In-Store Spending Dynamics

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In-Store Spending Dynamics: How Budgets Invert Relative-Spending Patterns

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The authors conduct four controlled lab experiments and one field study in a brick-and-mortar grocery store to demonstrate that relative spending—the price of the purchased item relative to the mean price of the product category—evolves nonlinearly and distinctly for budget and nonbudget shoppers. While the relative spending of budget shoppers evolves in a concave manner, the relative spending of nonbudget shoppers evolves inversely in a convex manner. Thus, budget (nonbudget) shoppers spend relatively more (less) in the middle than at the beginning and toward the end of their shopping trip. Mediation analyses confirm that the pain of paying experienced while shopping drives price salience, which then drives relative spending. Moreover, manipulating shoppers' pain of paying, by altering the opportunity costs associated with their spending or drawing shoppers' attention to their spending via real-time spending feedback, is shown to influence these spending patterns. The research offers theoretical contributions to the in-store decision-making, budgeting, and pain-of-paying literature and has important implications for marketing and promotion strategies in retail and mobile technology environments, as it suggests when a shopper may be more sensitive to price-related factors.

Keywords: spending, budgets, pain of paying, price salience, spending feedback, in-store decision-making, shopper marketing

Eighty-five percent of leading retailers indicate that engaging their customers during a shopping trip, using customer-facing technologies (e.g., mobile phones, smart shopping carts), is one of their top business opportunities (Rosenblum 2007). To optimally engage customers throughout their shopping trip, it is important to understand how consumer in-store spending decisions, such as whether they are inclined to purchase relatively expensive or inexpensive products, evolve throughout a shopping trip. This understanding provides insights on how to offer customized and timely promotions, optimally design store layouts, and provide relevant product information (Hui et al. 2013; Senne 2005).

Much of our current understanding of in-store spending behavior is based on cross-sectional analyses of end-of-trip variables such as basket composition and total spending, implicitly assuming that spending behavior is constant over the course of a shopping trip (Bell, Corsten, and Knox 2010; Inman, Winer, and Ferraro 2009). However, recent research has demonstrated that spending behavior is actually dynamic in that earlier spending influences subsequent spending (Dhar, Huber, and Khan 2007; Khan and Dhar 2006; Lee and Ariely 2006; Vohs et al. 2008). That is, shoppers make different spending decisions at different points in their shopping trips (Gilbride, Inman, and Stilley 2015; Lee and Ariely 2006; Stilley et al. 2010a, 2010b).

We offer a comprehensive, theoretical account and supporting empirical evidence for these in-store spending dynamics that suggests that shoppers' relative spending—the price of the purchased item relative to the mean price of the product category—evolves nonlinearly throughout a

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shopping trip as a function of the salience of price while shopping. For example, when a shopper purchases premium-brand, such as Coca-Cola, rather than store-brand cola, the relative spending is comparatively high. Our theoretical account explains when and why a shopper's inclination to purchase relatively expensive or inexpensive products evolves over major shopping trips involving more than 10 purchases (Kahn and Schmittlein 1992; Stilley et al. 2010a). Building on budgeting literature (Heath and Soll 1996; Sharma and Alter 2012; Stilley et al. 2010a, 2010b), we theorize and empirically verify that nonbudget and budget shoppers differ in their evolving inclinations to purchase relatively expensive or inexpensive options (Bliss 1988; Thaler 1999).

We make three important contributions in this article. First, we demonstrate that budget and nonbudget shoppers show nonlinear and distinct patterns of relative spending over the course of a single shopping trip. Second, we offer theory and empirical evidence to suggest that the pain of paying shoppers experience in each decision drives their price salience, which then drives relative-spending patterns in a single shopping trip. Finally, we demonstrate how to influence the pain of paying shoppers experience to alter these relative-spending patterns.

We first discuss the consumer spending and budgeting literature to provide the basis for our theorizing about how and why the spending decisions of nonbudget and budget shoppers evolve distinctively throughout a shopping trip. To empirically demonstrate our theory, we conducted studies 1–4 as controlled laboratory experiments and study 5 as a field study in a brick-and-mortar grocery store. In study 1, we observe budget and nonbudget shoppers and find confirmation of evolving relative-spending patterns: budget shoppers show concave patterns and nonbudget shoppers show convex patterns. In study 2, we find evidence that price salience drives relative spending and mediates the relationship between the number of spending decisions made and shoppers' relative spending. In study 3, we find empirical evidence showing that the pain of paying shoppers experience in each decision evolves as a shopping trip progresses and drives the distinct nonlinear patterns in price salience and relative spending. In study 4, we find additional process evidence demonstrating that influencing the pain of paying shoppers experience shifts the patterns of relative spending. Last, in study 5, we demonstrate the ecological validity of our findings by observing actual consumers shopping in a brick-and-mortar grocery store. Finally, we discuss theoretical contributions, limitations, and opportunities for future research.

IN-STORE SPENDING DYNAMICS

Marketing and economic models traditionally assume that spending evolves linearly as a shopping trip progresses (Bell et al. 2010; Wakefield and Inman 2003), implicitly assuming that a shopper's relative spending—the price of the purchased item relative to the mean price of the product category—on each subsequent item is constant.

For example, budget shoppers are, traditionally expected to consistently select relatively inexpensive items from each product category, while nonbudget shoppers will consistently purchase more expensive items. We challenge this assumption based on research that has demonstrated in-store spending behavior can be dynamic, as earlier spending decisions are known to influence subsequent spending decisions (Dhar et al. 2007; Khan and Dhar 2006; Vohs et al. 2008). More specifically, we propose that the pain of paying shoppers experience during each purchase decision evolves nonlinearly throughout a single shopping trip. Consequently, price becomes more or less salient for shoppers and leads to nonlinear relative-spending patterns for budget and nonbudget shoppers. To understand how and why shoppers' relative spending evolves nonlinearly, we first turn to literature on the pain of paying.

The Pain of Paying

Mental accounting research (Prelec and Loewenstein 1998) asserts that shoppers experience emotional distress, called the pain of paying, when they think about spending money (Knutson et al 2007; Loewenstein and Lerner 2003). The root of their emotional distress is their perception of opportunity cost: money spent on one product means less money to spend on another product (Frederick et al. 2009; Rick et al. 2008). Accordingly, shoppers experience more pain when they perceive a specific spending decision to have a large opportunity cost (Prelec and Loewenstein 1998; Rick et al. 2008). The pain of paying then increases shoppers' price salience, so that price looms large in their perceptions (Raghubir and Srivastava 2008). Consequently, they reduce their spending (Wathieu et al. 2004).

Traditionally, research has focused on the pain of paying at the end of shopping trips, examining shoppers' total spending (Bell and Lattin 1998; Thomas, Desai, and Seenivasan 2011). In contrast, we examine the pain of paying and price salience throughout the shopping trip, with each spending decision, to explain relative spending over the course of a shopping trip. Specifically, we argue that pain of paying is experienced with each spending decision and not only a cumulative amount (Knutson et al. 2007; Thaler 1980, 1985). This is in line with research that has shown segregated individual purchases are more emotionally distressful than a single aggregrate total (Ariely 1998; Raghubir and Srivastava 2008). Therefore, we consider the pain of paying experienced from each spending decision within a shopping trip to understand how relative spending evolves throughout the shopping trip.

Before we discuss how the experienced pain of paying evolves throughout a single shopping trip, it is important to understand how shoppers feel at the start of the shopping trip. In traditional shopping situations, shoppers begin their shopping trip with little emotional distress, and it takes a few spending decisions for shoppers to begin considering the opportunity cost associated with their spending (Frederick et al. 2009; Prelec and Loewenstein 1998). Accordingly, the pain of paying they experience is modest at first, but increases as they continue to make more spending decisions. The pain experienced during subsequent spending decisions then depends on the cumulative spending and associated opportunity cost with spending additional money (Ariely 1998), which is evaluated as the relative sacrifice or loss associated with each spending decision (Prelec and Loewenstein 1998; Rick et al. 2008; Thaler 1985). Consequently, opportunity costs are more painful early in the shopping trip and become less so toward the end (Kahneman et al. 1993; Redeliemier, Katz, and Kahneman 2003; Rick et al. 2008). For example, although spending $4 is more painful than spending $2, the experienced pain of paying will be less when a shopper has already spent $70 versus $10 (Thaler 1985; Kahneman and Tversky 1979). Hence, as spending accumulates, the emotional distress inherent in each subsequent spending decision diminishes (Kahneman and Tversky 1979; Prelec and Lowenstein 1998), as does price salience (Raghubir and Srivastava 2008). That is, at the start of the shopping trip, shoppers feel little pain of paying, so price salience is relatively low. Yet, as the pain increases, so does the price salience. Toward the end of the shopping trip, as the marginal increase in experienced pain diminishes (Ariely 1998), price becomes less salient in a shopper's mind. Thus, price salience evolves in a concave pattern. As price salience tends to reduce spending (Van Ittersum et al. 2007; Wathieu et al. 2004), relative spending should evolve convexly as the shopping trip progresses.

The Moderating Impact of Budgets

Shopping on an explicit budget—earmarked portions of income for specific uses (Bénabou and Tirole 2004)—can be an effective self-control strategy when one accurately projects future spending and when the budget is consequential (Heath and Soll 1996; Sharma and Alter 2012; Stilley et al. 2010a; Thaler 1985, 1999). Explicit budgets establish a reference point for considering opportunity costs and will determine to what extent shoppers experience the pain of paying (Morewedge, Holtzman, and Epley 2007; Rick et al. 2008; Soster, Gershoff, and Bearden 2014; Spiller 2011). Whereas nonbudget shoppers consider the opportunity cost of spending in reference to zero spending (Prelec and Loewenstein 1998; Thaler 1985), budget shoppers evaluate the cost of spending decisions according to how much room remains in their explicit budgets (Heath and Soll 1996; Soster et al. 2014). Consequently, the pain of paying will evolve uniquely for budget shoppers. We acknowledge that nonbudget shoppers may use implicit budgets based on previous expenditures in the category (Stilley et al. 2010a), but we demonstrate that when budgets remain implicit, zero spending still functions as the critical reference point for evaluating spending (see the web appendix for details).

As the opportunity cost of their spending is initially top of mind for budget shoppers, the emotional distress experienced at the start of their shopping trip is relatively high (Rick 2011). After they make a few spending decisions, however, they relax their consideration of opportunity cost as they realize that their budget is still largely intact (Frederick et al. 2009; Rick et al. 2008). Consequently, they feel a "sense of wealth" (Heath and Soll 1996), which should reduce the emotional distress they feel at the thought of spending money. However, toward the end of the shopping trip, as the budget becomes depleted, the sense of wealth is replaced with a stronger sense of opportunity cost. That is, each decision carries modest opportunity cost until shoppers reach the end of their trip and risk exceeding their budget (Heath and Soll 1996; Soster et al. 2014). Hence, we propose that the pain of paying evolves convexly for budget shoppers.

The salience of price follows suit (Raghubir and Srivastava 2008). It begins relatively high at the start of the shopping trip (Heath and Soll 1996; Thaler 1980; Van Ittersum, Pennings, and Wansink 2010), but decreases in response to the early reduced pain of paying (Heath and Soll 1996; Soster et al. 2014; Spiller 2011). However, toward the end, as pain increases, so does price salience. Given that price salience is negatively related to spending (Van Ittersum et al. 2007; Wathieu et al. 2004), the relative spending of budget shoppers is expected to evolve in a concave pattern.

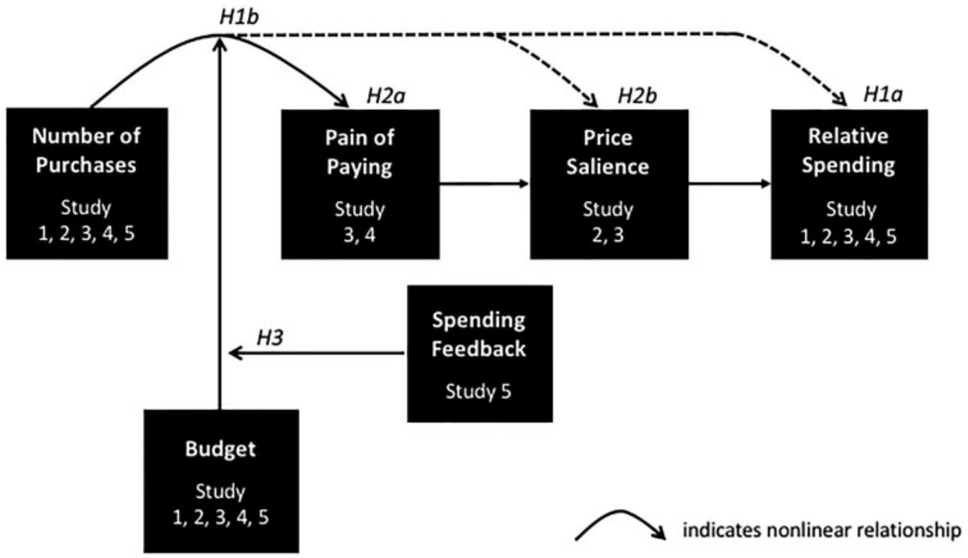
Spending Dynamics of Nonbudget versus Budget Shoppers

In sum, as budget and nonbudget shoppers evaluate their spending against distinct reference points, the amount of pain of paying they experience in each spending decision evolves convexly among budget shoppers and concavely among nonbudget shoppers. Consequently, the salience of price evolves similarly for both groups. Their relative spending is expected to evolve inversely, yielding a convex pattern in relative spending for nonbudget shoppers and a concave pattern for budget shoppers (figure 1).

> **H1:** The relative spending of budget and nonbudget shoppers evolves (a) nonlinearly and (b) distinctly throughout major shopping trips.

FIGURE 1

CONCEPTUAL MODEL AND OUTLINE OF STUDIES



> **H2:** The (a) pain of paying and the (b) corresponding salience of price drive the nonlinear patterns in relative spending.

We propose that the thought of spending money causes emotional distress that drives the evolution of relative spending as a shopping trip progresses. Specifically, after shoppers make their first few purchases, they begin considering the associated opportunity cost. Accordingly, if shoppers are given real-time spending feedback that draws attention to their total spending, they will pay more attention to how much they have spent, increasing the salience of the opportunity costs and ultimately driving shoppers to reduce their spending (Van Ittersum et al. 2013). In contrast, real-time spending feedback should reduce emotional distress for budget shoppers by signifying the money left in their budget and enhancing their sense of wealth (Heath and Soll 1996; Larson and Hamilton 2012). Thus, they will increase their relative spending early in the trip relatively more than budget shoppers not receiving spending feedback. However, as budget shoppers reach the end of the shopping trip, their pain of paying increases as the risk of exceeding their budget heightens, ultimately reducing their relative spending.

> **H3:** Real-time spending feedback moderates the relative spending of budget and nonbudget shoppers, such that it will amplify shoppers' nonlinear relative-spending patterns.

To empirically demonstrate how and why shoppers' relative spending evolves over the course of a shopping trip, we conducted four controlled laboratory experiments and one field study in a brick-and-mortar grocery store.

STUDY 1: THE SPENDING DYNAMICS OF BUDGET AND NONBUDGET SHOPPERS

We conducted study 1 to provide initial evidence for the proposed spending dynamics. In a simulated shopping trip, both budget and nonbudget shoppers made a series of purchase decisions between relatively expensive and relatively inexpensive products. We theorized that budget (nonbudget) shoppers would exhibit a concave (convex) pattern in their relative-spending decisions.

Design and Procedure

Participating in a computer-simulated grocery-shopping task were 111 paid online participants ($M_{\text{age}} = 35.8$; 49.5% women) from Amazon's Mechanical Turk. Participants were first given a pretested shopping list containing 16 product categories (e.g., bread, 1 loaf). For each product category, participants were given one lower-priced option and one higher-priced option (see the web appendix). For each choice set, the brand name, unit size, and price appeared below a picture of each product. After participants made their selection for that product category, the next choice set appeared. As our primary focus was to examine the evolution of spending throughout a shopping trip, we presented the purchase decisions randomly.

Thus, each participant viewed a unique sequence of purchase decisions to eliminate effects that might be attributed to particular sequences, their relationships, or specific product categories.

The study was a mixed design with budget (no budget vs. budget) as a between-subjects experimental factor and the sequence of spending decisions as a within-subject factor. Participants were randomly assigned to one of the two budget conditions. Participants in the nonbudget condition were asked to select items as if they were on a typical visit to their local grocery store. Participants in the budget condition were told to "Imagine that your budget for this shopping trip is $60." If they selected the 16 inexpensive options, their total expenditure was $49.50. If they selected the 16 expensive options, their total expenditure was $70.50. The $60 budget was the average of the two totals. To make their budgets consequential (Thaler 1999), we told participants that they would be required to solve three three-digit math problems if they breached their $60 budget.

Measures

To examine whether participants were more or less likely to purchase products that were relatively expensive or inexpensive, we recorded each spending decision as (0 = inexpensive, 1 = expensive).

Results

Consistent with past research, logistic regression results showed that budget participants were less likely to purchase the relatively expensive products ($ß_{Budget} = –.83$, SE = .11, Wald = 61.43, $p < .001$). Although one participant in the budget condition spent more than $60, he was kept in the analysis, as his spending did not affect the result. To examine whether the likelihood of choosing an expensive versus inexpensive option evolves nonlinearly and distinctly in a single shopping trip, we analyzed spending decisions using a logistic regression analysis that included budget condition, linear (x) and quadratic terms (x^2) for each spending decision, and their linear and quadratic interactions as predictor variables with the relative expense (i.e., high or low price) of the product as a dependent variable. Consistent with expectations, the results revealed a significant quadratic interaction ($ß_{Budget \times Purchases}{}^2 = –.02$, SE = .01, Wald = 12.55, $p < .001$), which supports hypothesis 1a. Next, to understand the nonlinear relationship for budget and nonbudget shoppers, we conducted separate logistic-regression analyses for each budget condition including linear (x) and quadratic (x^2) terms of a purchase order. Nonbudget shoppers showed a convex pattern in relative spending ($ß_{PurchaseDecision} = –.12$, SE = .06, Wald = 4.07 $p < .05$; $ß_{PurchaseDecision}{}^2 = .01$, SE = .003, Wald = 4.14, $p < .05$); budget shoppers showed a concave pattern ($ß_{PurchaseDecision} = .25$, SE = .08, Wald = 9.08, $p < .01$; $ß_{PurchaseDecision}{}^2 = –.01$, SE = .01, Wald = 8.43, $p < .01$), supporting hypothesis 1b (figure 2). Furthermore, an analysis of each spending decision showed that nonbudget (budget) shoppers were significantly more likely to favor expensive (inexpensive) items at the beginning and end of the shopping trip (see the web appendix).

Discussion

Study 1 confirms that shoppers' inclination to purchase relatively expensive or inexpensive options evolves nonlinearly over the course of a shopping trip. More specifically, the results support our core proposition that the relative spending of nonbudget shoppers evolves convexly, while the relative spending of budget shoppers evolves concavely. Although we propose that shoppers use budgets as a reference point, our study was designed so that participants would suffer consequences if they exceeded their budget. The results of study A (included in the web appendix), however, demonstrate that the reference point of the budget rather than the consequences of overspending drives the spending pattern for budget shoppers.

Next, to provide evidence of what drives the distinct and nonlinear spending patterns, we analyze how the salience of price evolves in a shopping trip.

STUDY 2: THE SALIENCE OF PRICE AND ITS INFLUENCE ON SPENDING DYNAMICS

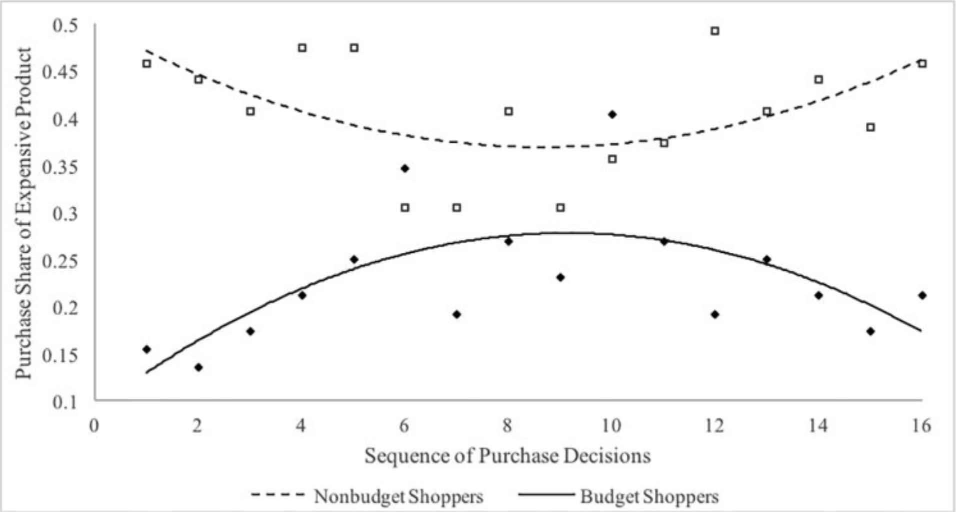
Study 2 was designed to demonstrate how price salience evolves and drives the relative-spending patterns of budget and nonbudget shoppers over the course of a single shopping trip.

Design and Procedure

To examine how price salience evolves throughout a shopping trip, we recruited 369 students to participate in a computer-simulated, grocery-shopping task for partial course credit ($M_{age} = 20.1$; 51% women). The study was a two-factor mixed design in which participants made 15 purchase decisions (within-subjects variable) after being randomly assigned to shop with or without a budget (between-subjects variable). To determine price salience during each purchase decision, we used MediaLab technology to measure how long participants looked at the prices of the available alternatives in each choice set. Participants viewed product prices for each product alternative by moving their cursor over a gray box labeled "Price." Below each gray box was a "Select" button that participants would use to choose an option (see appendix A for a screenshot).

FIGURE 2

STUDY 1: RELATIVE SPENDING OF BUDGET AND NONBUDGET SHOPPERS THROUGHOUT A SHOPPING TRIP



After four practice trials, participants were asked to make 15 purchases as part of a simulated weekly grocery shopping trip. First, they received a shopping list of product categories (e.g., "wheat bread, 1 loaf"; categories, products, and prices are listed in the web appendix). Next, participants were randomly assigned to budget or nonbudget conditions. We asked participants in the budget condition to "Imagine that your budget for this shopping trip is $60." If they chose the lowest (highest) price option in each category, their total price for 15 products would be approximately $41.05 ($69.91). For each purchase decision (presented one at a time), participants were given four alternatives of similar sizes. The prices of each alternative varied in accordance with their prices at a national grocery store to better simulate an actual shopping trip where consumers can choose from various products and price levels. For each product option, participants viewed a picture of the product, the unit size, and its (covered) price. The MediaLab technology did not allow complete randomization of purchase orders, so three separate randomized orders were generated through the Qualtrics survey engine for the 15 purchase decisions, and counterbalanced across participants. The three orders showed no significant differences in their linear or quadratic trends.

To incentivize participants to purchase as they normally would (Ding 2007; Ding, Grewal, and Liechty 2005), we announced that one participant would win a $100 prize package including their selected groceries and cash. Nonbudget participants were told that their prize would include their selected groceries and cash for a total of $100. For example, if participants spent $60, they would receive their selected groceries and $40 in cash. To make the budget consequential and thus effective (Thaler 1980), budget shoppers were told that if they exceeded their $60 budget, they would receive the groceries but not the remaining cash. Thus, they were motivated to adhere to their budget, yet also felt free to purchase products they wanted even if they exceeded their budget. Three participants exceeded their budget of $60, but remained in the analysis as their spending did not influence the results. After the experiment was completed, participants provided demographic information.

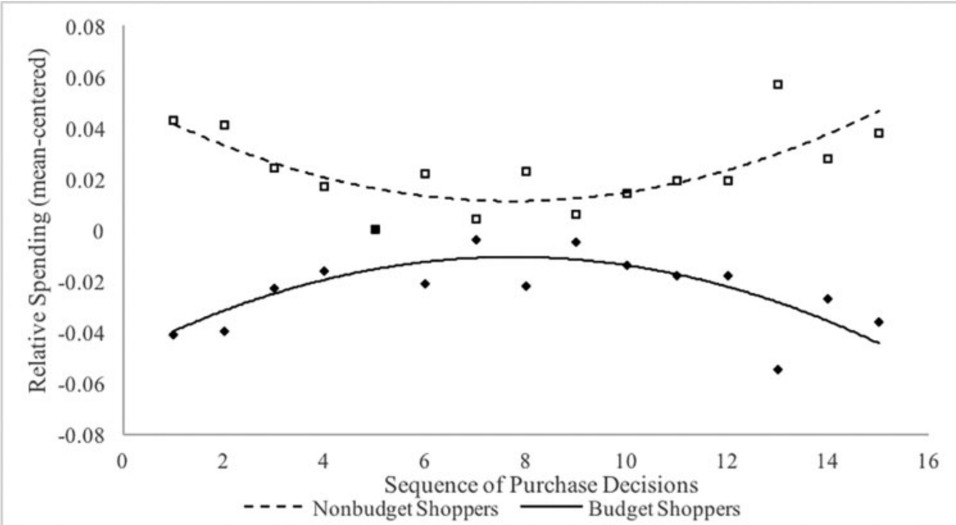
Measures

The MediaLab technology allowed us to determine how long participants viewed uncovered prices of the product options per purchase decision, according to purchase decision sequence (i.e., the n^{th} decision, irrespective of product category). These values were log-transformed via a box-cox transformation (i.e., taking the log of [amount of time +1]) to account for a skewed distribution and then standardized to account for the limited number of randomized purchase decisions the software could accommodate (i.e., the values of the n^{th} decision were standardized together).

To examine whether expensive or inexpensive items were selected, we focused our analysis on relative spending, which we calculated by dividing the price of the selected product by the average price of the product category. Given that the experiment had only three randomized orders, we mean-centered the relative-spending

FIGURE 3

STUDY 2: RELATIVE SPENDING OF BUDGET AND NONBUDGET SHOPPERS THROUGHOUT A SHOPPING TRIP



value to account for differences between the categories in the three randomized orders.

Results

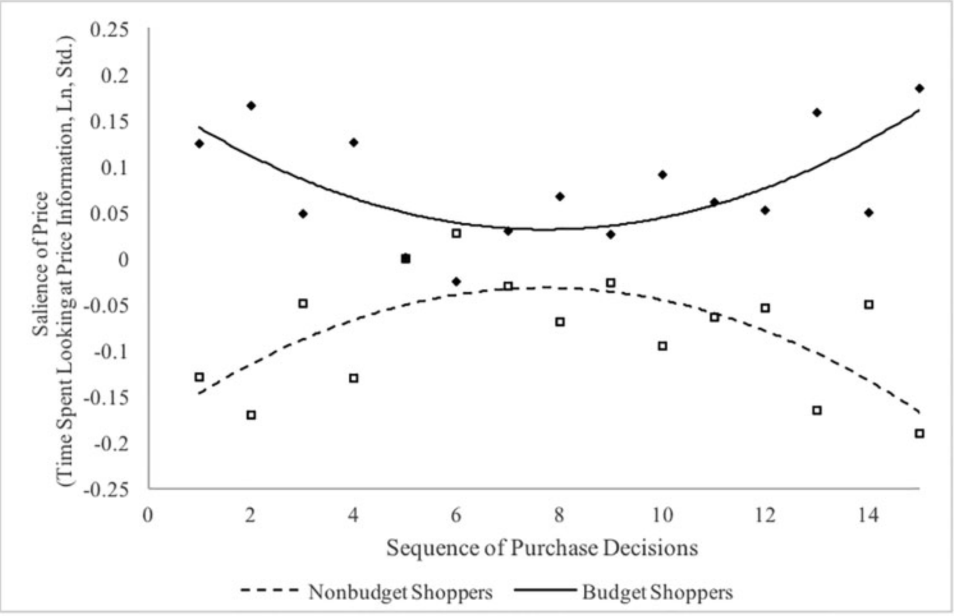
Relative Spending. We utilized a repeated-measures ANOVA with budget condition as a between-subject factor and the order of each purchase decision as a within-subjects factor to analyze the mean-centered relative spending over the course of the shopping trip. This approach allowed us to examine hypothesis 1 and determine whether relative spending evolves nonlinearly and distinctly for budget and nonbudget shoppers, while controlling for individual differences between participants. Consistent with hypothesis 1a, we found a significant quadratic interaction between the order of spending decisions (e.g., first, second, third) and budget condition ($F(1, 367) = 17.82$; $p < 0.01$). Relative spending thus evolves nonlinearly and distinctly for budget versus nonbudget shoppers. A pair of independent planned quadratic contrasts revealed a significant quadratic trend for nonbudget ($F(1, 180) = 7.78$; $p < 0.01$) and budget shoppers ($F(1, 187) = 10.41$; $p < 0.01$), supporting hypothesis 1b. Figure 3 confirms that relative-spending patterns are consistent with our theorizing.

Portion of Time Focused on Price. To test hypothesis 2 and determine whether price salience evolves differently for budget and nonbudget shoppers, we used a similar repeated-measures ANOVA with the same predictor variables and the time spent looking at price information as the dependent variable. A significant quadratic interaction between progressions through the shopping trip (first, second, third, . . ., 15th spending decision) and budget conditions revealed that budget and nonbudget shoppers spent different amounts of time looking at price information throughout the shopping trip ($F(1, 367) = 15.82$; $p < 0.01$). Separate planned quadratic contrasts for each budget condition were significant, indicating that price salience evolves in a quadratic pattern for both nonbudget shoppers ($F(1, 180) = 6.66$; $p < 0.05$) and budget shoppers ($F(1, 187) = 8.82$; $p < 0.01$). Figure 4 confirms that the patterns in price salience are consistent with our theorizing.

To examine whether price salience mediates the relationship between the number of spending decisions and relative spending, we conducted nonlinear mediation analyses (MEDCURVE macro; Hayes and Preacher 2010; IV = purchase decision, DV = relative spending, M = salience of price; IV → M = quadratic relationship; M → DV = linear relationship). The process allowed us to test how a series of purchase decisions indirectly affects relative spending when price salience increases (decreases) for nonbudget (budget) shoppers at the beginning of the shopping trip, and decreases (increases) for nonbudget (budget) shoppers toward the end of the shopping trip (Hayes and Preacher 2010). The nature of the macro, however, required a separate nonlinear mediation analyses for budget and nonbudget shoppers. Consistent with hypothesis 2b, price salience indeed mediates relative spending. For nonbudget shoppers, relative spending decreases when price salience increases ($\beta_{PriceTime} = -.12$, $p < .001$). For nonbudget shoppers, a bootstrapping analysis showed that price salience had a marginally significant indirect effect

FIGURE 4

STUDY 2: THE SALIENCE OF PRICE THROUGHOUT A SHOPPING TRIP



on relative spending at the beginning (1 SD below the mean; 90% Cl = –0.0011/–0.0001; 5,000 draws) and a significant effect at the end of the shopping trip (1 SD above the mean; 95% CI; 0.0002/0.0011; 5,000 draws). Consistent with expectations, the findings suggest that increased price salience decreases relative spending of nonbudget shoppers early, while reduced price salience increases relative spending later in the shopping trip.

Price salience also influenced the relative spending of budget shoppers ($ß_{\text{Price Salience}} = –.06$, $p < .001$), but in a distinct pattern. Early in the trip, price salience had a significant indirect effect on their relative spending (1 SD below the mean; 95% CI; .0001/.0006; 5,000 draws), and also toward the end (i.e., 1 SD above the mean; 95% CI; –.0007/–.0001; 5,000 draws). Aligned with our theorizing, reduced price salience early in the trip increased their relative spending, while increased price salience decreased their relative spending later.

Discussion

The study 2 results are consistent with our prediction that price salience evolves nonlinearly and distinctly for budget and nonbudget shoppers throughout a shopping trip. For nonbudget shoppers, price salience is modest at first and then increases before decreasing toward the end. For budget shoppers, price salience is relatively high at the start, decreases early, and increases again toward the end. Furthermore, these results demonstrate that price salience mediates how the number of spending decisions affects relative spending for both budget and nonbudget shoppers. We theorize that the pain of paying drives the nonlinear patterns in price salience. To find empirical support, we conducted study 3.

STUDY 3: PAIN-OF-PAYING EFFECTS ON PRICE SALIENCE AND SUBSEQUENT SPENDING DYNAMICS

Study 3 is conducted to offer empirical evidence showing that the distinct patterns in the pain of paying drive the distinct nonlinear patterns in price salience for budget and nonbudget shoppers.

Design and Procedure

To research the proposed underlying mechanism that drives shoppers' relative-spending patterns, we recruited 924 participants from Amazon's Mechanical Turk (M_{age} = 26.2, 51.2% women) for a computer-simulated shopping task. The basic shopping procedure was similar to study 2 in using the same products, pictures, and prices, with two differences. First, we completely randomized the order of the purchase decisions. Second, in keeping with the primary focus on how the pain of paying and price salience evolve to influence relative spending, we interrupted the shopping trips—between-subjects—at a randomly assigned measurement point after purchase decisions to examine the pain of paying and price salience. Thus, we utilized a 2 (budget vs. nonbudget) × 15 (after 1, 2, 3, ... 14, 15 purchase decision(s)) between-subjects design. Participants who were interrupted before they made all 15 purchases were not asked to complete their shopping after completing the measures.

Measures

Consistent with study 2, the dependent variable, relative spending, was operationalized as the likelihood of choosing a relatively expensive versus inexpensive product in each purchase decision. As the order of the purchase decisions was completely randomized, the relative-spending measure was not mean-centered to control for category-level effects, as in study 2. In keeping with the focus on how the pain of paying drives relative spending, we analyzed final spending decisions before the shopping was interrupted or finished.

To measure a shopper's experienced pain of paying, we adapted a two-faceted approach (Thomas et al. 2011) entailing (1) a nonverbal face scale from happy (☺) to sad (☹), and (2) the extent to which participants felt seven emotions: pain, restricted, comfortable [r], empowered [r], irritated, annoyed, and pleasant [r] (not at all to very much). At a specified measurement point, we asked: "How do you feel about spending money at this point in your shopping trip?" Next, participants completed the eight measures listed above (coded on a seven-point scale), aggregated into a single pain-of-paying measure ($\alpha = .86$).

Next, we assessed price salience during the most recent purchase using a validated measure (Wathieu et al. 2004). Participants were asked: "Most purchase decisions involve a tradeoff between a product's price and perceived quality. Please rate the importance of the price of the product (compared to the perceived quality) in your most recent decision by assigning 100 points between price and quality. If your decision was based solely on price, please assign the total 100 points to price." The portion allocated to price served to measure price salience. The study concluded with demographic questions.

Results

Relative Spending. As participants' relative spending for each purchase decision was collected between-subjects, it was analyzed with a regression model including variables for budget condition and number of purchases, a variable representing the quadratic relationship of the number of purchases (i.e., [number of purchases]^2), and the interaction between budget conditions and the two previous variables. Thus, we could test whether the relative spending of each group evolved nonlinearly and distinctly. Consistent with hypothesis 1a, the results revealed a significant quadratic interaction term ($\beta_{\text{Budget\_×\_Purchases}}{}^2 = -1.80$, $p < .01$), demonstrating that relative spending evolves distinctly and nonlinearly for budget and nonbudget shoppers. Separate analyses of each budget condition showed that relative spending evolves convexly for nonbudget shoppers ($\beta_{\text{PurchaseDecision}} = -.44$, $p < .05$; $\beta_{\text{PurchaseDecision}}{}^2 = .45$, $p < .05$), and concavely for budget shoppers ($\beta_{\text{PurchaseDecision}} = .68$, $p < .01$; $\beta_{\text{PurchaseDecision}}{}^2 = -.67$, $p < .01$), confirming hypothesis 1b (figure 5).

Price Salience. To determine whether price salience also evolves nonlinearly and distinctly, we utilized a regression analysis including the same independent variables used to analyze relative spending. Consistent with expectations, the results yielded the predicted quadratic interaction ($\beta_{\text{Budget×Purchases}}{}^2 = 1.77$, $p < .01$), indicating that price salience evolved nonlinearly and distinctly for both groups. A pair of independent regression analyses showed a significant pattern for nonbudget shoppers ($\beta_{\text{Purchases}} = .44$; $p < .05$; $\beta_{\text{Purchase}}{}^2 = -.49$, $p < .05$), and budget shoppers ($\beta_{\text{Purchases}} = -.67$, $p < .01$; $\beta_{\text{Purchase}}{}^2 = .61$, $p < .01$). The patterns are consistent with study 2 and in accordance with our theorizing (figure 6).

We next conducted a nonlinear mediation analysis, as described in study 2, to determine whether price salience mediates the relationship between progression through a shopping trip and relative spending. Similar to study 2, nonbudget shoppers showed decreased relative spending as price salience increased ($\beta_{\text{Price Salience}} = -.29$, $p < .01$). Bootstrapping analysis showed that price salience had a significant indirect effect on relative spending early (1 SD below the mean; 95% Cl = –0.0082/–0.0001) and later in the shopping trip (1 SD above the mean; 95% CI; 0.0012/0.0080); increased price salience decreased relative spending early, while reduced price salience increased relative spending later. Budget shoppers showed similar but unique relative-spending behavior according to price salience ($\beta_{\text{Price Salience}} = -.29$, $p < .01$). Decreased price salience increased relative spending early (1 SD below the mean; 95% CI; .0024/.0087; 5,000 draws), while the subsequently increased price salience decreased relative spending toward the end (i.e., 1 SD above the mean; 95% CI; –.0061/–.0004; 5,000 draws). The results additionally support hypothesis 2b.

Pain of Paying. To examine how participants' experienced pain of paying evolves and to account for the proposed differences in the patterns between budget and nonbudget shoppers, we conducted two separate regressions to accommodate different patterns of pain of paying (figure 7). For nonbudget shoppers, we predicted that the pain of paying would diminish. Accordingly, we found a marginally significant relationship between pain and a log term for the number of purchases for nonbudget shoppers (i.e., ln[number of purchases]; b=.10 SE = .06;

FIGURE 5

STUDY 3: RELATIVE SPENDING OF BUDGET AND NONBUDGET SHOPPERS THROUGHOUT A SHOPPING TRIP

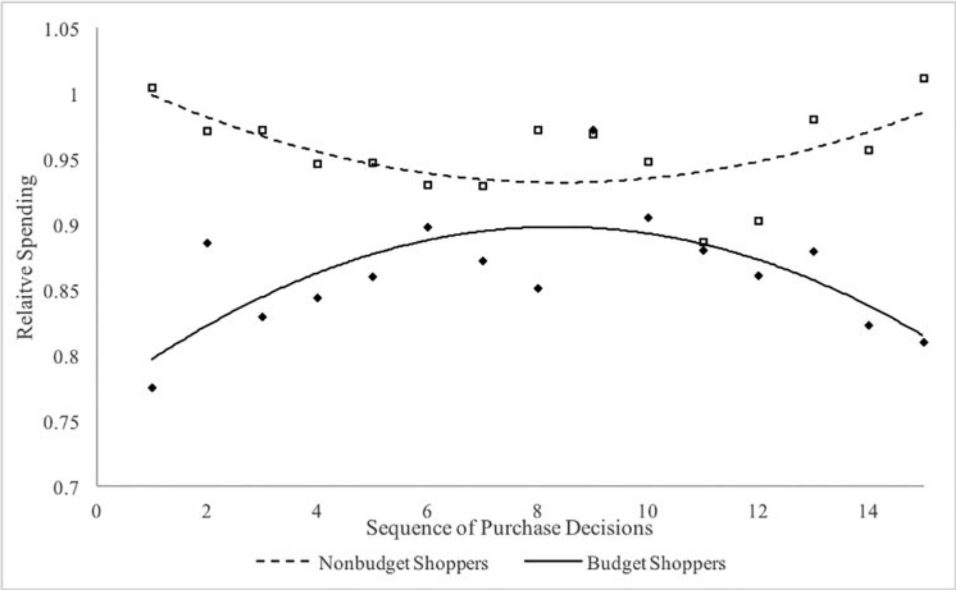
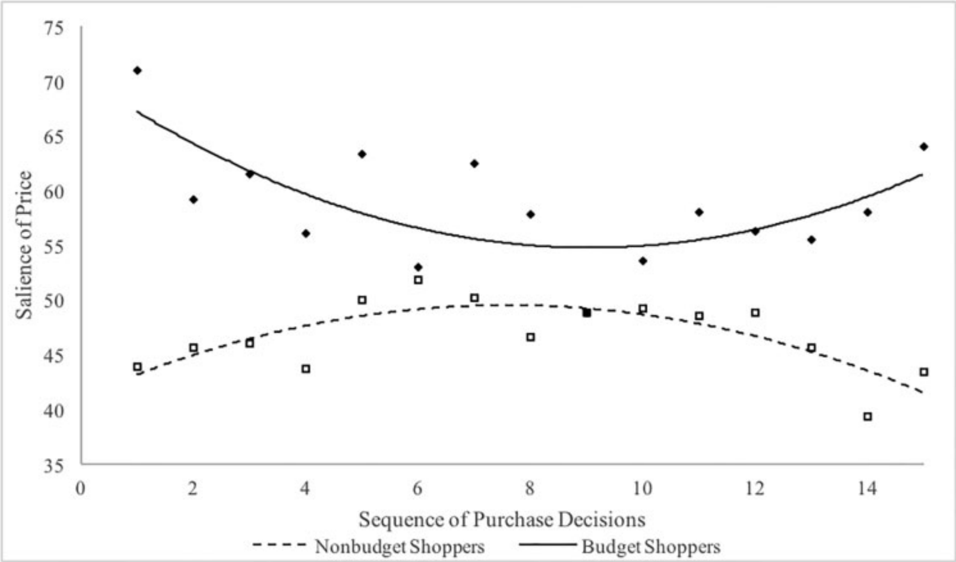


FIGURE 6

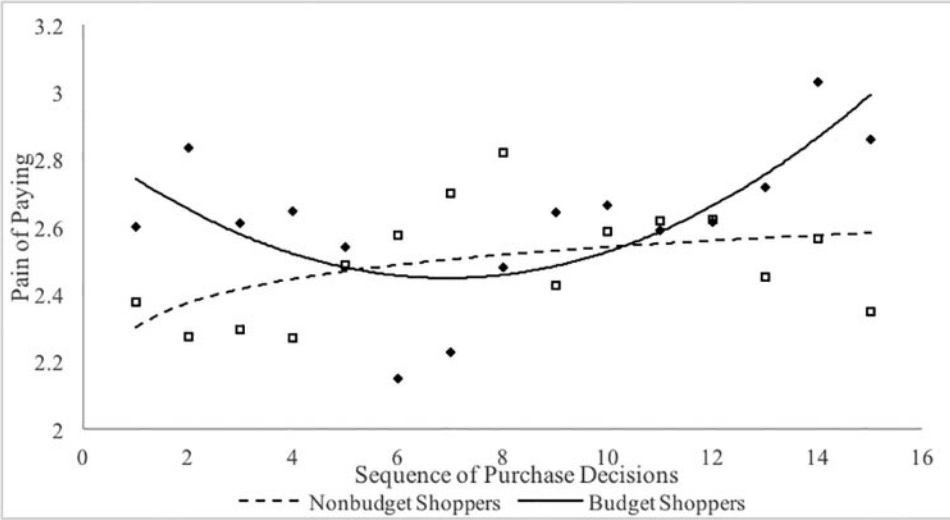
STUDY 3: THE SALIENCE OF PRICE THROUGHOUT A SHOPPING TRIP



$t = 1.64$; $p = .10$). For budget shoppers, however, we predicted the highest pain at the beginning and end of the shopping trip. Thus, we regressed their pain on linear and quadratic terms for the number of purchases made and found significant linear ($ß_{Purchases} = -.44$, $p < .05$) and quadratic terms ($ß_{Purchases}{}^{2} = .52$, $p < 0.01$).

FIGURE 7

STUDY 3: THE PAIN OF PAYING THROUGHOUT A SHOPPING TRIP



Next, we examined participants' experienced pain of paying as a mediator of the relative spending of nonbudget and budget shoppers (hypothesis 2a). For nonbudget shoppers, a regression model showed that relative spending decreased as the pain increased ($ß_{Pain}$ = –.09, $p < .05$). Furthermore, a nonlinear bootstrapping procedure (MEDCURVE macro; Hayes and Preacher 2010; IV = purchase decision, DV = relative spending, M = pain of paying; IV → M = logarithmic; M → DV = linear; IV → DV = quadratic) revealed that the pain mediated the relationship between the number of purchases and relative spending. For nonbudget shoppers, the pain indirectly affected relative spending early (1 SD below the mean; 95% Cl =–.001771/–.000002) and later in the shopping trip (1 SD above the mean; 95% CI; –0.000551/–0.00001), demonstrating that the pain decreased relative spending early, but as the pain lessened, relative spending increased.

Similarly, for budget shoppers, the pain of paying was negatively related to relative spending ($ß_{Pain}$ = –.13, $p <$ .01). Nonlinear bootstrapping analysis confirmed the mediating impact of pain on relative spending (MEDCURVE macro; Hayes and Preacher 2010; IV = purchase decision, DV = relative spending, M = pain of paying; specified relationships: [IV → M = quadratic; M → DV = linear; IV → DV = quadratic]). Specifically, decreased pain increased relative spending early (i.e., 1 SD below the mean; 95% CI; .0001/.0034; 5,000 draws), while the subsequent increase in pain decreased relative spending toward the end (i.e., 1 SD above the mean; 95% CI; –.0042/–.0003; 5,000 draws). Taken together, the results support hypothesis 2a.

Pain of Paying as It Relates to Price Salience and Relative Spending. To examine the sequential mediating impact of the pain of paying and price salience on relative spending (hypothesis 2), we adapted a serial mediation analysis (PROCESS model 6; Preacher and Hayes 2004) with 5,000 resamples (IV = purchases^2, mediator 1= pain of paying, mediator 2 = salience of price, DV = relative spending) for budget and nonbudget shoppers separately. To accommodate the nonlinear effect, each model also included the linear term (cov = purchases) for the number of purchases as a covariate to account for the entire nonlinear effect (Hayes 2015). For nonbudget shoppers, the pain of paying was positively related to price salience (b = 2.53; SE = 1.02; t = 2.48; p = .01), and price salience was negatively related to spending (b = –.0028; SE = .001; t = –6.21; $p < .001$). Number of purchases had a significant indirect effect through the pain of paying and price salience, as the confidence interval did not contain zero (95% CIs: .000009, .000161). Similarly, for budget shoppers, the pain of paying was positively related to price salience (b = 1.96; SE = .95; t = 2.07; $p < .05$), which was negatively related to spending (b = –.0023; SE = .0004; t = –5.73; $p < .001$). Number of purchases also had a significant indirect effect on the relative spending of budget shoppers though the pain of paying and price salience (95% CIs: –.000112, –.000004), consistent with hypotheses 2a and 2b.

Discussion

Consistent with our theoretical framework, study 3 demonstrates the evolution of relative spending. The results build on study 2 by showing that the emotional distress shoppers experience drives their price salience and subsequent relative-spending patterns. Although all participants showed the same relationship between the pain of paying, price salience, and relative spending, shopping with a budget altered the amount of emotional distress shoppers experienced in response to spending money at different points in the shopping trip.

We theorize that the opportunity cost of spending money is at the root of the emotional distress, which implies that, if we manipulate opportunity cost, we can influence the pain of paying and price salience to shift patterns in relative spending for budget and nonbudget shoppers (Spencer, Zanna, and Fong 2005). We test this supposition in study 4.

STUDY 4: MANIPULATING THE ROOT OF THE PAIN OF PAYING

To reiterate, our theoretical framework explains that the opportunity cost of spending drives the pain of paying, which then drives relative-spending patterns. In study 4, we manipulate the prices of the available alternatives to directly affect the root of the pain of paying. We expect that increasing the opportunity cost in each decision should shift the relative-spending patterns downward for both budget and nonbudget shoppers.

Design and Procedure

Participating in a computer-simulated grocery-shopping task were 400 paid participants from Amazon's Mechanical Turk. The basic study design was a simulated shopping trip in which participants made purchases in a randomized order, similar to the previous studies. In study 4 we also manipulated the root of the pain of paying by manipulating prices of the available alternatives. Thus, the study was a 2 (budget vs. no budget) × 2 (low [i.e., –15%] vs. high [i.e., +15%] prices) × 15 (sequence of purchase decision) mixed design. Participants could choose from three options within each product category. The budget and price conditions were randomly assigned between-subjects factors; the order of purchase decisions was a within-subjects variable.

We manipulated each price condition by scaling the prices of each product up 15% or down 15% from the prices used previously (see the web appendix for the product list). The scaling manipulation allowed us to examine how relative spending shifts in response to changes in the price levels, while controlling for the number of purchase decisions and maintaining relative spending across conditions. The allocated budgets were scaled according to the closest \$5 integer. Participants in the low-price budget condition were given \$50; those in the high-price condition were given \$70.

As in studies 2 and 3, we incentivized participants to purchase products they would actually use by giving them a chance to win a \$100 prize that would include the products they purchased and the remaining amount in cash. To mitigate differences in the payoffs of two pricing conditions, however, budgets in study 4 were no longer consequential, which allowed us to enhance the robustness of our findings by confirming that budgets rather than consequences were the reference point driving our findings. Although 16 participants exceeded their budget, they were kept in the analysis as their spending behavior did not influence the results.

Results

As in previous studies where purchase decisions were collected within-subjects, the results were analyzed with a repeated-measures ANOVA including price and budget conditions as between-subjects factors and the number of purchase decisions as a within-subjects factor. Consistent with the previous studies and hypothesis 1, we found a significant quadratic contrast between the budget condition and the number of purchase decisions ($F(1, 396) = 16.56$; $p < .001$). Moreover, the quadratic contrasts of the number of purchase decisions for budget ($F(1, 198) = 8.69$; $p < .01$) and nonbudget shoppers ($F(1, 198) = 8.01$; $p < .01$) were significant in independent follow-up analyses (figure 8).

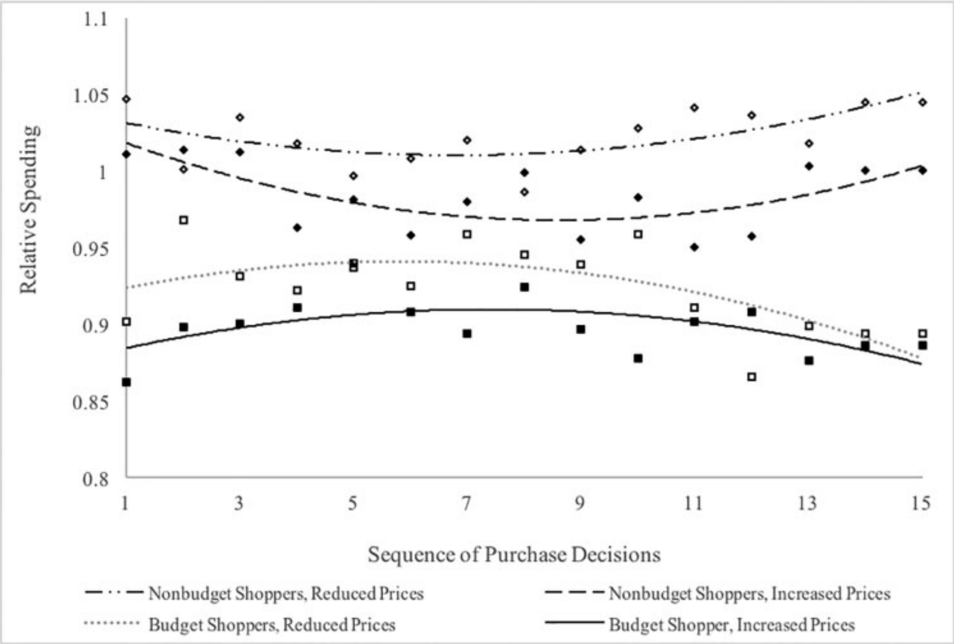
Consistent with the expectations motivating this study, we found a significant main effect for the price condition ($M_{\text{LowPrices}} = .97$ vs. $M_{\text{HighPrices}} = .94$; $F(1, 396) = 8.09$; $p < .01$). In accordance with our theorizing, the increased pain of paying associated with higher prices reduces relative spending. A linear interaction between budget, price, and the number of purchase decisions ($F(1, 396) = 3.43$ $p = .07$) suggests that the effect marginally depends on the budget condition. As figure 8 shows, increased prices appear to decrease relative spending with each subsequent decision for nonbudget shoppers. For budget shoppers reaching the end of their budgets, price increases appear to have decreasing effects.

Discussion

The results of study 4 build on the evidence offered in the first three studies and provide additional support for our theoretical framework by demonstrating that relative-spending patterns shift when we manipulate the root of the pain of paying. Specifically, raising the prices increases the opportunity cost of spending, which then increases the pain of paying and subsequently reduces relative spending. Although the increase in prices has a strong and significant main effect, suggesting that both budget and nonbudget shoppers consistently shift their relative spending, the shift appears marginally dependent on the budget condition.

FIGURE 8

STUDY 4: RELATIVE SPENDING PATTERNS OF BUDGET AND NONBUDGET SHOPPERS WHEN FACING LOWER VERSUS HIGHER OPPORTUNITY COSTS



Consistent with the notion that it generally takes a few spending decisions for shoppers to begin considering the opportunity cost associated with their spending (Frederick et al. 2009; Prelec and Loewenstein 1998), price increases have only a modest effect on the relative spending of nonbudget shoppers at the start of the trip. After they make a few purchases, the difference in the pain of paying between both price conditions starts to manifest and lasts as the shopping trip progresses. For budget shoppers, increased prices tend to evoke relatively large differences in relative spending at the start, aligning with the supposition that opportunity costs are initially their most salient consideration (Rick 2011). The effect diminishes when they reach the end of their budget.

Study 4 demonstrates that increasing the prices manipulates the root of the pain of paying, shifting relative spending downward for both budget and nonbudget shoppers. Next, we test whether we can shift relative spending in opposite directions in study 5 by offering concurrent feedback about spending as a shopping trip progresses. We pose that spending feedback increases nonbudget shoppers' emotional distress by drawing attention to their spending but reduces budget shoppers' emotional distress by drawing attention to the money left in their budget (hypothesis 3). Providing feedback will also show whether budget shoppers experience a sense of wealth early in the shopping trip when they have significant money left in their budget. Initial support for the process is included in the web appendix as study B, an experimental study conducted in a mock online grocery store containing more than 3,000 products in 18 main and 168 subcategories. To offer robust evidence for the sense of wealth, in study 5 we conducted a field experiment with real consumers actually shopping with their own money. Furthermore, they self-reported their budget at the beginning, eliminating the need for any specific budget manipulation.

STUDY 5: A FIELD STUDY IN A BRICK-AND-MORTAR GROCERY STORE

The study included 198 shoppers ($M_{age} = 52.0$, 62.4% women) who were intercepted as they entered a grocery store in the southeastern United States. Participants received \$10 compensation and the chance to win a prize package containing the products they purchased. To add to the budget factor, we included a real-time spending feedback factor to test hypothesis 3. This dataset was used in previously published research that examined end-of-trip and store-level variables rather than within-trip dynamics (Van Ittersum et al. 2013).

Design and Procedure

Study 5 was a 2 (budget vs. nonbudget) × 2 (with vs. without spending feedback) between-subjects field experiment in which participants self-reported whether they were shopping with a budget. When shoppers first entered the store, a trained interviewer invited those who planned to purchase more than 10 products to participate. Before giving study details, the interviewer asked whether they had budgeted a maximum amount to spend, and, if so, how much (Stilley et al. 2010b). Next, half of the participants were randomly assigned to receive real-time spending feedback from a shopping cart equipped with iPads that tallied the cumulative basket amount. The other half used a traditional shopping cart and received no spending feedback. Participants were told to proceed with their shopping, pay at checkout, and then return to the interviewer at the exit. To incentive-align the participants, they were given a one in 10 chance to win a prize package including the items purchased and cash totaling $150. Nonbudget shoppers would receive their groceries and the remainder in cash, up to $150. In contrast, budget shoppers qualified for the same prize package if they stayed within their self-reported budget to ensure that their budgets were consequential (Bliss 1980). If they overspent, they received only $150 cash minus the total price of the basket.

Measures

The interviewer copied participants' final receipts and asked them to detail their shopping route on a store map so that purchases could be ordered according to the store sequence. Nine participants failed to follow the procedures and were removed from the analyses. We categorized the purchase of multiple items of the same product as one spending decision (e.g., four milk containers equaled one milk purchase). We eliminated 20 participants who purchased fewer than 10 unique items.

To determine relative spending for each purchase, we compared purchases to calculate a mean for each category and relative spending for each spending decision. To account for differences in the number of products purchased and to compare the relative-spending patterns across shoppers, the purchases were categorized into 10 deciles. To examine the evolution of relative spending over the course of the shopping trip, we analyzed each relative-spending decision according to the decile. Purchases that were more than three standard deviations away from the decile's relative-spending mean were removed from the analysis (1.18% of the spending decisions).

Results

We analyzed budget shoppers' budget deviations (i.e., stated budget minus actual spending) to see whether their budgets were effective regulatory mechanisms. Eight shoppers spent more than five times their stated budget and were removed from the analyses, leaving 161 participants in the final analysis. The deviations of the other budget shoppers were all within three standard deviations of the average budget deviation ($M_{BudgetDeviation}$ = –\$5.07). Consistent with the previous studies, budget shoppers had lower relative spending in each purchase, compared with nonbudget shoppers ($M_{Budget} = .91$ vs. $M_{Nonbudget} = 1.01$; $F(1, 3217) = 34.24$; $p < 0.001$).

As in the lab studies, a regression model including terms for budget condition, linear and quadratic terms for the purchase decile, and linear and quadratic interactions yielded a quadratic interaction term ($ß_{Budget\times PurchaseDecile^2} = –.66$, $p = .01$; figure 9; see the web appendix for the means of each decile). In separate models, the quadratic terms were significant for budget ($ß_{PurchaseDecile^2} = –.26$ $p < .05$) and nonbudget shoppers ($ß_{PurchaseDecile^2} = .23$, $p < .05$), supporting hypothesis 1 and demonstrating that spending evolves concavely and convexly, respectively. Furthermore, as our theoretical framework predicted, budget condition significantly interacted with spending feedback ($ß_{Budget\times SpendingFeedback} = .30$, $p < .01$). Separate regressions showed that feedback positively influenced budget shoppers' spending ($ß_{SpendingFeedback} = .09$, $p < .05$) and negatively influenced nonbudget shoppers' spending ($ß_{SpendingFeedback} = –.05$, $p < .05$), supporting our prediction that spending feedback has opposing influence on the pain of paying, with ultimate effects on relative spending (hypothesis 3).

Discussion

In study 5, a field study, we observe actual consumers shopping for groceries to corroborate our experimental findings and confirm that relative spending evolves convexly for nonbudget shoppers and concavely for budget shoppers over the course of a single shopping trip.

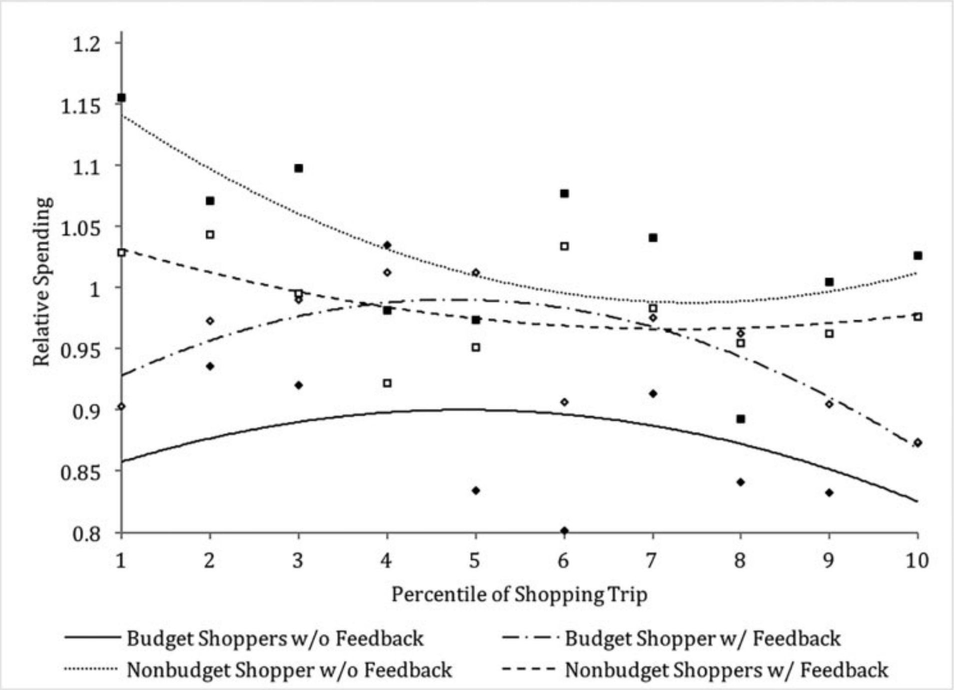
Consistent with expectations, the results confirm that spending feedback shifts downward the relative-spending pattern of nonbudget shoppers. For budget shoppers, the relative-spending pattern shifts upward. Real-time spending feedback apparently entices budget shoppers to increase their relative spending in the first half of the shopping trip. As the trip progresses and their spending room decreases, however, the increasing pain of paying and corresponding salience of price causes them to reduce their relative spending.

GENERAL DISCUSSION

Retailers are increasingly able to engage shoppers over the course of the shopping trip, so it becomes ever more important to understand how sequential spending decisions evolve over the course of a shopping trip. We go beyond end-of-trip spending totals to conduct four controlled lab

FIGURE 9

STUDY 5: RELATIVE SPENDING OF BUDGET AND NONBUDGET SHOPPERS IN A BRICK-AND-MORTAR STORE WITH OR WITHOUT REAL-TIME SPENDING FEEDBACK



experiments and one field study in a brick-and-mortar grocery store to observe how shoppers' relative spending evolves over the course of a single shopping trip nonlinearly and distinctly for budget and nonbudget shoppers. Moreover, we present a theoretical account and empirical evidence to suggest that shoppers' pain of paying and salience of price ultimately drive the distinct nonlinear patterns in relative spending. Finally, we demonstrate that both budget and nonbudget shoppers show shifting patterns of relative spending when we manipulate the opportunity cost at the root of the pain of paying. Our results offer novel theoretical contributions to studies of in-store decision-making (Hui, Bradlow, and Fader 2009; Hui et al. 2013; Stilley et al. 2010a, 2010b), the pain of paying and the associated salience of price (Prelec and Loewenstein 1998), and budgeting (Heath and Soll 1996; Thaler 1980, 1985).

Theoretical Contributions

In-Store Decision-Making. Research on in-store decision-making has recently begun to address the dynamic connections between individual spending decisions within a series of decisions (Dhar et al. 2007; Khan and Dhar 2006). For example, prior purchase decisions are known to influence subsequent purchases (Dhar et al. 2007; Vohs and Faber 2007) or motivate additional purchases (Khan and Dhar 2006; Stilley et al. 2010a, 2010b). We expand understandings of how individual decisions are connected and dynamically change throughout a shopping trip. Specifically, we offer theory and empirical evidence showing the evolution of shoppers' spending decisions.

Budgeting. How consumers categorize and track their spending is known to determine their spending patterns (Health and Soll 1996; Soster et al. 2014; Thaler 1980; 1985), but research has focused on single purchase decisions. In contrast, we demonstrate the influence of budgets on a series of spending decisions. Recognizing that budgets are often used as reference points (Heath and Soll 1996; Prelec and Loewenstein 1998), we theorize and verify that explicit budgets cause shoppers to follow distinct patterns in relative spending throughout a major shopping trip.

Pain of Paying. Research on pain of paying has traditionally assumed that the pain of paying experienced by shoppers grows linearly with aggregate spending. Accordingly, the number of products in-cart served as a proxy for pain of paying (Bell and Lattin 1998; Thomas et al. 2011). We enrich understandings about pain of paying in several important ways. Specifically, we build on literature regarding the pain of paying (Prelec and Lowenstein 1998; Rick et al. 2008) and budgeting (Heath and Soll 1996; Soster et al. 2014) to demonstrate that budget and nonbudget shoppers, who have distinct reference points, consider opportunity costs that then determine their unique pain-of-paying experiences. Despite the conventional wisdom that budget shoppers always reduce their spending, we demonstrate that they are likely to increase their relative spending early in a shopping trip. Furthermore, we can shift relative-spending patterns by manipulating the opportunity cost in each spending decision. In study 4, the shifting occurs because of manipulated opportunity cost. In study 5, the shifting occurs because of greater attention to accumulating totals. Besides demonstrating the relationship between the pain of paying and relative spending, we offer empirical evidence that price salience plays a mediating role. Specifically, we demonstrate that price salience follows a distinct, nonlinear pattern for budget and nonbudget shoppers, similar to the pattern in pain of paying. As the pain of paying increases, price salience grows, which in turn reduces shoppers' relative spending.

Limitations and Further Research

Our four controlled lab experiments offer consistent empirical evidence for the underlying processes causing nonlinear patterns in relative spending for budget and nonbudget shoppers. The web appendix contains reports of two additional lab experiments. To address possible concerns about ecological validity, we also conduct a field study in a brick-and-mortar grocery store. We observe real consumers purchasing products for their households under self-imposed budgets. The field study confirms the unique and distinct nonlinear patterns in relative spending and offers additional evidence consistent with the proposed underlying process.

Although our studies provide consistent support for our theoretical framework, all research has some limitations. The manipulation of budgets may be one such limitation, even though our field study largely assuages that concern because participants self-reported their budgets. Nevertheless, our specific manipulations or consequences for exceeding budgets could have influenced the results. To overcome this concern, we observe budgets of varying amounts, establish varying consequences, and find consistent results. For example, in studies 2, 3, and 5, we caused financial consequences by changing the prize packages; in study 1, we required participants to solve math problems if they failed to meet their budgets; and in study 4, we asked participants to stay within their budgets but levied no consequences if they failed.

A related concern could be that nonbudget shoppers may have implicit budgets based on their typical spending (Stilley et al. 2010a, 2010b). The field study, however, demonstrates that consumers without a budget either do not explicitly consider their spending in past shopping trips (Dickson and Sawyer 1990) or that information is not sufficiently salient to influence their spending (Larson and Hamilton 2012). Furthermore, a study reported in the web appendix shows that if we draw nonbudget shoppers' attention to their typical spending, their implicit budgets become explicit. They will then show a concave pattern of relative spending, similar to the pattern of budget shoppers. Although additional research is warranted, we show that implicit budgets have, at best, modest effects on relative-spending patterns.

Additionally, budgeting and spending patterns can be related to other constructs such as demographic (e.g., income) and psychographic (e.g., frugality, impulsiveness) characteristics. Budgets and spending patterns may alter as motivations and situations change, and according to desires to avoid overspending or underspending (Larson and Hamilton 2012). Although we show how spending patterns evolve as a shopping trip progresses, other individual factors related to spending are worthy of further research.

Future research can also consider other motivations for in-store decisions. Situational and contextual variables, such as price promotions, may interact to influence whether and when spending evokes emotional distress. For example, shoppers may encounter a price promotion that eases their emotional distress. However, just as price promotions may alleviate the pain of paying, the pain of paying may influence whether shoppers respond positively to price promotions depending on when the shopper encounters the promotion. Furthermore, research is needed to confirm the proposed process through which spending feedback influences relative spending.

Conclusion

The in-store spending dynamics presented, tested, and supported in this research provide a more in-depth understanding of a consumer's in-store spending behavior. These insights contribute to in-store spending, budgeting, and pain-of-paying literature and provide numerous insights to retailers and marketing practitioners about how to better organize marketing programs and communicate with shoppers. Although our theoretical framework and results are directly focused on in-store spending decisions of budget and nonbudget shoppers, the findings likely apply to many situations where consumers make a series of spending decisions.

DATA COLLECTION INFORMATION

The data collection process for all five studies was jointly managed by both authors. Both authors supervised the data collection for study 1 through Amazon's Mechanical Turk (spring 2012). The data for study 2 was collected through the Behavioral Research Lab at the University of Kentucky (fall 2016). The data for studies 3 and 4 was collected using Amazon's Mechanical Turk (fall 2016 [study 3] and spring 2017 [study 4]). The data in field study was collected through and coded by research assistants, under the supervision of the second author in the fall of 2012. This field data was originally collected for a different purpose (to examine end-of-shopping-trip factors as opposed to the dynamic-spending data that is presented in this article). All data were analyzed by the first author.

APPENDIX A

STUDY 2: VISUALIZATION OF MEDIALAB PURCHASE DECISION

Typical view

with price revealed (mouse placed on button)

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