] Though the predicted parallel mediation was significant, we considered the possibility that the process works in a different order such that installment payments affect perceived financial constraints which in turn affects budget control. However, this mediation was not significant (indirect effect = .29, 95% CI [-.00 .59], 10,000 resamples). We also tested if installment payments affect perceived financial constraints which in turn affects perceived cost. This mediation was also not significant (indirect effect = .21, 95% CI [-.00 .41], 10,000 resamples).

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Discussion

This study explained how BNPL installment payments affect perceived financial constraints by showing that BNPL reduced perceived costs (i.e., made costs more trivial) and increased budget control to reduce perceived financial constraints. Thus, differences in perceived financial constraints were explained by differences in perceived cost and budget control.

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Stimuli

Delayed Lump Sum Condition

Imagine that you are buying a set of 4 coffee mugs today with a price of $27.

The payment method is:

Pay $27 in 21 days

*interest-free *no fees when you pay $27 in 21 days

Installment Condition

Imagine that you are buying a set of 4 coffee mugs today with a price of $27.

The payment method is:

Pay in 3 installments of $9

*interest-free *no fees when you pay $9 in 7, 14, 21 days

Measures

Perceived financial constraints

To what extent does this payment method… (1 = Not at all; 9 = Very much)

- make you feel less financially constrained
- allow you to spend as you like
- improve your financial situation over others
- help with your financial situation

(adapted from Paley et al. 2019; α = .88*)*

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Perceived costs

To what extent does this payment method make… (1 = Not at all; 9 = Very much)

- the cost of the product trivial
- the cost of the product less noticeable
- the product cost little
- you purchase the product without much serious consideration

(adapted from Atlas and Bartels 2018; $\alpha = .88$*)*

Budget control

To what extent does this payment method… (1 = Not at all; 9 = Very much)

- give you the ability to maintain a budget
- make you see yourself as being capable of maintaining a budget
- enable you to maintain a budget
- increase your confidence about maintaining a budget

(adapted from Kidwell and Turrisi 2004; $\alpha = .98$*)*

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Web Appendix I: Study 4 Stimuli, Measures & Additional Analysis

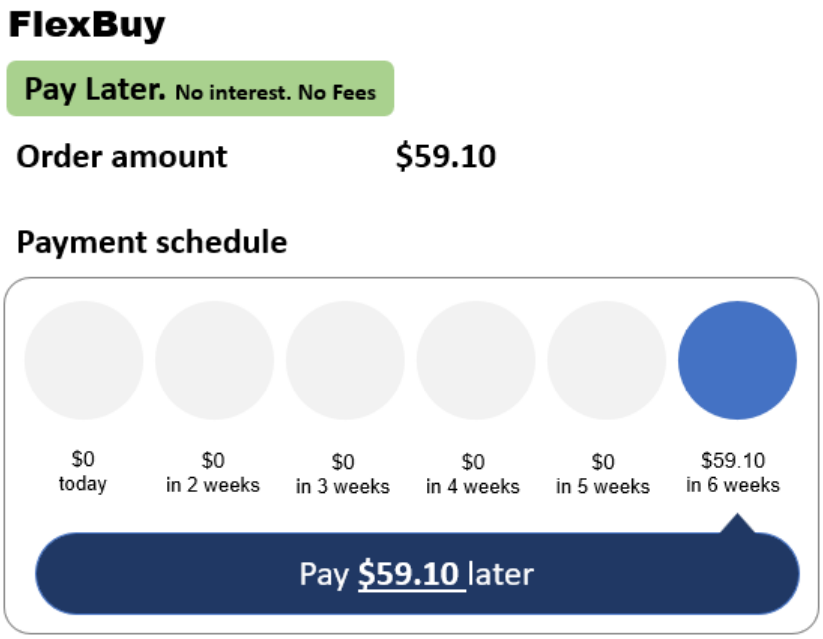
Stimuli

Delayed Lump Sum Condition

Imagine that you are planning for your upcoming trip that is happening in 6 weeks.

You found a cheap flight, costing $59.10.

The airline has just introduced a new payment method allowing you to pay the cost 6 weeks later.



Installment Condition

Imagine that you are planning for your upcoming trip that is happening in 6 weeks.

You found a cheap flight, costing $59.10.

The airline has just introduced a new payment method allowing you to split the cost into 6 weekly payments.

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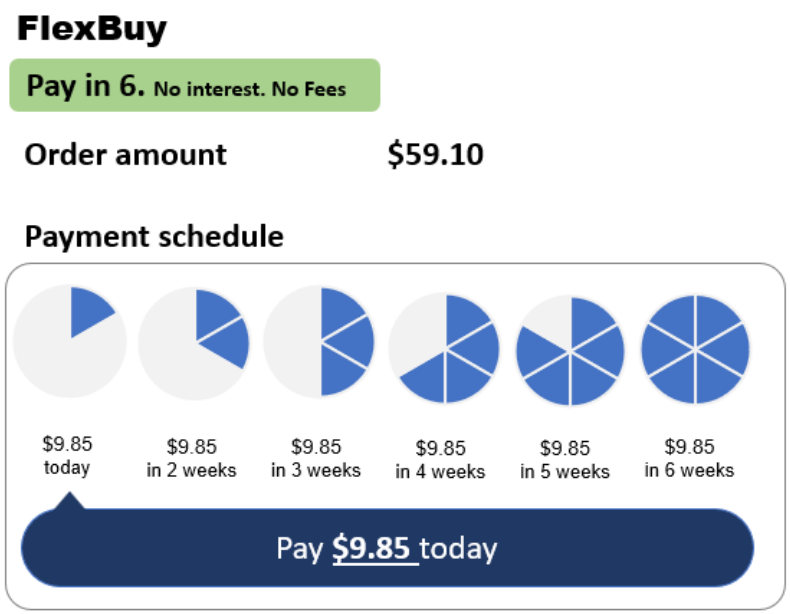

Measures

Perceived financial constraints

To what extent does this payment method… (0 = Not at all; 10 = Very much)

- make you feel less financially constrained
- allow you to spend as you like
- improve your financial situation over others
- help with your financial situation

(adapted from Paley et al. 2019; $\alpha = .93$*)*

Perceived costs

To what extent does this payment method make… (0 = Not at all; 10 = Very much)

- the cost of the product trivial
- the cost of the product less noticeable
- the product cost little
- you purchase the product without much serious consideration

(adapted from Atlas and Bartels 2018; $\alpha = .89$*)*

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Budget control

To what extent does this payment method… (0 = Not at all; 10 = Very much)

- give you the ability to maintain a budget
- make you see yourself as being capable of maintaining a budget
- enable you to maintain a budget
- increase your confidence about maintaining a budget

(adapted from Kidwell and Turrisi 2004; α = .98)

Behavioral Identification Form

Table WI1. Behavioral Identification Form (Chen, Xu and Shen 2017)

Actions	**Abstract-Outcome Descriptions**	**Concrete-Mean Descriptions**
1.Making a list	Getting organized	Writing things down
2.Reading a book	Gaining knowledge	Following lines of print
3.Washing clothes	Removing odors from clothes	Putting clothes into the machine
4.Picking an apple	Getting something to eat	Pulling an apple off a branch
5.Chopping down a tree	Getting firewood	Wielding an axe
6.Measuring a room for carpeting	getting ready to remodel	using a yardstick
7.Cleaning the house	restore cleanliness	vacuuming the floor
8.Painting the room	making the room look fresh	applying brush strokes
9.Paying the rent	maintaining a place to live	paying the bill
10.Caring for houseplants	making the room look nice	watering plants
11.Locking a door	securing the house	putting a key in the lock
12.Voting	influencing the election	marking a ballot
13.Climbing a tree	getting a good view	holding on to branches
14.Filling out a personality test	revealing what you're like	answering questions
15.Brushing teeth	preventing tooth decay	moving a brush around one's mouth
16.Taking a test	showing one's knowledge	answering questions
17.Greeting someone	showing friendliness	saying hello
18.Resisting temptation	showing moral courage	saying "no"
19.Eating	getting nutrition	chewing and swallowing
20.Growing a garden	getting fresh vegetables	planting seeds
21.Driving by car	traveling to a destination	steering and changing gears
22.Having cavity filled	protecting the teeth	going to the dentist
23.Talking to a child	teaching a child something	using simple words
24.Pushing a doorbell	seeing if someone is home	pressing a button

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Purchase likelihood

To what extent does this payment method… (0 = Not at all; 10 = Very much)

- make it easier to purchase this flight
- boost my chances of buying this flight

(adapted from Atlas and Bartels 2018; $\alpha = .86$*)*

Additional Analysis

In Study 4, we removed participants who failed the attention checks, which resulted in a sample of 399 participants. In recruiting participants for this study, we excluded participants that had participated in any of our previous experiments for this research. Thus, none of the 399 participants had taken part in our previous BNPL studies. We also explore the impact of removing participants that indicated that they had completed similar surveys (i.e., outside our own studies). As indicated in Figure WI1, and despite dropping 7% (i.e., 28 out of 399) of participants from our sample ($n = 371$, 49.6% male, $M_{age} = 42.3$), the serial mediation model was significant. Similar to the results in the main manuscript, BNPL installment payments reduced perceived costs, reducing perceived financial constraints, which in turn increased purchase likelihood (indirect effect = .17, 95 % CI [.06, 30], 10,000 resamples). BNPL installment payments also increased budget control, reducing perceived financial constraints, which in turn increased purchase likelihood (indirect effect = .35, 95CI [.10%, 65], 10,000 resamples). The manipulation checks (Tables WI2 and WI3) and descriptive statistics (Tables WI4 and WI5) also confirm the same pattern of results.

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Figure WI1. Serial Mediation (Hayes 2017, Model 80)

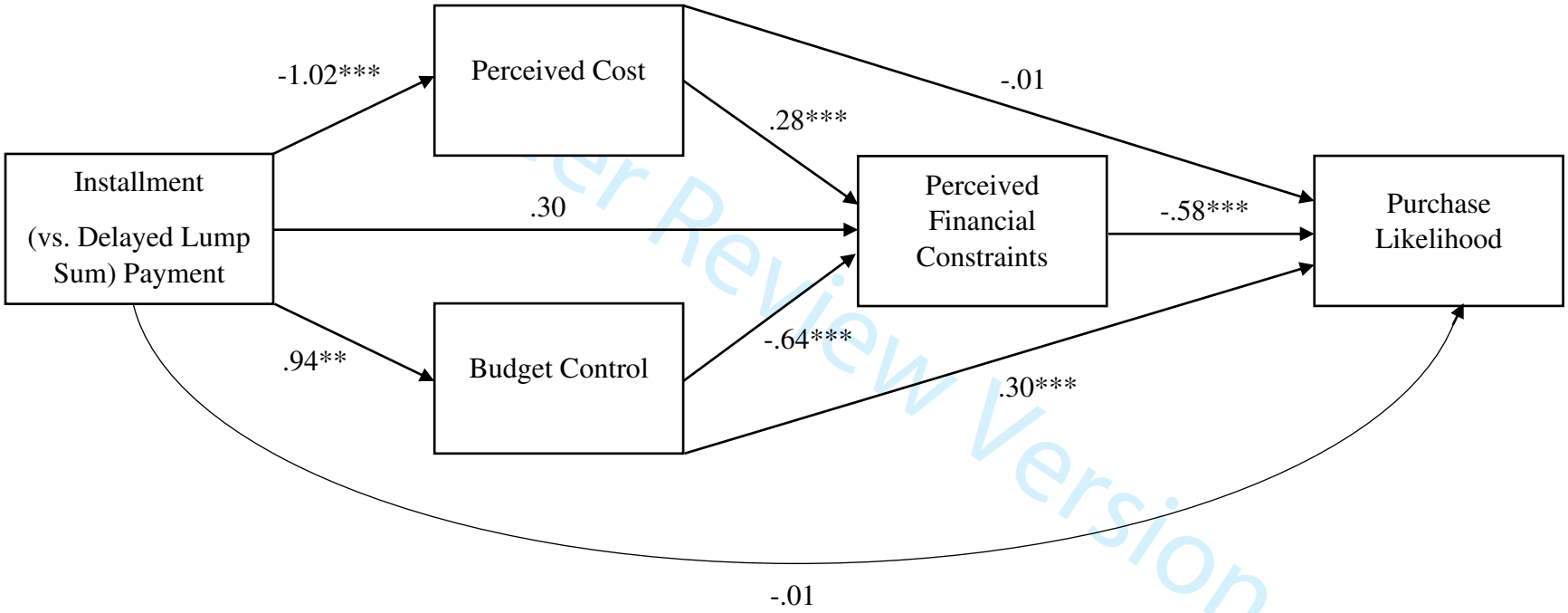

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Table WI2. Manipulation checks – descriptives (reduced sample)

Manipulation check	Group	N	Mean	Median	SD	SE
Ongoing installments	Delayed lump sum	186	3.47	0.0	4.24	0.311
	BNPL installment	185	9.39	10.0	1.42	0.105
Deferred	Delayed lump sum	186	9.14	10.0	1.82	0.134
	BNPL installment	185	8.61	10.0	2.10	0.154

Table WI3. Manipulation checks – independent samples t-test (reduced sample)

Manipulation check	Student's t Statistic	df	p	Cohen's d
Ongoing installments	-18.01	369	< .001	-1.870
Deferred	2.59	369	.010	.269

Table WI4. Measures – descriptives (reduced sample)

Measure	Group	N	Mean	Median	SD	SE
Perceived cost	Delayed lump sum	186	5.62	5.50	2.96	0.217
	BNPL installment	185	4.59	4.00	2.95	0.217
Budget control	Delayed lump sum	186	5.48	6.00	3.37	0.247
	BNPL installment	185	6.42	7.00	3.17	0.233
Perceived financial constraints	Delayed lump sum	186	5.28	4.50	3.15	0.231
	BNPL installment	185	4.69	4.25	3.07	0.226
BIF (Number of concrete choices)	Delayed lump sum	186	9.23	9.50	6.55	0.480
	BNPL installment	185	8.85	9.00	6.09	0.448
Purchase likelihood	Delayed lump sum	186	5.59	6.25	3.57	0.261
	BNPL installment	185	6.21	7.00	3.34	0.245

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Table WI5. Measures – independent samples t-test (reduced sample)

Manipulation check	Student's t Statistic	df	p	Cohen's d
Perceived cost	3.339	369	<.001	-0.3467
Budget control	-2.779	369	0.006	-0.2885
Perceived financial constraints	1.821	369	0.069	0.1891
BIF (Number of concrete choices)	0.574	369	0.566	0.0596
Purchase likelihood	-1.727	369	0.085	-0.1794

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Web Appendix J: Supplementary Study 3 – Stimuli, Measures & Analysis

Prior work on temporal reframing has focused on price presentation where prices are framed in segregated ("$2 a day") vs. aggregate ("$60 a month") terms, with payment remaining in aggregate terms ("monthly payments"). In contrast, BNPL segregates actual payments ("4 weekly payments of $15").

While our main studies demonstrated the impact of segregating payments, we did not distinguish between segregation by price frame vs. payment method in our experimental manipulations. To compare segregation by price frames vs. payment, this pre-registered experiment adopted a 2 (price frame: aggregated vs. segregated) x 2 (payment: lump sum vs installment) between-subjects design. We aimed to show that (1) segregating payments into BNPL installments still increases purchase likelihood when prices are segregated, and (2) segregating payments (not price) decreases perceived financial constraints.

Method

We pre-registered this study on AsPredicted.org (https://aspredicted.org/6tk98.pdf). While we recruited eight hundred participants on Prolific for a small monetary payment, eight hundred and seventy participants attempted our survey. Participants who failed the attention checks were excluded from the analysis, leaving a final sample of n = 801 (40.1% male, 58.8% female, 1.1% others, M_{age} = 41.30). The study adopted a 2 (price frame: aggregated vs. segregated) x 2 (payment: lumpsum vs. installment) between-subjects design.

First, all participants were asked about their favorite coffee pod brand and their monthly budget for coffee to stimulate them to think about their personal current spending[5]. Next, all participants read a hypothetical scenario about buying a discounted bundle of 80 of their favorite coffee pods. Similar to Gourville (1998; 1999; 2003), participants in the segregated (vs. aggregate) price condition were told that an ongoing subscription would be

[5] Participants reported an average monthly coffee budget of £23.10 (SD = £18.10).

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akin to spending about "£0.50 a day" (vs. "£180.68 a year") on coffee. To manipulate payment, participants in the lumpsum (vs. installment) conditions could "pay £19.80 in 4 weeks" (vs. "pay 4 weekly installments of £4.95").

Participants then indicated their purchase likelihood on a 9-point scale (1 = not at all likely, 9 = extremely likely). They also indicated how financially constrained they felt on four items: To what extent would you feel (1) less financially constrained, (2) able to spend as you like, (3) an improvement in your financial situation over others, (4) helped with your financial situation (1 = not at all, 9 = very much, α =.93). Next, participants also responded to four questions on perceived costs: To what extent (1) does the cost seem trivial, (2) does the cost seem less noticeable, (3) does the product cost little money, (4) would you purchase the product without much serious consideration (1 = not at all, 9 = very much; α = .83). Finally, participants completed manipulation checks regarding the price frame, payment method, and reported their demographic details.

Results

Manipulation checks. To test whether the price frame was successful, participants' responses to "how was the price of the product presented" (1 = £0.50 a day, 9 = £180.68 a year) were analyzed. Our price frame manipulation was successful, with participants in the segregated price condition describing the price as more segregated than those in the aggregate price condition ($M_{segregate}$ = 1.19, SD = .88 vs. $M_{aggregate}$ = 8.38, SD = 1.59, t(797) = 79.3, p <.001, cohen's d = 5.61). Consistent with our manipulations, participants in the installment condition described the payment more as 'ongoing installments' compared to their counterparts in the lump sum condition ($M_{installment}$ = 8.68, SD = 0.77 vs. $M_{lump\ sum}$ = 5.97, SD = 3.44, t(780) = -15.30, p <.001, cohen's d = -1.09). Participants in the lump sum condition regarded the payment as more deferred than their counterparts in the installment condition ($M_{installment}$ = 6.37, SD = 2.64 vs. $M_{lump\ sum}$ = 8.11, SD = 1.89, t(780) = 10.60, p <.001, cohen's

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d = .76)[6]. This is consistent with the manipulations, as the installment condition required payments to be made sooner than the lump sum condition.

Purchase likelihood. A 2 (price frame: aggregated vs. segregated) x 2 (payment: lumpsum vs. installment) ANOVA revealed a significant main effect of payment on purchase intentions ($F(1,797) = 8.39$, $p = .004$, $\eta^2 = .01$). As predicted, participants in the installment condition were more likely to purchase compared to those in the lumpsum condition ($M_{installment} = 5.16$, SD = 2.75 vs. $M_{lump\ sum} = 4.59$, SD = 2.80, $t(797) = -2.90$, $p = .004$, cohen's d = - .21). In line with prior work (e.g., Gourville 1998; 1999; 2003), an ANOVA also revealed a marginally significant main effect of price frame ($F(1,797) = 3.46$, $p = .063$, η^2 =.004). Participants in the segregated price frame condition were more likely to purchase compared to those in the aggregate price frame condition ($M_{segregated} = 5.06$, SD = 2.79 vs. $M_{aggregated} = 4.69$, SD = 2.79, $t(797) = -1.86$, $p = .06$, cohen's d = - .13). There was no significant interaction effect between price frame and payment ($F(1,797) = .07$, $p = .79$, η^2 = .00).

Perceived financial constraints. A 2 (price frame: aggregated vs. segregated) x 2 (payment: lumpsum vs. installment) ANOVA revealed a significant main effect of payment on perceived financial constraints ($F(1,797) = 15.94$, $p < .01$, $\eta^2 = 0.02$). As predicted, participants in the installment condition felt less financially constrained than those in the lumpsum condition ($M_{installment} = 5.28$, SD = 2.22 vs. $M_{lump\ sum} = 5.91$, SD = 2.24, $t(797)$ = 3.99, $p < .001$, cohen's d = - .28). However, price frame did not have a significant effect on perceived financial constraints ($F(1,797) = .076$, $p = .78$, $\eta^2 = .00$). There was also no significant price frame x payment interaction ($F(1,797) = .008$, $p = .93$, $\eta^2 = .00$).

Perceived cost. A 2 (price frame: aggregated vs. segregated) x 2 (payment: lumpsum vs. installment) ANOVA revealed a significant main effect of payment on perceived cost

[6] Since not every participant responded to the manipulation check questions, there were some missing responses (N = 19).

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(F(1,797) = 22.22, p <.01, η^2 = .03). As predicted, participants in the installment condition perceived costs to be lower than those in the lumpsum condition ($M_{installment}$ = 4.99, SD = 1.85 vs. $M_{lump\ sum}$ = 5.62, SD = 1.92, t(797) = 4.71, p <.001, cohen's d = - .33). While price frame did not have a significant effect on perceived costs, there was directional evidence that segregated (vs. aggregated) terms were perceived as less costly ($M_{seggregated}$ = 5.24, SD = 1.88 vs. $M_{aggregated}$ = 5.37, SD = 1.94, F(1,797) = .97, p = .33, η^2 = .001). This could possibly be due to the salience of the aggregate costs. There was also no significant price frame x payment interaction (F(1,797) = 1.35, p = .25, η^2 = .002).

Moderated mediation. As preregistered, we tested if the effect of payment on purchase intention was mediated by perceived financial constraints and perceived costs and, if these indirect effects depended on the price frame. Specifically, we conducted a moderated mediation with the payment condition as the independent variable, perceived financial constraints and costs as the mediators, price frame as a moderator, and purchase likelihood as the dependent variable (Hayes 2022, PROCESS Model 8).

Critically, financial constraints mediated the effect of installment payment on purchase likelihood for segregated (indirect effect = .43, 95% CI [.13 .74], 10,000 resamples) and aggregate price frames (indirect effect = .41, 95% CI [.12 .71], 10,000 resamples). Price frame did not significantly moderate the indirect effect of payment on purchase likelihood via perceived financial constraints (index = .02, 95% CI [-.38 .44]). Perceived costs also mediated the effect of installment payment on purchase likelihood for segregated (indirect effect = .17, 95% CI [.04 .33], 10,000 resamples) and aggregate price frames (indirect effect = .29, 95% CI [.14 .47], 10,000 resamples). Price frame did not significantly moderate the indirect effect of payment on purchase likelihood via perceived costs (index = -.11, 95% CI [-.32 .08]).

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These findings show that payment impacts purchase likelihood through perceived financial constraints. Notably, the effect occurs across both segregated and aggregate price frames, and separately from perceived costs. Furthermore, our results suggest that segregating payment, but not suggested price segregation, reduces perceived financial constraints.

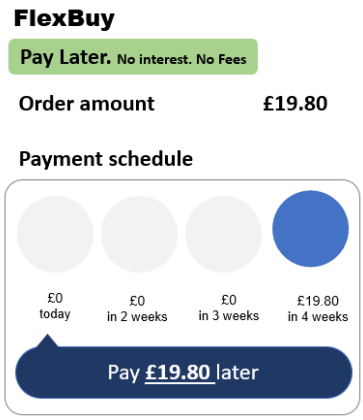
Stimuli

Aggregate (vs. Segregated) Price Frame, Lump sum (vs. Installment) Payment Condition

Suppose you were offered a discount on a bundle of 80 coffee pods, with payment made in 4 weeks (vs. 4 weekly installments).

Since you usually have a couple of cups a day, an ongoing subscription would be akin to spending about £180.68 a year (vs. £0.50 a day) on coffee.

Using the following payment, you can pay £19.80 in 4 weeks (vs. 4 weekly installments of £4.95).



(Lump sum payment)

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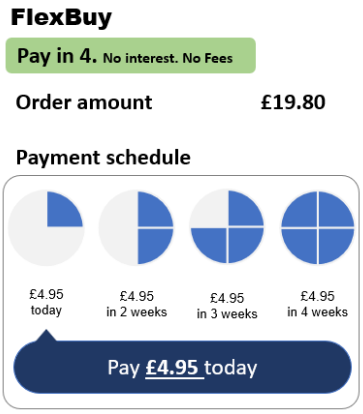

(Installment payment)

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Measures

Perceived financial constraints

To what extent would you feel … (1 = Not at all; 9 = Very much)

- less financially constrained
- able to spend as you like
- an improvement in your financial situation over others
- helped with your financial situation

(adapted from Paley et al. 2019; α = .93)

Perceived costs

To what extent … (1 = Not at all; 9 = Very much)

- does the cost seem trivial
- does the cost seem less noticeable
- does the product cost little money
- would you purchase the product without much serious consideration

(adapted from Atlas and Bartels 2018; α = .83)

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References
(not in the main text)

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