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The impact of digital household budgets on online purchase decision-making processes

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Abstract

Recent literature found positive effects of digital household budget feedback when used over longer timespans. This current study, in turn, investigates whether digital budget feedback also influences consumer behavior in single online purchase decisions. The related research question states: Do transparent technology-mediated household budgets influence consumers' willingness to pay and payment pain in single, individual online purchase decision processes? The underlying study used a quantitative-, mixed-design approach and simulated online purchases for one hedonic and one utilitarian product. Three hundred fourteen study subjects were assigned to either a control group or one of three treatment groups manipulated with specific budget statuses to examine differences in consumer reactions. Critical measures of willingness to pay and payment pain have been taken to analyze potential significant effects. Results found significant differences in consumer willingness to pay and payment pain between and within groups concerning both products. The study could, however, not confirm differences to occur between utilitarian and hedonic purchases. The findings extend existing literature by demonstrating that consumers adjust their online spending based on individual household budget feedback. Consumers that wish to align spending with their current budget status might thus rely on app-mediated budget updates. At the same time, marketers could offer individualized pricing offers to consumers based on situational budget status information.

1 | INTRODUCTION

The ever more convenient and seemingly abundant access to financial resources appears to have incentivized consumers around the globe to lose financial discipline and overspend. According to a study by the American Health Association, spending or living beyond available resources constitutes one of the top-three reasons individuals run into personal bankruptcy (Himmelstein et al., 2019). Germany registered more than thirty-thousand bankruptcies in the first quarter of 2021 with high debts at online mail order businesses such as Amazon being among the main reasons to default (Handelsblatt, 2021). However,

nowadays, ever more consumers are able to gain access to digital applications that can provide budget feedback anytime. Thereby, these applications might assist consumers in organizing personal budgets and thus, gaining control over their spending behaviors.

An explanatory model on the efficacy of such applications is provided by the field of mental accounting, which Richard Thaler describes as “the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities” (Thaler, 1999, p. 183). Adjacent mental accounting research has meanwhile discovered that consumers engage in complex cognitive reasoning processes such as categorizing and setting budgets for specific

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events to control their spending behavior (Heath & Soll, 1996) and that they are less inclined to spend additional money when they approach their budget limits (Soster et al., 2014).

Further, as a growing body of mental accounting literature suggests, there seem to be solutions that effectively assist consumers in controlling their financial behaviors. Above all, technology—such as intelligent financial management apps that supply regular budgetary feedback to consumers—potentially provides effective antidotes to dysfunctional financial management and extends mental budgeting into a digital dimension (Ghosh & Huang, 2020). Even though the intersection of mental budgeting and technological progress remains underexplored (Zhang & Sussman, 2018), findings obtained in digital-similar contexts suggest that transparent digital budgets might constitute an effective means to steer spending behaviors. For example, extant research provides an exploratory view on potential influences of budget transparency and salience on consumers' willingness to pay (WTP) (Boden et al., 2020; Soster et al., 2014) and periodical spending (Huebner et al., 2020). Researchers importantly inferred that transaction salience and budget transparency can effectively influence consumer spending. These findings seem to relate to the observation that increasing the awareness toward transaction costs raises the pain of paying—the negative feelings consumers experience when paying for a product or service—that, in turn, presumably affects spending (Boden et al., 2020; Thomas et al., 2011; Zellermayer, 1996). Lukas and Howard (2023) investigated the real-world influence of budgets on consumer spending, discovering that despite being generally optimistic, budgets do assist in decreasing expenditure, an effect that remains noticeable for half a year post budget setting. Interestingly, it was found that impulsive consumers set lower budgets but don't necessarily overspend. The influence of budgets on spending was also observed across different psychographic variables. The data for this comprehensive study was gathered through a variety of methods, including the analysis of budgeting and spending data from a widely used personal finance app in the United Kingdom, a field experiment with members of a Canadian credit union, and a financial diary study conducted with consumers in the United States. Liu et al. (2021) researched the impact of mobile payments on consumer behavior, revealing that mobile payments increase willingness to pay (WTP) and are faster than cash payments even when physical differences are controlled. However, the effect does not apply when money is a gift rather than earned, indicating that payment methods significantly influence consumer behavior. Hou et al. (2021) used mental accounting theory to explain how digital payments stimulate household consumption, revealing that households using digital payments spend 20.63% more than those using alternative methods. The effect is particularly pronounced for long-term consumption and among households with low self-control abilities, suggesting that digital payments increase transaction utility, facilitate intentional adjustment of mental accounts, and lead to more unplanned consumption. Chatterjee and Rose (2012) found that payment mechanisms influence consumer perceptions of products, with credit card users focusing more on benefits and cash users focusing more on costs. This differential focus affects recall accuracy, word recognition, response times, reservation prices, and product choices.

Yet, previous research either drew on longitudinal studies that looked at total consumer baskets over a certain period or looked at different payment methods in the context of single transaction spending. Outlined findings, for example, remain to fall short of explaining the influence of available budget statuses on individual purchases and, thereby, potential solutions to steer financial discipline at the moment of a purchase decision.

This study aims to fill outlined research gaps by examining how technology-mediated budget feedback influences individual consumer psychology, as represented by the pain of payment consumers experience during purchase decision processes, and behaviors, as represented by the willingness to spend. It further seeks to examine whether consumer reactions also differ by product category and whether visible digital budgets affect consumer repurchase behavior that research crucially found to be a function of available budgets (e.g., Heath & Soll, 1996; Soster et al., 2014). These considerations transfer into the following main research hypotheses:

H1. A transparent digital household budget (positive budget; negative budget) has an impact on the consumer's perceived pain of paying (decrease; increase) in purchase-decision-making processes.

H1a. Consumers with different budget statuses show distinct changes in perceived payment pain in a way that consumers with tight budgets experience greater payment pain than consumers with relaxed budgets.

H1b. Consumers with different budget statuses show distinct changes in perceived payment pain in a way that consumers with tight budgets experience greater payment pain than consumers with relaxed budgets.

H1c. Consumers with different budget statuses show distinct changes in perceived payment pain in a way that consumers with tight budgets experience greater payment pain than consumers with relaxed budgets.

H2. A transparent digital household budget (positive budget; negative budget) has an impact on the consumer's willingness to pay (increase; decrease) in purchase-decision-making processes.

H2a. Consumers with different budget statuses show distinct changes in their willingness to pay, whereby consumers encountering exceeded budgets are willing to spend significantly less than consumers with relaxed budgets.

H2b. Consumers encountering exceeded budgets decrease their willingness to pay.

H2c. Consumers encountering non-exhausted budgets increase their willingness to pay.

H3. Consumers with a visible household budget will adjust their spending more drastically for hedonic purchases compared to utilitarian purchases.

H4. In the event of a loss of a product, consumers with a visible household budget are less willing to repurchase the product.

H4a. Consumers encountering exceeded budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment.

H4b. Consumers encountering depleted budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment.

H4c. Consumers encountering non-exhausted budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment.

2 | MATERIALS AND METHODS

The operationalized constructs have been tested in a study that used a 2 (utilitarian vs. hedonic product) \times 2 (pre- vs. post-treatment measurements) \times 4 (control vs. low budget vs. medium budget vs. high budget group) mixed design (Appendix A). Following the proposals of Field and Hole (2003), participants were randomly¹ separated into four groups. The sub-sample without exposure to a budget served as the control group. For the control group, participants were asked about their general spending tendencies for the item in question without the influence of the simulated budget app feedback. In scenarios where the product was considered lost, their willingness to repurchase was queried without referencing any budgetary constraints. It is essential to highlight that while the control group's survey had similarities in the WTP/POP sections to the treatment groups, there were no inclusions of the 'Your available budget' section or any direct references to simulated budgetary feedback. The remaining three sub-samples were manipulated by receiving additional information on their budget status. Participants allocated to the low budget condition obtained the notification that they had exceeded their allocated budgets prior to the purchase simulation. Participants of the medium budget condition received budgets manipulated so that the purchase would fully deplete their budgets.² Participants of the high budget condition still had their entire budget at their disposal (Figure 1).

Measurements of WTP and payment pain were taken twice, a first time before and a second time after participants received their budget treatments. This pre-test/post-test mixed study approach

enables investigating data trends and potential effect sizes of different manipulations of the independent variable, meaning, whether the degree of budget depletion systematically relates to consumers' WTP and pain of payment (Field, 2018). Whether participants first encountered the utilitarian, or the hedonic product purchase has also been randomized to control for order effects (Brace, 2018; Field, 2018).

Responses were gathered through an online questionnaire—eventually distributed on Amazon Mechanical Turk (MTurk)—that simulated hypothetical online shopping experiences for a t-shirt (utilitarian product) and a movie theater ticket (hedonic product). Conducting the experiment in a digital environment enabled accessing geographically distant samples in the United States—the study's target population (Malhotra et al., 2012; van Selm & Jankowski, 2006).

The questionnaire contained four sections: the t-shirt purchase simulation, the movie theatre purchase simulation, a question sequence on individual mental budgeting propensity, and questions on subject demographics (Figure 2).

The introductory text contained suggestive phrases such as "need" that framed the t-shirt as a utilitarian product. While literature commonly recommends avoiding framing in questionnaires (Goldin & Reck, 2019), pretest results had previously confirmed unbranded t-shirts to be regarded as utilitarian products. Therefore, product features and framing terms were intentionally used to anchor individual product associations.

Presetting appropriate filters to select from a reputable sample of MTurk participants supported the collection of valid responses and countered potential shortcomings in data quality. By recommended preselection, all participants had a task approval rate greater than 95% and completed more than 500 tasks (Peer et al., 2013). All respondents received a payment of USD 0.50 to complete the survey.

The underlying dataset of the present study has been cleaned in multiple steps: First, responses have been checked for illogical answers regarding measurements of essential items. Participants who stated arbitrary values have been excluded.³

Second, all subjects that overtly gave wrong answers to controlling questions have been removed. Both steps aimed to reduce statistical noise (Oppenheimer et al., 2009). Based on recommendations of Gummer et al. (2018), controlling questions were used several times and in different formats.

Third, following the proposals of Andy Field (2018), the remaining dataset has been corrected for outliers by trimming extreme values that differed more than two standard deviations from the mean.⁴

Fourth, missing values were detected and, if possible, reconstructed,⁵ otherwise reporting missing values with a negative nine. Likewise,

¹Randomization eliminates systematic effects of behavior, that is, systematic differences are allocated inconsistently across groups which factors out given a sufficiently great sample size (Field & Hole, 2003).

²Setting prices close to depletion aimed to replicate "bottom-dollar-spending," identified by Soster et al. (2014), in a single transaction context.

³For example, when no budget information was shown to the consumer at all, that is, the subject had been assigned to the control group, a WTP of USD 0 was deemed illogical and thus, removed from the dataset. Note: Control group members were given the information that they need the product and are inclined to purchase; thus, a WTP of USD 0, without having introduced budget constraints, was considered illogical.

⁴Trimming was applied to pre-treatment WTP values for both purchase simulations.

⁵In a limited number of cases where blank values could be unequivocally recovered. Some values have been de-formatted by transferring the dataset into an Excel-format. Respective numbers could be recovered by consulting the dataset in the online interface.

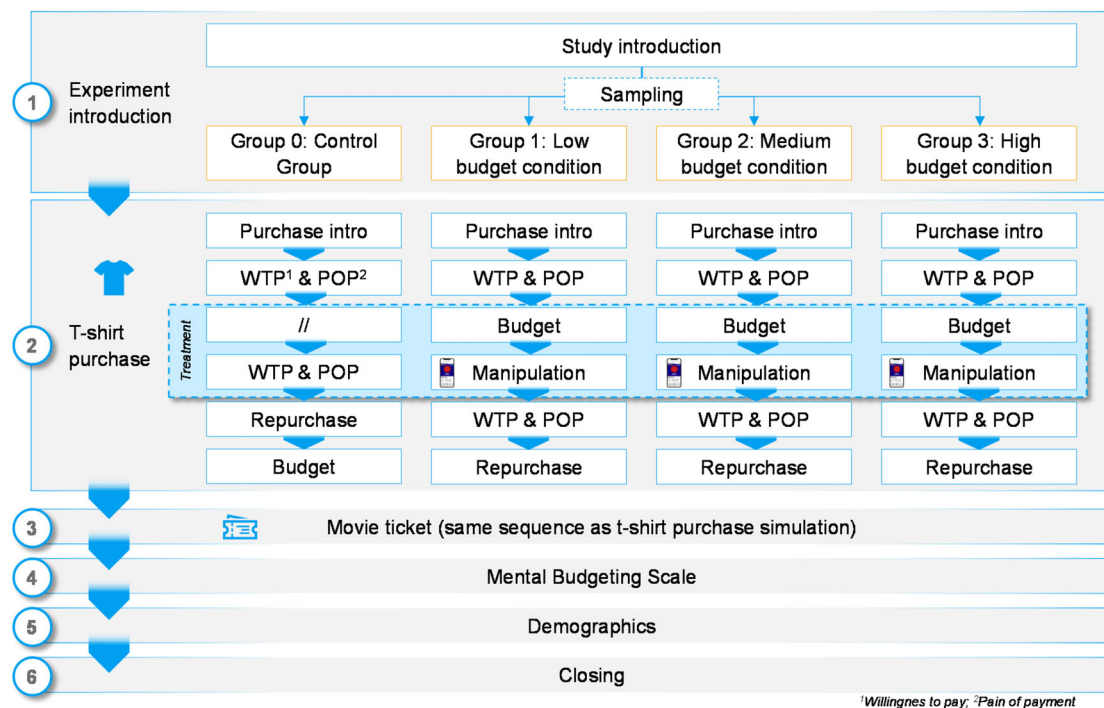


FIGURE 1 Questionnaire procedure. Source: Own illustration.

obvious typing errors have been corrected, again following the proposals of Field (2018).

Correcting for extreme and missing values as well as for illogical answers reduced the dataset to 314 participants.

3 | RESULTS

The final sample used for statistical analyses contained 314 participants, whereby the control group comprised 80 subjects, the low budget group included 81 subjects, the medium budget group counted 74 subjects, and the high budget group consisted of 79 subjects (Appendix B, Tables B1–B5; Figure B1).

The final sample contained 42.2% ($N = 129$) females and 58.9% ($N = 185$) male respondents.⁶ Participants were, on average, 38.59 years old, ranging from 22-year-old respondents to 70-year-old respondents, whereby the largest share of participants was aged between 25 and 40 years. The average household size was 2.7 people. Study subjects tended to be relatively educated, measured in the highest attained educational degree. Most participants (59.2%; $N = 186$) completed a bachelor's study, and 12.1% of participants even attained a graduate degree. Most subjects (78.0%; $N = 245$) specified to work as full-time employees. Considerable shares of respondents reported working part-time (9.3%) or being self-employed (8.0%). The sample income distribution appeared to be relatively diversified, covering all listed income classes from less than USD 20,000 to more than USD 100,000. Most participants specified

to earn between USD 50,000 and USD 60,000 annually—figures that approximately correspond with the pre-Covid American average and significantly surpass the pre-Covid median (SSA, 2020).

3.1 | Willingness to pay

Table 1 depicts the sample means, standard deviations, and standard errors (SE) of the pre- and post-treatment WTP for the t-shirt purchase simulation categorized by experimental groups (Appendix C, Figures C1–C4).

Experimental observations showed perceivable yet minor between-group differences in pre-treatment WTPs, further supporting the thesis that pre-treatment subsamples did not substantially differ concerning their willingness to pay for an unbranded t-shirt. Recorded post-treatment WTPs between all groups were considerably greater, providing preliminary indication that the group-specific budget manipulations indeed had discernible influences on the groups' average willingness to pay. Subjects assigned to the low budget condition reduced their WTP post-treatment ($M_{\text{post}}^7 = \text{USD } 11.04$) compared to their initial maximum willingness to spend ($M_{\text{pre}}^8 = \text{USD } 12.63$). Participants of the medium budget condition showed only minor post-treatment deviations ($M_{\text{post}} = \text{USD } 13.82$) from their initial willingness to spend ($M_{\text{pre}} = \text{USD } 13.88$). In noteworthy contrast, subjects assigned to the high budget condition, on average, increased their WTP post-treatment by almost two US dollars

⁶Statistics concerning sample demographics have not been split into experimental groups.

⁷ M_{post} indicates the corresponding mean post-treatment.

⁸ M_{pre} indicates the corresponding mean pre-treatment.

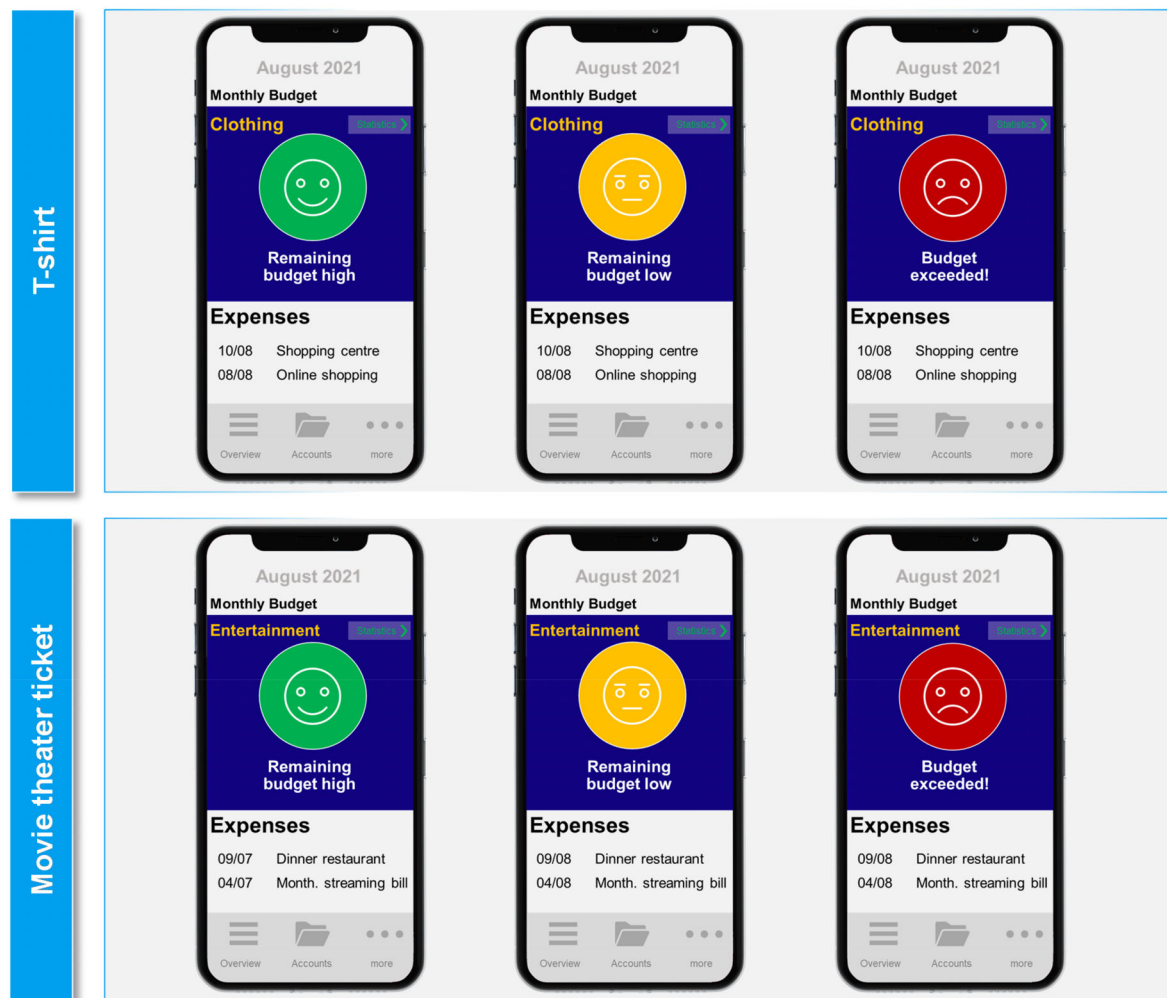


FIGURE 2 Budget treatment. Source: Own illustration.

TABLE 1 T-shirt purchase WTP (in USD).

Group	N	Pre-treatment WTP		Post-treatment WTP		Δ WTP $M_{\text{post}} - M_{\text{pre}}$
		M_{pre}	$SD_{\text{pre}} (SE_{\text{pre}})$	M_{post}	$SD_{\text{post}} (SE_{\text{post}})$	
1_Control	80	13.69	7.51 (.84)	14.35	8.80 (.98)	+.66
2_Low Budget	81	12.63	6.85 (.76)	11.04	7.23 (.80)	−1.59
3_Medium Budget	74	13.88	6.82 (.79)	13.82	7.53 (.88)	−.06
4_High Budget	79	12.42	6.67 (.75)	14.18	8.18 (.92)	+1.76

Source: Own illustration, SPSS output.

($M_{\text{post}} - M_{\text{pre}} = \text{USD } 1.76$). The control group likewise slightly increased their average spending ($M_{\text{post}} - M_{\text{pre}} = \text{USD } .66$), indicating that the purchase simulation might have induced participants to increase their WTP ceteris paribus.⁹ Further, the sub-sample variability increased for all groups, expressed in corresponding standard deviations. The diverging WTPs within groups might indicate that participants showed distinct reactions when encountering budgetary information within each of the four budgeting categories.

⁹Note that this observation contrasts pretest findings that showed no systematic bias.

Table 2 depicts the pre- and post-treatment WTP for the movie ticket purchase simulation. As reported for the t-shirt purchase, the low budget group subjects show a diminished WTP average after being confronted with exceeded budgets ($M_{\text{post}} - M_{\text{pre}} = \text{USD } -1.43$), whereas respondents of the medium budget group show approximately constant WTPs comparing pre- and post-treatment ($M_{\text{pre}} = \text{USD } 13.08$; $M_{\text{post}} = \text{USD } 13.05$). Participants that have been manipulated with high available budgets showed an increase in their average WTP ($M_{\text{post}} - M_{\text{pre}} = \text{USD } 1.57$). The control group likewise reported a positive change of WTP post-treatment.

Thereby, WTP trends across the treatment groups show similar tendencies for both goods. Descriptive results indicate a decrease in WTP for the low budget group, a constant WTP for the medium budget group, and an increasing WTP for the high budget and the control group. Measured standard deviations show slight increases post-manipulation, indicating a widening within-groups variability in response to the budget treatments.

3.2 | Pain of payment

Table 3 shows the developments of reported payment pain per subsample considering the t-shirt purchase simulation, whereby smaller averages represent higher levels of perceived payment pain. All payment pain questions were based on Likert scales, classifying as interval data (Brace, 2018).

Results illustrate a greater tendency for subjects with overshot budgets to experience a more intense pain of payment after having been manipulated with budgetary information ($M_{\text{post}} - M_{\text{pre}} = -.75$). Subjects of the medium budget condition likewise showed increases in payment pain, yet to a lesser extent ($M_{\text{post}} - M_{\text{pre}} = -.40$). Participants of the high budget condition also recorded slightly increasing levels of payment pain ($M_{\text{post}} - M_{\text{pre}} = -.21$); thus, they seem to have not experienced relief from payment pain, despite having been manipulated with

positive financial information. Control group subjects also, on average, showed minor negative changes in their perceived pain of payment.

Similar observations can be drawn from the movie theater data (see Table 4). Subjects of the low budget and medium budget condition, on average, reported increases in payment pain, whereby the effect on the low budget group ($M_{\text{post}} - M_{\text{pre}} = -.78$) was considerably stronger than on the medium budget group ($M_{\text{post}} - M_{\text{pre}} = -.48$). Closely mirroring the t-shirt purchase simulation results, subjects assigned to the control and the high budget condition show slightly negative tendencies concerning pre- to post-treatment payment pain. However, results of the high budget groups showed a smaller increase of payment pain for the movie ticket than the t-shirt purchase, whereas between-product differences within the remaining groups tended to be similar.

3.3 | Repurchase

Participants have also been asked to indicate whether they would repurchase a product if they lost it in both purchase simulations. Table 5 shows the shares of respondents that would repurchase the corresponding product on a per-treatment-group basis.

Relative frequencies show considerable differences between all treatment groups, particularly between the control and treatment groups. Subjects confronted with exceeded budgets show

Group	N	Pre-treatment WTP		Post-treatment WTP		ΔWTP
		M_{pre}	$SD_{\text{pre}} (SE_{\text{pre}})$	M_{post}	$SD_{\text{post}} (SE_{\text{post}})$	$M_{\text{post}} - M_{\text{pre}}$
1_Control	80	13.66	6.97 (.78)	14.34	7.32 (.82)	+.68
2_Low Budget	81	12.58	7.09 (.79)	11.15	6.86 (.76)	-1.43
3_Medium Budget	74	13.08	6.56 (.76)	13.05	6.85 (.80)	-.03
4_High Budget	79	11.91	6.17 (.69)	13.48	7.27 (.82)	+1.57

Source: Own illustration, SPSS output.

TABLE 2 Movie ticket purchase WTP (in USD).

Group	N	Pre-treatment POP		Post-treatment POP		Δpop
		M_{pre}	$SD_{\text{pre}} (SE_{\text{pre}})$	M_{post}	$SD_{\text{post}} (SE_{\text{post}})$	$M_{\text{post}} - M_{\text{pre}}$
1_Control	80	3.83	.84 (.09)	3.70	.83 (.09)	-.13
2_Low Budget	81	3.73	.78 (.09)	2.98	1.19 (.13)	-.75
3_Medium Budget	74	3.85	.86 (.10)	3.45	1.14 (.13)	-.40
4_High Budget	79	3.86	.94 (.11)	3.65	.86 (.10)	-.21

Source: Own illustration, SPSS output.

TABLE 3 T-shirt purchase payment pain.

Group	N	Pre-treatment POP		Post-treatment WTP POP		Δpop
		M_{pre}	$SD_{\text{pre}} (SE_{\text{pre}})$	M_{post}	$SD_{\text{post}} (SE_{\text{post}})$	$M_{\text{post}} - M_{\text{pre}}$
1_Control	80	3.86	.87 (.10)	3.74	.92 (.10)	-.12
2_Low Budget	81	3.74	.86 (.10)	2.96	1.24 (.14)	-.78
3_Medium Budget	74	3.80	.91 (.11)	3.32	1.14 (.13)	-.48
4_High Budget	79	3.78	1.05 (.12)	3.72	1.01 (.11)	-.06

Source: Own illustration, SPSS output.

TABLE 4 Movie ticket purchase payment pain.

TABLE 5 Repurchase relative frequencies.

Group	N	T-shirt repurchase		Movie ticket repurchase	
		Yes (in %)	No (in %)	Yes (in %)	No (in %)
1_Control	80	52 (65.0%)	28 (35.0%)	49 (61.3%)	31 (38.8%)
2_Low Budget	81	33 (40.7%)	48 (59.3%)	38 (46.9%)	43 (53.1%)
3_Medium Budget	74	38 (51.4%)	36 (48.6%)	37 (50.0%)	37 (50.0%)
4_High Budget	79	44 (55.7%)	35 (44.3%)	45 (57.0%)	34 (43.0%)

Source: Own illustration, SPSS Output.

the lowest willingness to repurchase. Only 40.7% ($N = 33$) of participants decided to repurchase the t-shirt, and 46.9% specified repurchasing the movie ticket. Medium and high budget sub-samples show only slight differences concerning repurchase intentions in both product categories. Approximately half of the subjects assigned to the medium budget condition seemed keen to repurchase and little more than half of the subjects assigned to the high budget condition stated that they would rebuy each product. The control group showed noteworthy higher tendencies to repurchase both products: 65.0% ($N = 52$) of subjects decided for a t-shirt and 61.3% ($N = 49$) for a movie ticket repurchase. Considering post-repurchase payment pain, all groups indicated notable increases compared to the original purchases, highlighting that repurchases are perceived more painful than the related original purchases.

3.4 | Influence of visible household budgets on pain of payment (H1)

The first hypothesis postulates that different transparent budgets distinctly influence the perceived payment pain of consumers in purchase-decision processes. As the underlying payment pain questions ground on a five-point Likert scale (Antonides, de Groot, & van Raaij, 2011), the study deployed a mixed ANOVA test procedure. The homogeneity of covariances assumption had to be rejected, as indicated by a statistically significant Box-test¹⁰ for both the t-shirt and the movie theater purchase simulation ($p^{11} < .01$). Further, post-treatment measurements violated the homogeneity of the error variances assumption, as assessed by Levene's test ($p < .01$) for both purchase situations¹² (Salkind, 2010).

There was a statistically significant interaction between time¹³ and group for the t-shirt purchase, $F^{14}(3, 310) = 8.50$, $p < .001$, partial $\eta^2 = .08$.¹⁵ Therefore, the results show that the experienced

payment pain levels differed significantly across different treatment groups—an observation that may be attributed to the budget status manipulations. The subsamples have further been tested for simple main effects¹⁶ between treatment groups using a one-way ANOVA, but based on robust Welch-ANOVA outputs since homogeneity of variances could not be assumed (Field, 2018). Results indicate whether treatment groups significantly differed regarding experienced payment pain pre- or post-treatment. The corresponding test statistic shows that differences in payment pain concern post-treatment measures ($p < .01$), whereas pre-treatment measures did not produce significant results ($p = .73$). The Welch-ANOVA results therefore confirm that the experimental groups differ in levels of payment pain in response to the individual treatments. In particular, the Tukey-HSD post-hoc-test, executing multiple comparisons between individual subsamples, notes significant differences in post-treatment payment pain between the control group and the low budget group ($p < .01$), between low budget and high budget group samples ($p < .01$), and between low and medium condition subsamples ($p < .05$).¹⁷ Importantly, Games-Howell¹⁸ comparisons—that do not require equal subsample variances for analysis—likewise report significances in all but the low and medium sample comparison ($p = .06$), further supporting the validity of previous results despite violations of homoscedasticity.

A repeated-measures ANOVA was further applied to investigate statistically significant effects within-subjects, that is, pre- to post manipulation changes in payment pain for each group. Results show significant p -values for the low budget group ($F(1, 80) = 34.98$, $p < .01$, partial $\eta^2 = .30$) and the medium budget group ($F(1, 73) = 14.36$, $p < .01$, partial $\eta^2 = .16$), as well as for the high budget group ($F(1, 78) = 6.90$, $p = .01$, partial $\eta^2 = .08$) and the control group ($F(1, 79) = 5.27$, $p < .05$, partial $\eta^2 = .06$).¹⁹ The statistical significances in all conditions hint at a common tendency to experience increased levels of payment pain.

As was the case for the t-shirt purchase, there was a statistically significant interaction between time and group for the movie ticket purchase, $F(3, 310) = 12.32$, $p < .001$, partial $\eta^2 = .11$. Results hence show that differences occurring in payment pain across treatment groups are significantly different based on the visible budget status.

¹⁰The Box-test determines whether covariance matrices are equal and tends to be very sensitive to non-normal distributions (Pituch & Stevens, 2016).

¹¹ p is an abbreviation of p -value which estimates the likelihood to receive the observed test statistic or test statistics at least as big as the one observed under the assumption that the H_0 hypothesis was true (Field, 2018).

¹²Violations increase the probability for type-one errors, that is, rejecting H_0 even though the statement is true (Salkind, 2010).

¹³Time is a commonly used term that refers to different within subject measurements that happen over time, in this case pre- and post-treatment. The statistically significant results thus show that there is a distinctive change in payment pain over time dependent on the individual groups (Field, 2018).

¹⁴ F expresses that the ANOVA uses an F -distribution to calculate test statistics (Field, 2018).

¹⁵Eta-squared (η^2) gives the effect size of derived test statistics (Field, 2018).

¹⁶Simple main effects refer to the procedure of investigating which groups significantly differ.

¹⁷Thereby, results confirm H_{1a} for the t-shirt purchase.

¹⁸The Games-Howell-test is a commonly applied post hoc alternative for the Tukey-test that is used in cases of unequal variances (Field, 2018).

¹⁹Thereby, results confirm H_{1b} . H_{1c} however has to be rejected. Consumers encountering non-exhausted budgets even reported increases in levels of payment pain.

Concomitant one-way ANOVA statistics based on Welch's *F* indicate that these differences in payment pain between groups again only concern post-treatment observations ($p < .01$), while pre-treatment pain of paying was not significantly different between the individual groups ($p = .85$). Post hoc tests (Tukey-HSD and Games-Howell) show significant differences between the control group and the low budget group as well as between the low budget group and the high budget group. Significances thus indicate that subjects who encountered overstrained budgets experience greater payment pain than people with relaxed or absent budgets.²⁰

Repeated-measures ANOVA results show significant results for the low budget group ($F(1, 80) = 35.00, p > .01$, partial $\eta^2 = .30$) and the medium budget group ($F(1, 73) = 24.94, p < .01$, partial $\eta^2 = .26$), whereas the high budget group results were not significant ($F(1, 78) = .56, p < .01$, partial $\eta^2 = .01$).²¹ The control group also showed statistical significance ($F(1, 79) = 5.90, p = .02$, partial $\eta^2 = .07$).²² These results tend to correspond with findings from the t-shirt purchase simulation, indicating a general tendency to experience greater post-manipulation payment pain for all groups. Only the high budget group showed between-product differences, that is, constant levels of payment pain for the movie ticket, whereas the average throughout the t-shirt purchases significantly decreased.

Overall, findings for both purchase decision processes partially support H_1 . While test statistics confirmed that subjects encountering constrained budgets experience greater payment pain, results could not confirm that favorable budget information, that is, non-depleted financial resources, induce relief of payment pain. In case of the t-shirt purchase, subjects confronted with favorable budget statuses reported even greater levels of payment pain.

3.5 | Influence of visible household budgets on willingness to pay (H2)

The second hypothesis specified that distinct transparent budgets produce budget-specific changes in consumers' WTP. The hypothesis was tested likewise based on a mixed ANOVA procedure. Sphericity could be assumed due to the two measurement pre- and post-treatment design. There was further homogeneity of the error variances, as determined by Levene's test, for all WTP measurements ($p > .05$). The application of the Box-test further confirmed homogeneity of covariances for the t-shirt ($p = .21$) and the movie theater ticket ($p = .04$).²³ purchase simulation.

There was a statistically significant interaction concerning the t-shirt purchase between time and group, $F(3, 310) = 11.73, p < .001$, partial $\eta^2 = .10$. Hence, it can be assumed that the change in WTP across treatment groups significantly differs based on the available budget. A one-way ANOVA indicated that post-treatment WTPs

showed significant differences depending on the budgetary information subjects received ($p < .05$). In contrast, the average WTP for a t-shirt reported before encountering the budget manipulations did not significantly differ between all groups ($p = .46$), assessed at a significance level of .05. The Tukey-HSD post hoc results further specified that the control group's average WTP differed significantly from the low budget group average ($p < .05$). Other individual comparisons did not yield statistical significance; yet, differences between the post-treatment averages of the low budget condition and the high budget condition were close to significance ($p = .06$).

After reviewing the main effects of the between-subject factor, that is, available budgets, a simple repeated-measures ANOVA was conducted to investigate which groups show significant deviations in pre- to post-treatment WTP. Test statistics show significant results for the low budget group ($F(1, 80) = 16.81, p < .01$, partial $\eta^2 = .17$) and the high budget group ($F(1, 78) = 14.36, p < .01$, partial $\eta^2 = .16$), whereas test statistics for both, control group and medium budget group averages were not significant. In line with ex-ante hypotheses, results thus confirm that high available budgets, on average, significantly increased subjects' WTP, while exceeded budgets significantly decreased participants' willingness to spend and overall confirm hypotheses H_{2a-c} concerning the t-shirt purchase.

In synchronicity with results for the t-shirt purchase, there was a statistically significant interaction between time and the treatment group, $F(3, 310) = 9.37, p < .001$, partial $\eta^2 = .08$, also for the movie ticket simulation. Hence, it can be assumed that the change in WTP across the different treatment groups significantly differs based on the available budget, likewise for the movie ticket purchase. One-way ANOVA calculations showed statistical significance post-treatment ($p < .05$) but not in pre-treatment WTP ($p = .39$), indicating that the group-specific budget treatments indeed evoked significant differences between the experimental groups. In particular, post hoc Tukey-HSD *p*-values showed a significant difference between the control group and the low budget condition in post-treatment WTP ($p < .05$).

The repeated-measures ANOVA, applied to investigate statistically significant effects within-subjects, that is, pre- to post manipulation, showed significant results for the low budget group ($F(1, 80) = 16.81, p < .01$, partial $\eta^2 = .11$) and the high budget group ($F(1, 78) = 14.36, p < .01$, partial $\eta^2 = .20$), whereas both, control group and medium budget group results were not significant. Thereby, results also confirm hypotheses H_{2a-c} concerning the movie ticket purchase.

Overall, t-shirt and movie ticket simulation results confirm the hypothesis that treating participants with different budget statuses (high vs. medium vs. low) leads to statistically significant differences in their WTP. Explicitly, subjects assigned to the low budget condition tended to be willing to spend less, while participants manipulated with non-exhausted budgets tended to increase their WTP.

Previous ANOVA analyses did not yet investigate the relationship between payment pain and willingness to pay. Hence, a mediation analysis was subsequently carried out to investigate the relationships between budget feedback, pain of payment, and WTP in an integrated

²⁰Results thus confirm H_{1a} also in context of the movie ticket purchase.

²¹Movie theater purchase results thus also confirm H_{1b} but not H_{1c} .

²²Low η^2 values—also true for the high budgeting group—hint at comparatively low effect sizes of the results that hence might only be interpreted with caution (Cohen, 1988).

²³Assessed at a significance level of .001.

format, whereby pain of payment is presumed to mediate the relationship between budget feedback and WTP.²⁴ Successful mediation would improve the explanatory power of the relationships between dependent and independent variables. Successfully proving mediation would, for example, indicate that consumers being aware of negative budget balances perceive increases in payment pain that, in turn, causes them to decrease their WTP. However, the statistical outputs of the mediation analysis were inconclusive;²⁵ thus, it cannot be concluded that certain levels of payment pain mediate the relationship between budget feedback and WTP.

3.6 | Differences between utilitarian and hedonic purchases (H3)

The study further set out to test whether subjects show distinct changes in WTP based on the product they purchase (utilitarian vs. hedonic). It was assumed that subjects would more drastically confine their spending for hedonic purchases compared to utilitarian purchases in the face of tight budgets while assuming the opposite for the high budget subsample. Before testing, relative differences in pre- to post-manipulation WTP have been calculated per subject and for both products, holding the H_0 hypothesis that there are no differences in relative WTP changes between both products. Again, results have been compared per treatment group, now using a paired samples t-test (Freeman et al., 2014).

The test results showed no statistically significant difference in relative spending changes in each of the treatment groups. The test statistic for subjects assigned to the low budget condition did not reach statistical significance ($t^{26}(80) = -1.068, p = .289, d^{27} = 0.12$), although a negative sample mean of between-product-differences indicated that participants seemed to restrict their spending more in case of the movie ticket.²⁸ Likewise, the test for the medium budget group did not produce statistically significant results ($t(73) = -.722, p = .47, d = 0.08$). Subjects assigned to the high budget condition neither showed a systematic tendency to change spending more drastically for either the t-shirt or the movie ticket ($t(78) = .646, p = .52, d = 0.07$).²⁹ The control group results also showed no statistical significance. Even conducting a one-sided t-test, that is, postulating that subjects of the low and medium budget group would only decrease their WTP, whereas subjects of the high budget group would only increase their WTP, would not have yielded significant results. The test has been repeated by using alternative modes of transforming WTP changes, for example, within-subjects pairwise adjustments of

WTP, yet delivered similar results, all of which were not statistically significant. Hence, confirming descriptive observations, the study overall found no difference in spending change pre- to post-treatment between both products— H_3 had to be rejected.

3.7 | Effects of visible household budgets on repurchases (H4)

The last hypothesis to be tested presumes that consumers with a visible household budget are less willing to repurchase a product in case of product loss than consumers without budgetary information. Underlying nominal data³⁰ rendered most non-parametric test procedures non-applicable (Field, 2018; Freeman et al., 2014). Thus, differences in observed proportions between groups have been examined using a binomial test. As the hypothesis postulates significant differences between the control and treatment groups, the observed control group proportion concerning repurchase intention served as a benchmark frequency for comparison with observed relative frequencies of the treatment groups.

In sum, 65.0% ($N = 52$) of the control group subjects indicated that they would repurchase the t-shirt and 61.3% ($N = 49$) signaled to repurchase the movie ticket. Testing for differences in proportions between the control and individual treatment groups resulted in significant differences between control- and low-budget groups ($p < .01$) as well as between control- and medium-budget groups ($p < .01$). Conversely, testing control group proportions against the high budget group yielded no significant result ($p = .06$). Likewise, test statistics for the movie ticket purchase produced significant results for the low budget group ($p < .05$) and the medium budget group ($p < .05$) but not for the high budget group ($p = .25$). Thus, the hypothesis that merely being aware of a specific budget status leads to significantly different repurchase behaviors finds support in two of three cases. Moreover, the significances observed in cases of the t-shirt repurchase have been stronger than for the movie theater purchase. Overall, statistical results seem to indicate that dealing with exceeded budgets—as applies to the medium³¹ and low budget subsamples—represents a tipping point that strongly affects subjects' willingness to rebuy.

The notion that exceeded budgets constitute a tipping point has been further investigated (i.e., reaching the point of depleted budgets leads to a significant change in repurchase willingness). Again, binomial tests were deployed to test for significant differences.³² Relative frequencies observed for the high budget group instead of the control group now served as benchmark proportions for the remaining two treatment groups. Testing for differences considering the t-shirt purchase yielded significant results in the low budget condition ($p < .05$), whereas the test statistic for the medium budget group was not significant. Likewise, test statistics for the movie ticket only yielded

²⁴Successful mediation would occur, if the effect of budget feedbacks on consumer WTPs could be better predicted by including payment pain as intermediary variable in the analysis.

²⁵Investigations of the indirect effect yielded a confidence interval that included a correlation coefficient of zero. It could thus be that the indirect path directing from payment pain to willingness to pay does not show any correlation in which case mediation would not have occurred.

²⁶A t-value is an estimate of the z values used in cases of unknown populations. It expresses the standardized deviation from the H_0 hypothesis (Field, 2018).

²⁷d or Cohen's d indicates the effect size of the test statistic (Field, 2018).

²⁸However, as the t-test indicates, at a difference far below statistical significance.

²⁹All effect sizes (marked with a d) have been found to be smaller than 0.2, thus, did not reach the lower bound for small effect sizes according to Cohen (1988).

³⁰Note that participants have been asked whether they would repurchase the product based on a dichotomous "yes" versus "no" format.

³¹Consider that subjects assigned to the medium budget condition also faced exceeded budgets in case they decided for a repurchase.

³²Note that this investigation was not part of the original hypothesis H_4 .

significant results for the low budget condition ($p < .05$). As test statistics for the high and medium budget groups did not produce significant outputs, results could not confirm the notion that encountering exceeded budgets constitutes a tipping point that causes consumers to change more drastically repurchase behavior.

Data thus partially support H_4 altogether. It seems that subjects without budgetary information tend to be more likely to engage in repurchases than subjects that have received updates on their budget statuses. Even though differences between the group encountering largely available budgets and the control group did not yield statistical significance, descriptive results show considerable differences between both groups (see Table 5). In particular, the presence of tight budgets—medium and low budgets considering the present study—was shown to significantly affect consumer repurchase behavior. However, differences between the high budget and medium budget groups were not significant, although the medium budget group exceeded their budgets in fundamental contrast to the high budget group.

4 | DISCUSSION

4.1 | Pain of payment

Empirical results could support most of the hypotheses derived from existing literature. Most importantly, inferential statistics showed that specifically exceeded budgets lead to significantly greater perceived pain of payment which confirms previous research that related greater levels of payment pain to depleted budgets (e.g., Raghurir & Srivastava, 2008; Soster et al., 2014). Pairwise comparisons between individual treatment groups showed significant differences in payment pain between the low budget and remaining groups, indicating that particularly the awareness of negative budgets evokes strong psychological reactions. These findings highlight that consumer chiefly show psychological avoidance to overspending, thereby corresponding with prospect theory's assertion that individuals are loss averse (Kahneman & Tversky, 1979).

However, results found that, contrary to presumptions, relaxed financial budgets did not relieve subjects from payment pain, concerning the t-shirt purchase even related to a significantly heightened pain-of-paying-average. A potential explanation might be found in previous research suggesting that transaction salience—as applies to this study's budget status manipulations—affects payment pain, thus effectively functioning as a controlling mechanism preserving individuals from excessive spending (Prelec & Loewenstein, 1998; Raghurir & Srivastava, 2008). It could therefore be that merely making individuals receptive to budgets as potentially limited resources—independent of the budget status—evokes regulating emotions causing consumers to experience greater payment pain.³³

The previous argument does yet not account for the negative pain of payment developments observed within the control group.

Therefore, a second potential explanation regards the observed tendency across all groups to experience increased levels of payment pain and centers on the prolongation of the purchase situation³⁴. It could be that the longer a purchase decision lasts, the greater the cognitive dissonance³⁵ consumers experience. Consumers might then attribute these inconvenient emotions to increased levels of payment pain, independent of whether they are aware of budgetary limitations. In fact, several studies have highlighted that cognitive dissonance entails aroused states and psychological discomfort—which consumers in this study might have reported in altered levels of payment pain—that have far-reaching impacts on individual decision-making (Cooper & Fazio, 1984; Elliot & Devine, 1994). Both explanations, however, still fall short of explaining post-manipulation increases of WTP within the high budget subsample despite previously reporting higher payment pain.

Descriptive results on payment pain further pointed at considerable variability³⁶ already in pre-treatment pain of payment within individual groups. These findings lend support to extant payment pain literature that suggests perceived pain of payment to depend on individual consumer typology; that is, some individuals inherently experience more intense payment pain than others (Rick et al., 2008). This explanatory frame appears to be further supported by observations concerning post-treatment WTP that show noteworthy larger standard deviations in all groups than pre-treatment measures. These diverging sample variabilities might result from inherently different levels of payment pain in reactions to budget treatments that, in turn, have consumer-idiosyncratic effects on WTPs.

4.2 | Willingness to pay

The study moreover found that budgetary information leads to significantly different, precisely, diverging WTPs based on the degree of financial resources available. A potential explanation might be that consumers being aware of, for example, strenuous financial resources, experience greater pain of paying (e.g., Liu & Chou, 2020; Soster et al., 2014). Hence, there might exist links between payment pain and WTP the present study yet could not confirm.³⁷ Moreover, results on WTP extend previous research concluding that increases in budget transparency effectively reduce overall consumer spending (Huebner et al., 2020) by replicating findings on a single transaction basis, confirming that technology-mediated budget updates also affect consumer behavior at individual purchase-decision level. As budget setting eventually tends to be controlled by individuals, results indicate that adopting budgeting procedures can effectively steer consumer spending if desired, thus supporting previous research of

³³Note that in the pre-test post-test design of the study, budgets have been introduced after the first-time measurement of payment pain. Understanding the introduction budgetary information as an additional constraint, that participants had previously not thought of, potentially explains why participants reported constant or increased levels of payment pain.

³⁴Prolongation in this case refers to the fact that participants received the information that the products are sold out and the purchase situation repeated.

³⁵Cognitive dissonance is the psychological discomfort individuals perceive when they hold two conflicting actions or ideas that cause an internal inconsistency (Festinger, 1957). Consumers in the present study might feel dissonance about whether to engage in a purchase.

³⁶Expressed in comparatively large standard deviations.

³⁷The present study investigated relationships using linear regression.

Fernbach et al. (2015), who found effective mental budgeting to condition individuals' success in financial management. Findings also support previous research streams proposing that intentionally setting low budgets—as explicitly simulated in the low budget condition—can help reduce spending even if consumers do not entirely comply with budgetary targets, that is, overshooting a budget (Zhang et al., 2020).

In addition, the present work discovered that subjects assigned to the medium budget condition, on average, showed increasing payment pain but no simultaneous decrease in WTP, suggesting that consumers approaching budget limits rather tolerate higher levels of payment pain—an emotional construct—before adjusting their WTP—a behavioral construct. As subjects assigned to the low budget condition, on average, significantly decreased their willingness to spend, it seems that budgetary limits constitute critical points that impel consumers to alter behavior and curb spending. Again, this finding foremost confirms Kahneman's and Tversky's (1979) fundamental notion that individuals predominantly try to avoid losses. Consumers might mentally account for negative budget balances as losses that they seek to counterbalance by decreasing their WTP (loss-avoidance behavior).

Results furthermore lend support to previous consumer behavior literature highlighting that consumer behaviors are sticky (e.g., Wood & Neal, 2009; Vogel, Evanschitzky, & Remaseshan, 2008), whereas consumer emotions are comparably volatile (e.g., Laros & Steenkamp, 2005; Richins, 1997) and that a particular emotional load—for example, a certain level of payment pain—is necessary to change individual behaviors (Watson & Spence, 2007). This implication finds further support in the inconclusive results of the mediation analysis. Mediation investigates linear relationships between variables, whereas inferring that certain emotional thresholds are necessary to induce changes implies a non-continuous relationship between both constructs.³⁸ Hence, it seems consequential that the mediation model found no relationship between pain of payment and WTP.

Another potential explanation for behaviors observed in the medium budget condition concerns the study design. It could be that medium-budget-group answers might have been anchored by implicitly confronting participants with their pre-treatment willingness to spend³⁹ before asking for their post-treatment WTP. Therefore, participants might have been subtly prompted to repeat their pre-treatment WTP.

4.3 | Utilitarian spending vis-à-vis hedonic spending

Statistical analyses suggested discarding the hypothesis that consumers would adjust their spending more drastically for hedonic purchases than utilitarian purchases. Findings of Huebner et al. (2020)—who inferred that consumers spend relatively less on hedonic

categories when receiving budgetary feedback—could therefore not be replicated on a single transaction basis. Extant mental accounting literature highlighted that transaction salience—as, among other things, produced by budget feedback—induces more pronounced levels of payment pain concerning hedonic purchases and causes consumers to show comparatively volatile spending (e.g., Liu & Chou, 2020; Runnemark et al., 2015). These findings suggest that differences in payment pain cause differences in consumer spending. However, experimental observations in the present study show that both product purchases seemed to have been perceived as equally painful. Thus, because budget treatments seem to have induced equal psychological states within groups in both purchase simulations, it seems natural to have observed almost identical behavioral responses (i.e., changes in consumers' WTP). It might thus be that the effect of visual budget feedback superimposed characteristic differences between both product categories, at least in a single purchase decision context.⁴⁰ Hence, experiments investigating total consumer budgets in connection with more exhaustive consumer baskets might be necessary to control for superseding effects of transparent budget feedback and, thereby, adequately test for utilitarian and hedonic spending differences.⁴¹

4.4 | Repurchase behavior

The study eventually found that available budgets significantly affect consumer repurchase propensity, thus confirming previous research that points to budget salience as an effective means for consumers to steer purchase decision-making (Zhang et al., 2020). A disparity was observed between the high budget subsample and the control subsample,⁴² indicating that the mere awareness of having a budget might already effectively control consumer spending, even in situations consumers can source from non-depleted resources. Results also pointed to only minor differences between the high and medium budget conditions, even though both groups were placed in fundamentally different contexts. Whereas participants of the high budget condition could source from sufficient financial resources, participants of the medium budget condition exceeded their budget limits if they decided to repurchase. A potential explanation might be that, while the low budget group encountered exceeded budgets prior to repurchases, participants of the medium budget condition still encountered slightly positive or neutral budgets. As noted, consumers show specifically intense emotional reactions to overshoot budgets; it thus seems reasonable that changing to a negative budget represents a tipping point likewise in the case of product repurchases, thus separating low and medium budget groups more sharply than medium and high budget groups.

³⁸The standard mediation procedure bases on linear regression models that are unable to identify sophisticated between-variable relationships (Hayes, 2017). It might still be that there are non-linear, for example, hyperbolic relationships that yet go beyond the scope of the present project.

³⁹Note that participants of the medium budget condition have been treated with an available budget equal to one-time their pre-treatment WTP. Therefore, participants might have been inclined to restate their pre-treatment WTP.

⁴⁰It could be that the effect of exposing participants to a prominently colored app interface was stronger than the effects produced by differences in product categories.

⁴¹Therefore, longitudinal studies—as executed by Huebner et al. (2020)—might be more adequate to investigate differences in utilitarian and hedonic spending.

⁴²Note that the difference still was not statistically significant.

Findings might also support extant mental budgeting research that found individuals circumventing budget constraints by reallocating funds purposefully in case of special events, as applies to repurchases (Imas et al., 2020). Such behaviors, if true, only seem to have occurred if budgets have not been exceeded in the initial purchase situation since participants of the low budget condition showed significantly lower willingness to repurchase the product, presumably as they already encountered overstrained budget pre-manipulation.

5 | CONCLUSION

5.1 | Research contributions

Given the advent of digital budget-management applications, this paper aimed to investigate the potential effects of transparent digital budgets on consumer behavior, thus illustrating the merits of a prospective technology-enabled mental budgeting era (Appendix D, Table D1). It specifically intended to examine whether digitally mediated budget statutes influence consumer behavior in purchase decision processes. The underlying study placed particular emphasis on WTP and payment pain, hypothesizing that consumers who face tight budgets experience higher levels of payment pain and, consequently, reduce their WTP, whereas consumers encountering relaxed budgets engage in opposite behaviors. It further sought to examine whether consumer changes in payment pain and WTP substantially vary depending on the product category—herein, hedonic, and utilitarian products—having presumed that consumers adapt their spending more drastically in hedonic-oriented purchases. Lastly, the study intended to verify that observed effects remain constant in consumer repurchasing processes; for example, consumers facing depleted budgets are less inclined to decide on a product repurchase.

Results have been gathered through an experimental setup that surveyed 314 participants sourced from Amazon Mechanical Turk. The questionnaire aimed at investigating two purchases—a t-shirt purchase that represented a utilitarian good and a movie ticket purchase that represented a hedonic purchase. Based on main experimental findings, it can be concluded that the awareness of a specific budget status indeed influences consumers' WTP and payment pain to a significant extent. Results show that individuals that encountered exceeded budget balances, on average, significantly reduced their WTP, whereas participants that encountered non-depleted balances significantly increased their willingness to spend in both purchase situations. Furthermore, the study found that the awareness of depleted budgets significantly increases the psychological pain of payment consumers experience in purchase decision processes. However, in contrast to expectations, results did not confirm that individuals with comfortable budget statuses experienced relief of payment pain.

Investigations on repurchase behavior indicated that consumers with tight budgets are less inclined to repurchase a product than consumers with relaxed budgets, particularly those entirely unaware of their budgets. Statistical results yet did not confirm that, as

hypothesized, consumers tend to adjust spending more sharply in hedonic purchases than in utilitarian purchases—in other terms, they increase payment more drastically when encountering relaxed budgets while showing opposite behaviors when facing strained budgets.

Overall, this paper contributes to the existing mental accounting literature by replicating previous research findings on changes in consumer spending in reaction to budget feedback on a single transaction basis, for example, confirming that budgetary information affects consumers' willingness to pay for a specific product. This study's empirical results showed that technology-enabled self-management could indeed produce effective results—predominantly insofar as budget feedback assists consumers to comply with their financial goals.

5.2 | Managerial implications

Consumers shifting to manage their finances digitally also poses additional chances for marketers to refine pricing policies, for example, to price discriminate in a targeted manner. Since budget statuses affect consumers' WTP, marketers might consider using budgetary information of consumers to offer targeted pricing tactics—promotions in particular. For example, giving consumers whose budgets approach exhaustion favorable price offerings might positively impact company profits and improve the customer relationship (Kumar & Reinartz, 2016). In particular, marketers might refine acquisition tactics by offering targeted coupon promotions when engaging with consumers whose budget approaches depletion (Heilman et al., 2002).

Additionally, knowledge about consumer budgets has a potentially far-reaching impact on product recommendation and referral models. Most current recommendation algorithms primarily draw on predictive approaches that rely on past shopping behavior and search patterns (Doshi, 2019). Because budget size substantially influences product preference and selection, integrating corresponding information would vastly expand the predictive power of such mechanisms and improve recommendation models. Moreover, knowing that consumers are aware of non-exhausted budgets tend to increase spending, companies might use such information to display targeted advertisements that incentivize consumers to spend available budgets, indirectly affecting transaction efficiency.⁴³ Therefore, by cooperating with financial service providers, for example, sharing consumer data, companies can effectively enhance their revenue and sales management.

Knowing about consumer financial statuses could also serve as an effective means for companies to address potential issues in customer-specific risk management. This implication applies explicitly in the field of e-commerce. Companies could use budget data in addition to currently applied online-store risk management practices such as averaging retail prices or restricting payment methods (Ruch & Sackmann, 2009). Insourcing information on consumer-specific value

⁴³Consumer segmentation based on budgeting would lower transaction costs by precisely targeting customers based on their financial status.

and risk that might be attached to their current budget status could help set up effective risk management decisions on a per customer and transaction basis without sacrificing turnover potential and enhancing companies' revenue and, eventually, value management. At this point, it needs to be highlighted that neither financial service providers nor businesses may capitalize on consumer data at the expense of consumer privacy.

The confluence of digital commerce and financial management apps is redefining the landscape of e-commerce and consumer behavior. This synergy presents both opportunities and responsibilities for businesses. Immediate budgetary feedback, integrated within e-commerce platforms, can influence a consumer's purchasing decision. Such real-time insights aid consumers in prudent financial management while providing businesses a window into evolving buying patterns. This is particularly salient as consumers increasingly seek digital solutions that blend shopping with financial tracking. The potential for collaboration between e-commerce and budgeting apps is vast. Partnerships can offer a streamlined user experience, merging shopping with budgetary insights. This not only fosters fiscal responsibility among consumers but also equips businesses with data to refine their offerings. However, the fusion of these platforms amplifies concerns around data privacy. While rich consumer data can be invaluable to businesses, its collection and use must be ethically grounded. Ensuring stringent data protection and prioritizing consumer trust are crucial in this integrated digital era.

Further, implications for financial service providers, consumers, and marketers can show noteworthy relationships as depicted in the triangle scheme below (Figure 3).

5.3 | Limitations and directions for future research

A first overarching limitation concerns the nature of laboratory experiments. Manifestations of intention behavior gaps closely correspond with the notion of social desirability, that is, people altering their responses and potentially deviating from actual behaviors to comply with social norms or research favors (Hackett, 2018). For instance, it thus might be that, even though subjects decreased their WTP in laboratory environments, when being in an actual purchase situation, subjects go through different mental processes causing them to deviate from intended spending behaviors. Further research could control potential intention behavior gaps by replicating findings based on field, thus, behavioral data. As frequently deployed in shopper marketing research (e.g., Van Ittersum et al., 2013), in-store experiments could inspire subsequent research on how to transfer laboratory-based experiments into natural environments.

Moreover, questioning pain of payment multiple times might have promoted pattern answering (Brace, 2018). For example, a share of participants might have been subtly inclined to alter their answers to payment pain questions, which would also potentially explain the tendency across all groups, specifically the control group, to report heightened levels of payment pain post-treatment.

Another limitation of our study pertains to the clarity surrounding the control group's context. While the control group was intended to provide a baseline of consumers who were aware of general spending tendencies but not influenced by real-time budgetary feedback, certain survey references might have inadvertently induced a "budgeting" context. The inclusion of phrases like "regardless of the current situation" aimed to allow participants to respond independent of the

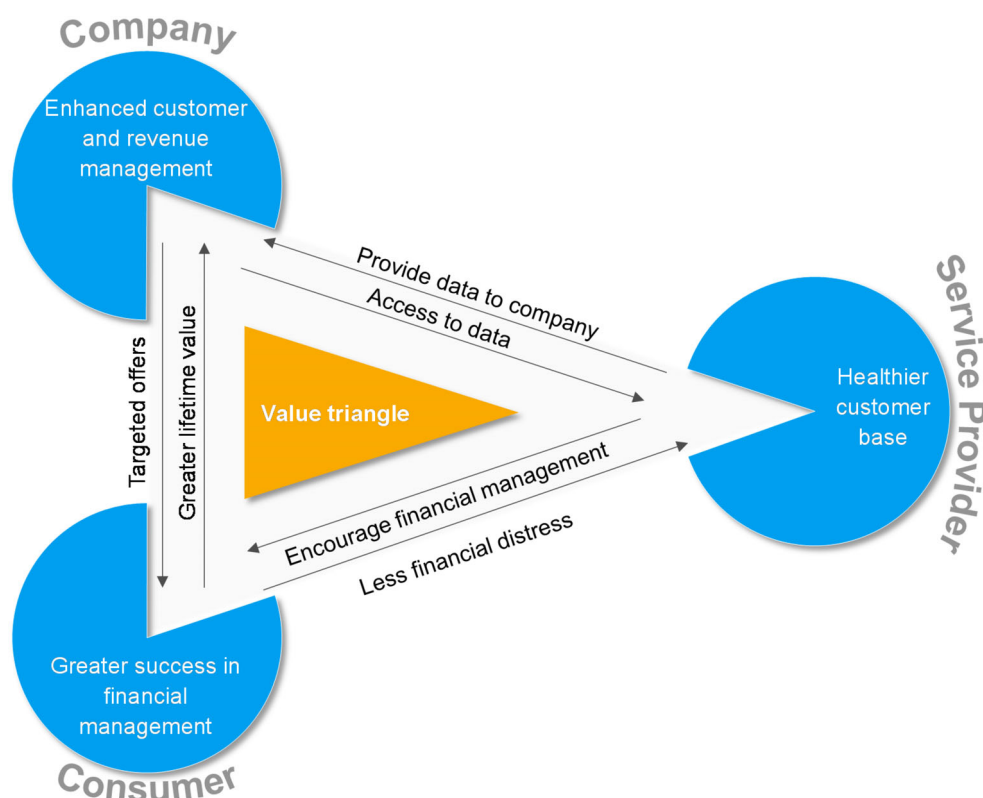


FIGURE 3 Practical implications value triangle. Source: Own illustration.

simulation, but potential ambiguities in phrasing could have influenced their mindset.

The statistically insignificant differences in WTP adjustments between utilitarian and hedonic products also point toward noteworthy study limitations. As highlighted in the discussion section, one would expect stronger consumer reactions for hedonic products following existent literature perspectives (e.g., Huebner et al., 2020; Liu & Chou, 2020). Therefore, the non-separating measurements between both products might indicate insufficient categorical differentiation. Even though pretest manipulation checks have validated that both products fall into different categories, they still might not entirely represent their corresponding product categories. In fact, research found that individuals often regard products to exhibit features of utilitarian as well as hedonic nature (e.g., Alba & Williams, 2013; Chitturi et al., 2008). As noted by Huebner et al. (2020), particularly t-shirts also incorporate hedonic features. Insignificant differences between both products might thus have resulted from consumers perceiving t-shirts as not predominantly utilitarian alternatives. Further studies could account for these considerations by testing results on multi-items per category, which would support deriving conclusions generalizable to the entire category.

This study further applied convenience sampling methods that, although widely applied in social sciences research, likewise bring along the threat of lacking generalizability of results. Although the study aimed to adhere to randomization requirements, descriptive sample demographics, for example, showing a slight gender bias toward male respondents, might indicate results as not entirely representative of the underlying population. In a similar vein, results are not generalizable to other geographies as the study has exclusively been conducted in the United States. Conducting comparable studies in different geographies would hence further allow for multi-national inferences.

It also must be noted that results of the mixed ANOVAs—applied to investigate payment pain differences—have been reported, although underlying data violated assumptions of homogeneity of variances and heterogeneity of covariances. While Field (2018) asserts that such violations might not be problematic and statistical results thus may be interpretable, deriving pain of payment on a more detailed 11-point Likert scale, as Zellermayer (1996) initially proposed, could make results less sensitive for deviations of variances between groups.

Another potential limitation is the broad age range of our respondents, spanning from 22 to 70 years old. This wide age distribution could potentially introduce variability in our results, given the potential differences in technology adoption and financial behaviors across different age groups. Consequently, this may affect the generalizability of our findings.

Lastly, real shopping situations also regularly provide consumers with alternatives to select from (Okada, 2005). Moreover, as prices are usually fixed and changes in WTP remain hypothetical, it might be likely that consumers tend to pick less preferred yet cheaper alternatives when given a set of choices. Subsequent research could investigate such phenomena

by extending the experimental setting and giving consumers alternatives that differ by product preference or perceived value and price.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX A

A.1 | Study Questionnaire

The following picture sequence shows the questionnaire showing the question format for subjects assigned to the low budget condition.

0% completed

Welcome to our survey on spending behavior!

In this survey, we are interested in learning about how people spend their money.

The first part of the survey will ask you to purchase two products – **a t-shirt and a movie ticket**.

In the second part we will ask you a few short questions on your spending behavior.

We will conclude by asking you about some personal information (i. e. age, education, etc.).

Some more information on the survey:

- Once you clicked "next" you cannot go back to the previous page
- You are required to answer all questions to complete the survey
- Please give integer values to all free text answers. If you give decimal numbers, you will get a notification requesting you to round to the nearest integer
- The last page of the survey will display an MTurk Code. Please copy the code and paste it into the corresponding code identifier field on MTurk to get your survey compensation

Next

7% completed

T-shirt purchase

Imagine that you recently realized that you need a new black t-shirt.

You are now shopping online and search for a t-shirt with the following characteristics:

- color: black
- quality: medium
- material: cotton
- brand: unbranded

Here is a preview of the t-shirt you are currently looking at:

[/ Tops](#)

Black t-shirt classic



Color: **Deep Black**



[Which Size Fits Me?](#)

Size: **Please select** | [Size Chart](#)

XS

S

M

L

XL

2XL

Qty: 1

–

+

Add To Bag

Product Details

(Non-responsive screenshot)

1. How much would you be willing to pay for such a t-shirt at most?

Please indicate the highest amount you would be willing to pay.

10 USD

13% completed

2. Imagine you found a suitable t-shirt. How does it feel to pay 10 USD for the t-shirt?



Very painful



Somewhat painful



Neither painful nor
pleasurable



Somewhat
pleasurable



Very pleasurable

Next

19% completed

3. Regardless of the current purchase situation – how much do you plan to spend, on average, for clothing each month? *(Please note that you consider to buy an unbranded t-shirt for 10 USD and that your monthly clothing budget usually also includes expenses for other clothes)*

Please indicate your monthly clothing budget.

 USD

Next

25% completed

Time for a location change...

You move to your living room and sit down on your couch.

You take out your phone and return to the website to continue shopping.

The t-shirt you selected is still in your shopping cart.

Your available budget

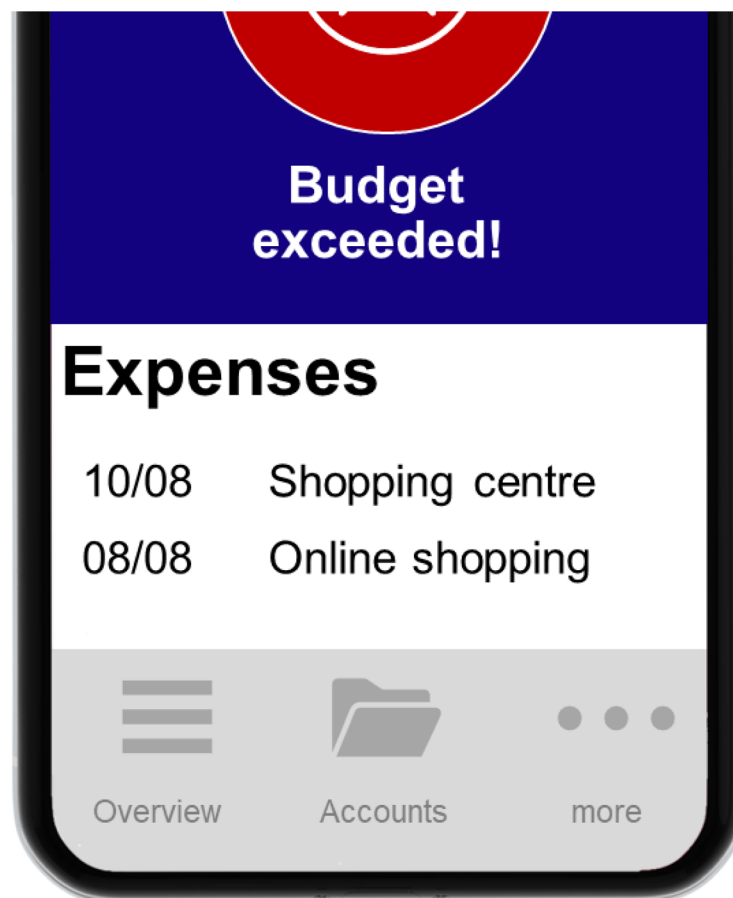
You remember that you have recently downloaded a budgeting app on your phone that you use to keep track of your monthly finances.

You take out your phone and open the app. It shows the following:

At the beginning of the month you have allocated **100 USD** to your clothing category.

You now open the app and it tells you that you have exceeded your budget by **-10 USD**.





(Non-responsive screenshot)

4. You decide to buy the t-shirt. How does it feel to pay 10 USD for the t-shirt?

☐ Very painful

☐ Somewhat painful

☐ Neither painful nor
pleasurable

☐ Somewhat
pleasurable

☐ Very pleasurable

Your t-shirt is sold out

Now assume that you receive a message that the t-shirt was sold out.

As you are looking for a basic t-shirt without a specific brand, you continue screening the website to look for an alternative t-shirt with the **same characteristics** as the one that was sold out.

Your smartphone sends you a message again that says you have **exceeded** your clothing budget by **-10 USD**.

5. Assume you found another t-shirt of the same characteristics. How much would you be willing to pay for the t-shirt at most?

Please indicate the highest amount you would be willing to pay.

USD

Next

31% completed

6. You decide to buy the t-shirt. How does it feel to pay 6 USD for the t-shirt?

☐ Very painful

☐ Somewhat painful

☐ Neither painful nor
pleasurable

☐ Somewhat
pleasurable

☐ Very pleasurable

7. Assume that you lose the t-shirt after picking it up from your local post office. Would you buy the t-shirt again at a price of 6 USD? Your budget now stands at -16 USD.

☐ Yes

☐ No

8. Assume you purchased the t-shirt a second time. How does it feel to pay 6 USD for the t-shirt?

☐ Very painful

☐ Somewhat painful

☐ Neither painful nor
pleasurable

☐ Somewhat
pleasurable

☐ Very pleasurable

9. Do you still remember what you were willing to pay for the first t-shirt?

Please state again your initial willingness to pay.

USD

Next

38% completed

Thanks for your purchase!

Click "Next" to continue to the following section of the survey.

Next

Movie theater ticket purchase

Imagine your friend told you about her / his amazing movie theater evening last week.

You have not watched a movie for quite a while and decide to visit the **movie theater**.

You now search the website of a movie theater of your choice.

You watch several trailers of your favorite genre.

The picture below shows a screenshot of the website you are potentially browsing:

The screenshot shows a website interface for buying movie tickets. At the top, there's a navigation bar with a back arrow and the text 'Buy Tickets'. Below this, a dark banner features a movie poster for 'Your favorite movie' (PG-13, 2 Hr 13 Min) at 'AMC B4th Street 6'. A link for 'Theater's COVID-19 Policies' is also visible. Below the banner, there are options for 'Reserved seating', 'Closed caption', and 'Accessibility devices available' in 'Auditorium 2'. A section titled '1. Number of Tickets' states 'You can request up to 9 reserved seats per transaction.' Below this, there are two rows of ticket selection: 'Adult' and 'Senior'. Each row has a minus button, a counter set to '0', and a plus button.

(Non-responsive screenshot)

10. How much are you willing to pay for a movie theater ticket (only considering the single ticket price without add-ons like popcorn, nachos, or coke, etc.) at most?

Please indicate the highest amount you would be willing to pay.

 USD

Next

50% completed

11. Assume you selected a movie. How does it feel to pay 12 USD for the ticket?

☐ Very painful

☐ Somewhat painful

☐ Neither painful nor
pleasurable

☐ Somewhat
pleasurable

☐ Very pleasurable

Next

56% completed

12. Regardless of the current purchase situation – how much do you plan to spend, on average, for entertainment (i.e., movie theatre visits, video-on-demand services & subscriptions, books, gaming equipment etc.) each month? *(Please note that you consider to buy a movie ticket for 12 USD and that your monthly entertainment budget usually also includes expenses for other items)*

 USD

Next

63% completed

Time for a location change...

You decide to move to the kitchen and continue shopping while eating your breakfast.

You take out your phone and return to the theater website to continue shopping.

The movie ticket you selected is still in your shopping cart.

Your available budget

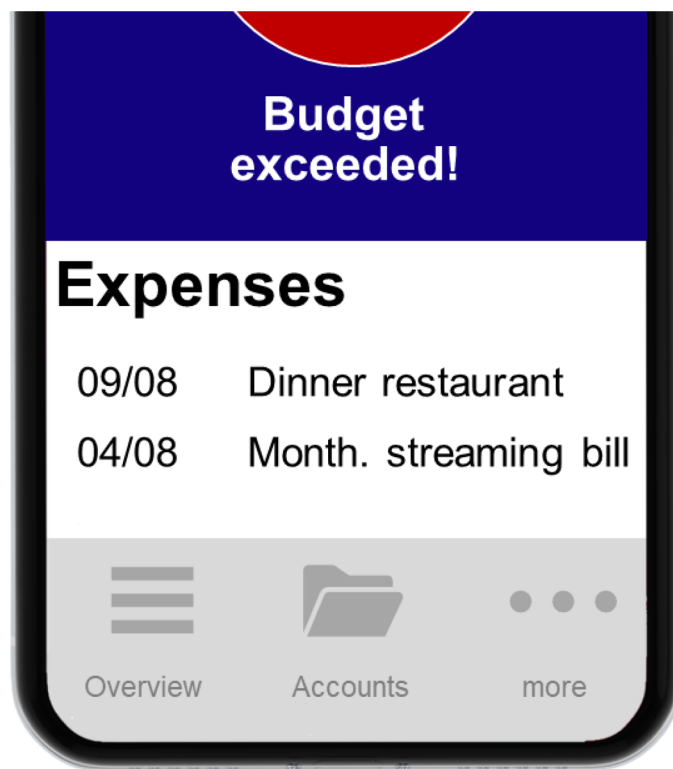
You remember that you have recently downloaded a budgeting app on your phone that you use to keep track of your monthly finances.

You take out your phone and open the app. It shows the following:

At the beginning of the month you have allocated 60 USD to entertainment.

You now open the app and it tells you that you have exceeded your budget by -12 USD.





(Non-responsive screenshot)

13. You decide to buy the ticket. How does it feel to pay 12 USD for the movie ticket?

☐ Very painful

☐ Somewhat painful

☐ Neither painful nor
pleasurable

☐ Somewhat
pleasurable

☐ Very pleasurable

Your seat is no longer available

Now assume that you receive a message that the tickets for the movie you selected are sold out.

You change to the website of another movie theater nearby to see whether the theater also offers the movie you would like to see.

Your smartphone sends you a message again that says you have **exceeded** your entertainment budget by -12 USD.

14. Assume you found the movie. How much would you be willing to pay for such a theater ticket at most?

Please indicate the highest amount you would be willing to pay.

USD

Next

69% completed

15. You decide to buy the ticket. How does it feel to pay 7 USD for the movie ticket?

- ☐ Very painful ☐ Somewhat painful ☐ Neither painful nor pleasurable ☐ Somewhat pleasurable ☐ Very pleasurable

16. Assume that you lose the e-mail with your one-time code for the movie ticket. If there was another ticket available, would you buy the ticket again for a price of 7 USD? Your budget now stands at -19 USD.

- ☒ Yes
☐ No

17. Assume you purchased the movie ticket a second time. How does it feel to pay 7 USD for the movie ticket?

- ☐ Very painful ☐ Somewhat painful ☐ Neither painful nor pleasurable ☐ Somewhat pleasurable ☐ Very pleasurable

18. Do you still remember what you were willing to pay for the first movie ticket?

Please state again your initial willingness to pay.

USD

Next

75% completed

Thanks for your purchase!

Click "Next" to continue to the following section of the survey.

Next

81% completed

19. Now, we will be asking you a series of questions about your own budgeting process in your daily real life (independent of the previous purchase situations).

Please state to which extent you agree or disagree with the statement above.

	Totally disagree	Moderately disagree	Neither agree nor disagree	Moderately agree	Totally agree	I don't know
If I spend more on one thing, I economize on other expenses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I spend more than normal on one thing in one month, I spend less on other things in the next month.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have reserved money (budget) for different expenses, such as food, clothing, transportation, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I never spend more than a fixed amount on food, clothing, transportation, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you read this statement, please tick the answer option "totally agree"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next

88% completed

20. Please type your age (full years) into the box.

 years

21. Which of the following best describes your gender?

- ☐ Female
- ☐ Male
- ☐ Diverse

22. Which of the following best describes the highest education you have completed?

- ☐ Some high school
- ☐ High School Diploma
- ☐ GED
- ☐ Some college
- ☐ Associates Degree
- ☐ Bachelors Degree
- ☐ Some graduate study
- ☐ Graduate Degree

23. What is your employment status?

Choose the answer that best describes your current employment status.

- ☐ Student
- ☐ Employed part-time
- ☐ Employed full-time
- ☐ Work at home without pay
- ☐ Self-employed
- ☐ Not currently employed

24. Which of the following best describes your annual net household income?

- ☐ Less than \$20,000
- ☐ \$20,000 - \$29,999
- ☐ \$30,000 - \$39,999
- ☐ \$40,000 - \$49,999
- ☐ \$50,000 - \$59,999
- ☐ \$60,000 - \$69,999
- ☐ \$70,000 - \$79,999
- ☐ \$80,000 - \$89,999
- ☐ \$90,000 - \$99,999
- ☐ \$100,000 or more

25. How many children / people are in your household (including you)?

people

26. Do you live with a spouse or partner?

- ☐ Yes
- ☐ No

Next

Thank you for completing this questionnaire!

We would like to thank you very much for helping us.

Your personal code for MTurk is: D1445

Your answers were transmitted, you may close the browser window or tab now.

APPENDIX B

B.1 | Descriptive statistics demographics

TABLE B1 Gender.

Gender	Frequency	Percent
Female	129	41.1
Male	185	58.9
Total	314	100.0

Source: Own illustration, SPSS output.

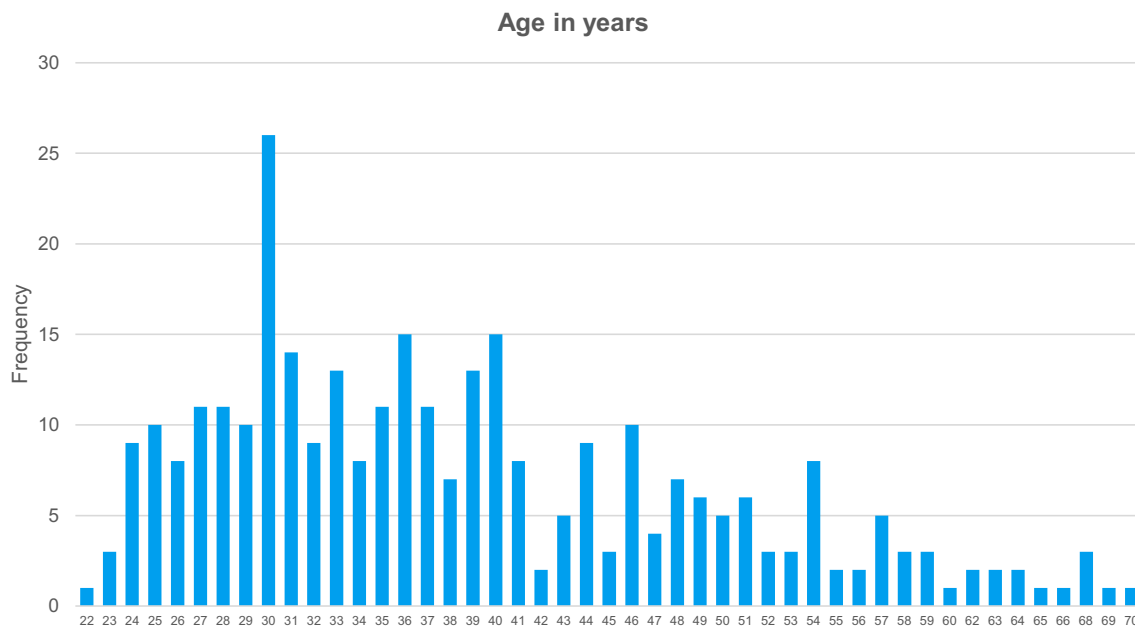


FIGURE B1 Age distribution total sample. *Source:* Own illustration, SPSS output.

TABLE B2 Profession.

Employment status	Frequency	Percent
Student	2	0.6
Employed part-time	29	9.3
Employed full-time	245	78.0
Work at home without pay	3	1.0
Not currently employed	10	3.2
Self employed	25	8.0
Total	314	100.0

Source: Own illustration, SPSS output.

TABLE B3 Education.

Highest degree	Frequency	Percent
Some high school	4	1.3
High school diploma	21	6.7
GED	1	0.3
Some college	33	10.5
Associates degree	23	7.3
Bachelor's degree	186	59.2
Some graduate study	8	2.6
Graduate degree	38	12.1
Total	314	100.0

Source: Own illustration, SPSS output.

TABLE B4 Income.

Employment status	Frequency	Percent
Less than \$20,000	26	8.3
\$20,000–\$29,999	29	9.2
\$30,000–\$39,999	35	11.2
\$40,000–\$49,999	47	15.0
\$50,000–\$59,999	68	21.7
\$60,000–\$69,999	25	8.0
\$70,000–\$79,999	32	10.2
\$80,000–\$89,999	13	4.1
\$90,000–\$99,999	12	3.8
\$100,000 or more	27	8.6
Total	314	100.0

Source: Own illustration, SPSS output.

TABLE B5 Household size.

Household	Frequency	Percent
0	11	3.5
1	53	16.9
2	76	24.3
3	72	23.0
4	79	25.2
5	20	6.4
6	1	0.3
Missing	1	0.3
Total	314	100.0

Source: Own illustration, SPSS output.

APPENDIX C

C.1 | Overview estimated marginal means

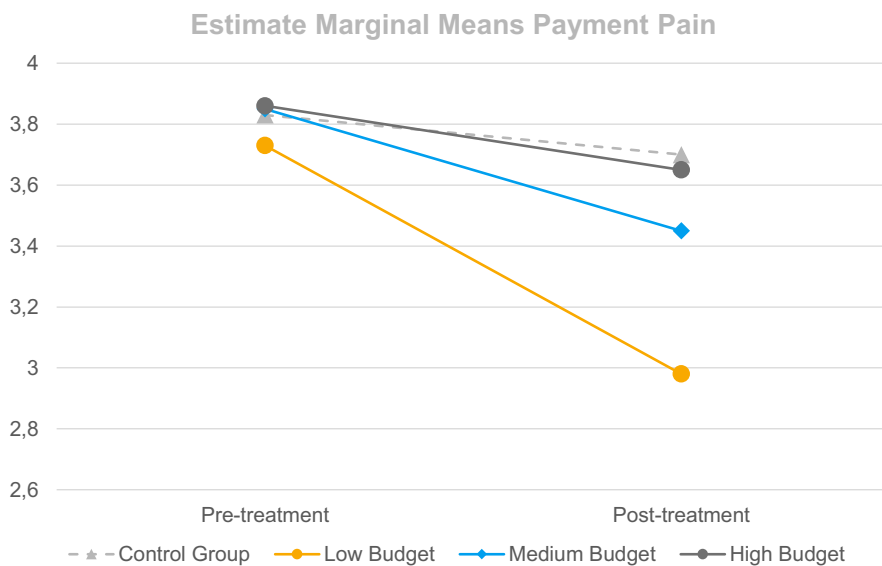


FIGURE C1 Means payment pain T-shirt purchase. *Source:* Own illustration, SPSS output.

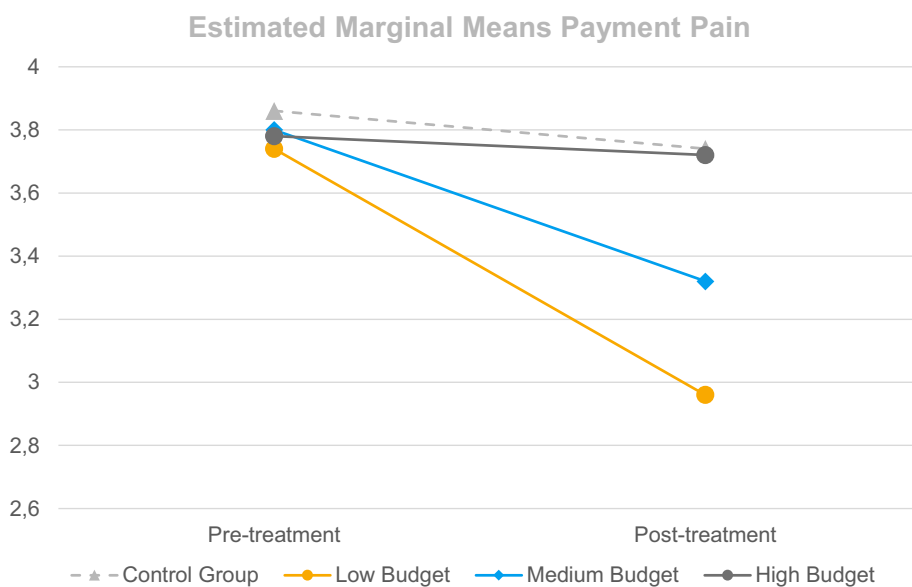


FIGURE C2 Means payment pain movie ticket purchase. *Source:* Own illustration, SPSS output.

FIGURE C3 Means WTP T-shirt purchase. *Source:* Own illustration, SPSS output.

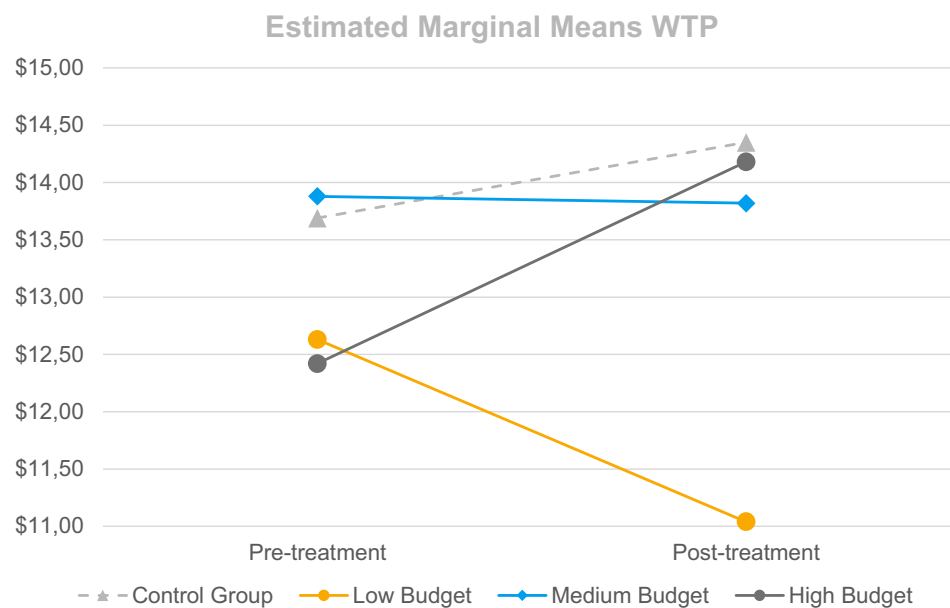
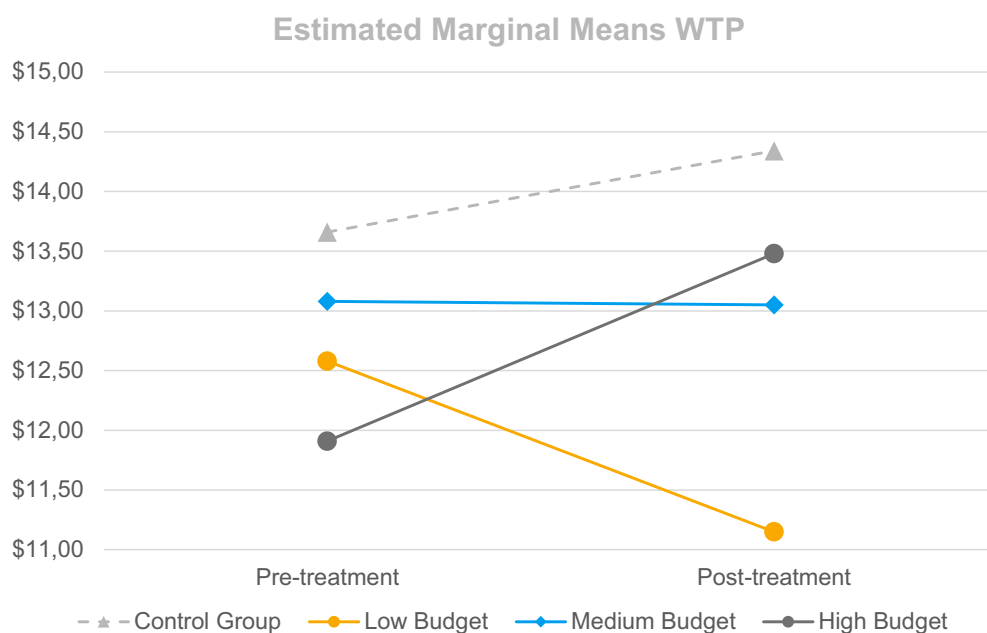


FIGURE C4 Means WTP movie ticket purchase. *Source:* Own illustration, SPSS output.



APPENDIX D

D.1 | Research hypotheses test results

TABLE D1 Overview research hypotheses.

Results research hypotheses		
H ₁	A transparent digital household budget (positive budget; negative budget) has an impact on the consumer's perceived pain of paying (decrease; increase) in purchase-decision-making processes	(✓)
H _{1a}	Consumers with different budget statuses show distinct changes in perceived payment pain in a way that consumers with tight budgets experience greater payment pain than consumers with relaxed budgets	✓
H _{1b}	Consumers encountering exceeded budgets experience an increase of payment pain	✓
H _{1c}	Consumers encountering non-exhausted budgets experience a decrease of payment pain	×
H ₂	A transparent digital household budget (positive budget; negative budget) has an impact on the consumer's willingness to pay (increase; decrease) in purchase-decision-making processes	✓
H _{2a}	Consumers with different budget statuses show distinct changes in their willingness to pay, whereby consumers encountering exceeded budgets are willing to spend significantly less than consumers with relaxed budgets.	✓
H _{2b}	Consumers encountering exceeded budgets decrease their willingness to pay	✓
H _{2c}	Consumers encountering non-exhausted budgets increase their willingness to pay	✓
H ₃	Consumers with a visible household budget will adjust their spending more drastically for hedonic purchases in comparison to utilitarian purchases	×
H ₄	In the event of a loss of a product, consumers with a visible household budget are less willing to repurchase the product	(✓)
H _{4a}	Consumers encountering exceeded budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment	✓
H _{4b}	Consumers encountering depleted budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment	✓
H _{4c}	Consumers encountering non-exhausted budgets show a decreased willingness to repurchase the product compared to a control group without budget treatment	×

Source: Own illustration.