

Addressing financial mismanagement by young adults

DDM110 Design for behavioural change 2019/2020

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INTRODUCTION

Young adults often leave their parents' home without ever having ever been solely responsible for their own personal finance (Mae, 2002). This might make them vulnerable for the marketing tactics of financial institutions and psychological costs. Half of the young adults have limited insight in their personal financial future (FFP, 2018). The urges to buy and consume are immense. Consequently, the practical necessity to suppress the immediate tendency to buy is undermined. Satisfaction of buying can come from the rush obtained from the purchasing itself, or the product that is obtained. These purchases can be compulsive and abstractly motivated (I don't know why I bought it) or out of the believe of false necessities (I need a new dress for this party) (Penman & McNeill, 2008). We consider it as necessary to support these young adults to create a better management of their financial wellbeing and therefore selected this topic. Besides, being part of the target population ourselves, it would enable our team to spend more time understanding and applying the behavioral theories and frameworks instead of emphasizing with the target population. Therefore, allowing to effectively gain more knowledge about behavioral change theories.

Behaviors that come along with financial mismanagement are elaborate; eating too expensive food, friends doing expensive things, an addiction, an expensive hobby, etc. However, from our target behavior assessment we found that the behavior that is easy to measure with the most impact, likelihood to change and spillover is, young adults not making and keeping a budget. The young adults we have been focusing on are between the age of 18 and 25, living on their own and switching to a world of personal fiscal responsibility. There is little interference of other stakeholders as making and keeping a budget is usually done individually and this activity only effects the personal financial status. On the other hand, the social environment of the young adults which consists of family, friends, peer students and roommates could motivate them to make and keep a budget. However, our main focus is the solo-activity and people's personal integration of the motivation to conduct this behavior.

The intended behavior that we want to generate is that young adults consciously make a budget and behave accordingly. To reach this, young adults need to be trained and educated (psychological capability), they need to belief that making a budget is beneficial (reflective motivation) and the behavior needs to become a routine (automotive motivation) (Michie,

Atkins, & West, 2014).

THE DESIGN

The concept

To answer the needs described in our goal, an educative financial goal-setting application has been designed. This application serves as a tool in which we aim to make the target behavior easier, we aim to lead people through the process of budgeting and we aim to perform measurements (e.g. tracking daily expenses) that motivate the young adults to make and keep a budget (Fogg, 2003).

The user is guided in making and keeping a budget based on their personal (self-set) goals. Through educative tips about finances, users are trained and educated to behave fiscally responsible (psychological capability). The tailored applications should persuade the young adults in believing the benefits of budgeting (reflective motivation), through tracking expenses and the category-based monthly overviews of these. Prompts and notifications are used to ensure that budgeting becomes a routine (automotive motivation). (Michie et al., 2014).

The iterative process

In the development of this app there were multiple moments of reflection and improvement, prior to the final iteration. First, the fundament of the application was established, and mechanisms and principles from the goal setting theory (GST) (Locke & Latham, 2002) were practicalized. This was based on our COM-B model analysis (Michie et al., 2014) and the behavior change taxonomy (appendix I). At this phase a first series of interface designs were developed and shortly after, presented as a first concept pitch. We realized that the concept did not reflect all rules elaborated on in the GST and it was not as detailed as desired. Therefore, the GST was thoroughly studied again and the value of every single element regarding the concept was examined. This examination was significant guidance for the final iteration (appendix IV). Consequently, there were some improvements made and new elements added as rationalized below.

Design rationale

First month trial and momentary pop-ups

Within the first month using the application, the young adults only receive momentary pop-ups (fig. 2) whenever they use their debit card, without being asked to make a budget first. The pop-ups asks to allocate the expense to a category of a pre-made selection and whether the use was impulsive expenses or not.

The pop-ups and the results of the first month (fig. 1), aim to create consciousness among our users about their expenses and persuade the user to believe that budgeting is important to provide overview and manage their finance. For example, when at the end of the month they found that 50% of their food related expenses is impulsive, this could increase the awareness that budgeting could save them a great amount

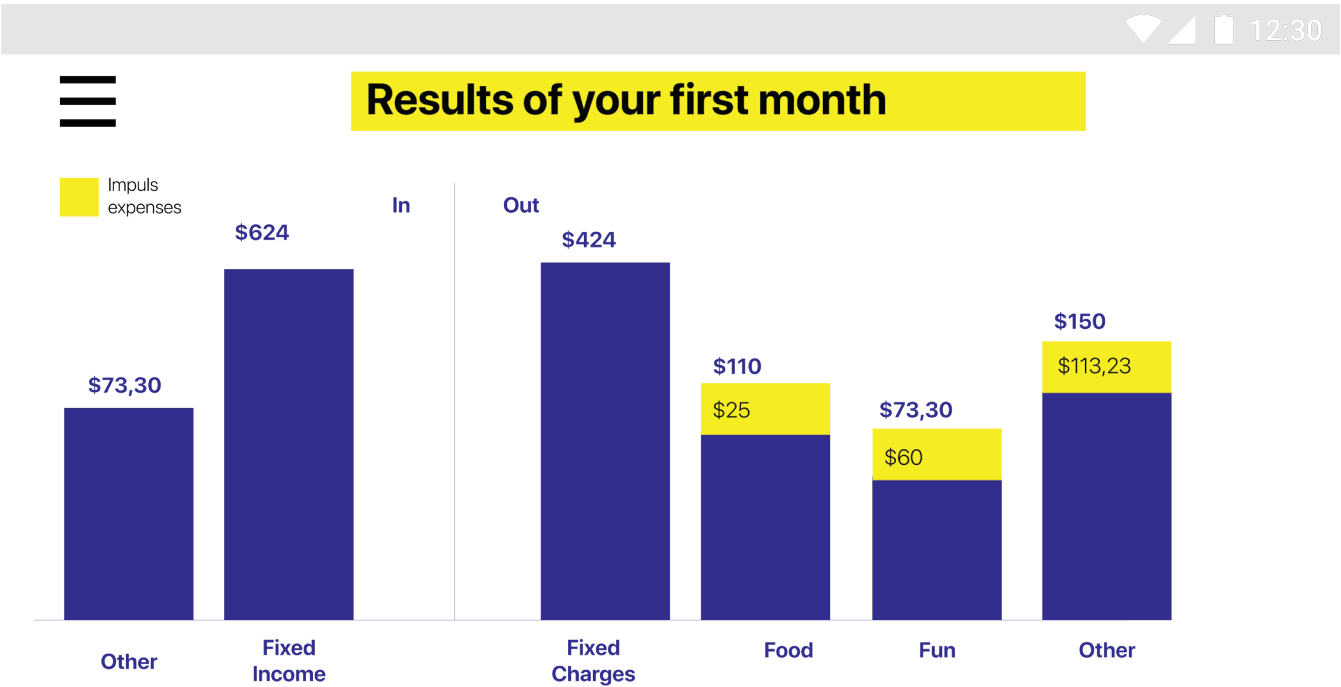


Figure 1 - First month's results

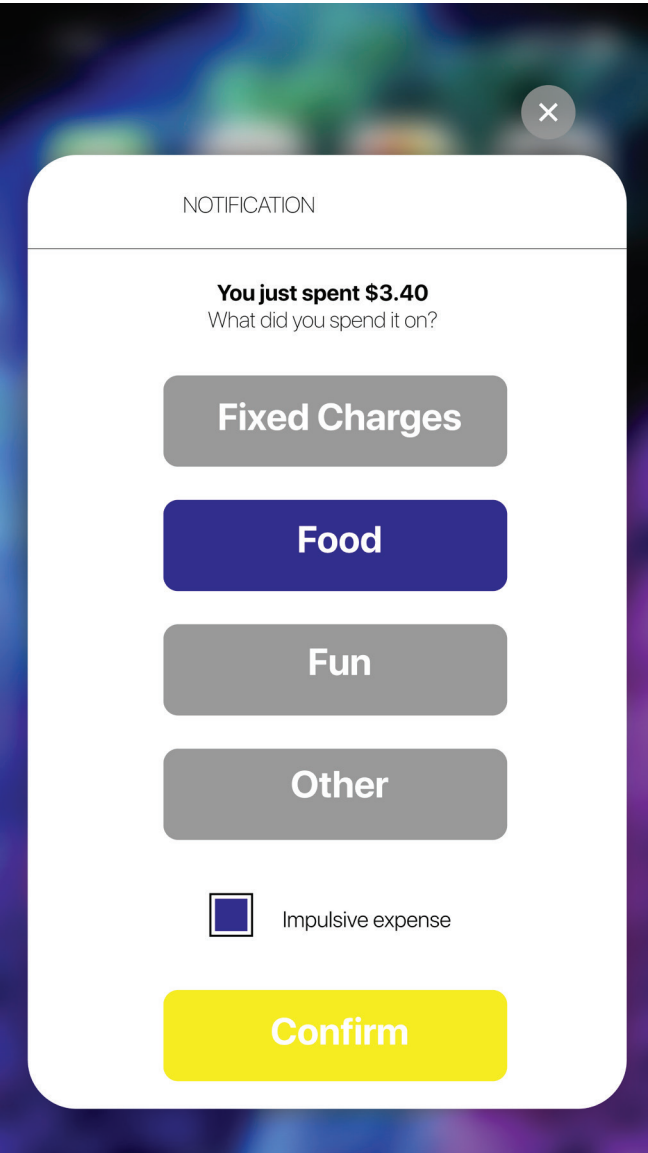


Figure 2 - Expense popup

of money. The increased believe of the importance to make and keep a budget, increment the reflective motivation of our users. This supports our goal, based on our COM-B analysis (Michie et al., 2014).

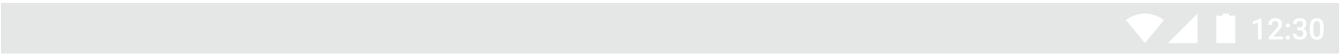
Goals and badges

In the budgeting application there is the opportunity to set personal goals, next to assigned performance goals (fig. 3). According to the GTS, commitment to a goal and thereby the performance of a behavior is higher if the goal is set by oneself. However, to prevent a strong decrease in satisfaction and commitment by not achieving (distal) self-set goals, we offer assigned goals which are easy to achieve and automatically create intermediate proximal goals for the self-set distal goals (e.g. milestones for saving goals). Yet, the rationale of these assigned goals should be convincingly

explained to achieve commitment. As an indication of a completed goal, the user is rewarded with a badge (fig. 4).

Tips

As described earlier, we aim to increase the psychological capability regarding budgeting. This can be done by education (Michie et al., 2014). Alongside educating it is important to train the young adults to maintain the target behavior. For these purposes, the exemplary figure provides the young adults with "tips" on making a budget (fig. 7). Additionally, tips are created that supply purchasing strategies (fig. 8) and other behavioral suggestions (fig. 9) to reach budget goals. Since managing ones' expenses to stay on a budget can become complex, this design is created to allow users discover appropriate task strategies (GST).



What do you find important or want to achieve?

It is helpful to set goals for yourself. Do you want to safe up for that holliday, or have some more money to do fun things?
We will add this to your budget, but don't worry, you can always change it later.



Figure 3 - Setting personal goals

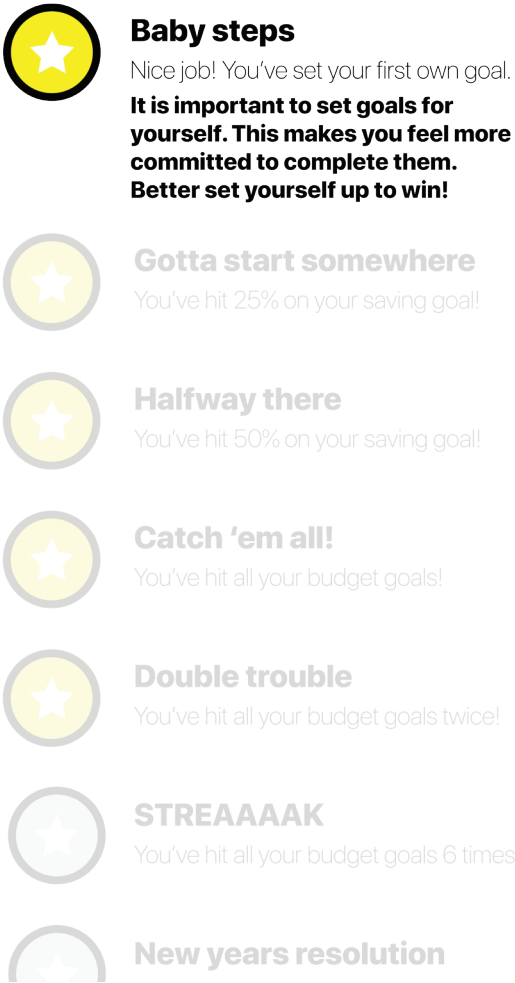


Figure 4 - Badges

Weekly feedback

As changing spending-behavior is a complex feat, the intervention presents weekly summary of feedback (fig. 6), to break down the monthly budget goals in more proximal goals (GST). Besides, to prevent that users lose track of their set goals or adjust their goals in their mind, the summary feedback is presented alongside the previously set goals (GST). Lastly, coaxing comments are presented alongside the feedback to increase self-efficacy of the user (GST).

Monthly result

As the target behavior is creating a monthly budget, it is important to have a monthly evaluation to see if the goals are accomplished. Therefore, an overview is created which shows the set goals alongside the actual expenses, for the same reasons as the weekly feedback (fig. 5). Furthermore, if goals are achieved, people set new higher goals or lower goals if they failed (GST). Therefore, this evaluation can be used to inspire next month's budget.

Theme of the application

The theme of the application is convincingly tailored to the target population. This was done to make provided information more persuasive (Oinas-kukkonen & Harjumaa, 2009) ; the lay-out of the application became more attractive for our target population, the language used to train and educate the young adults became less formal, and an exemplary figure was added to communicate feedback. The latter supports the social actor-level (Fogg, 2003)

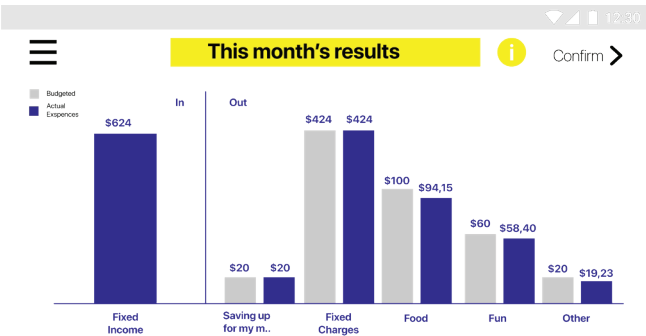


Figure 5 - Monthly results

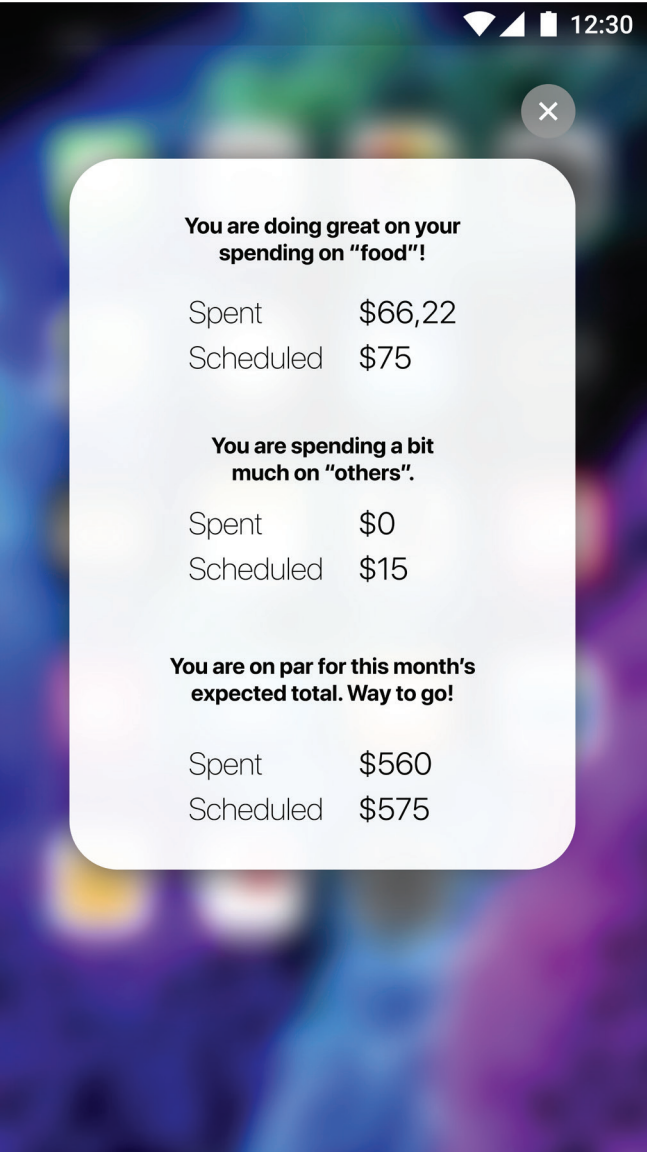


Figure 6 - Weekly feedback

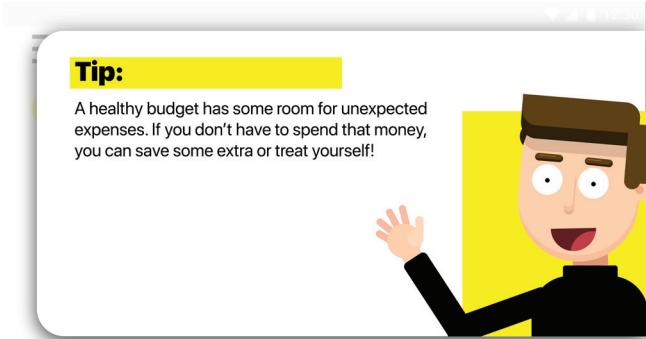


Figure 7 - Example tip for making a budget

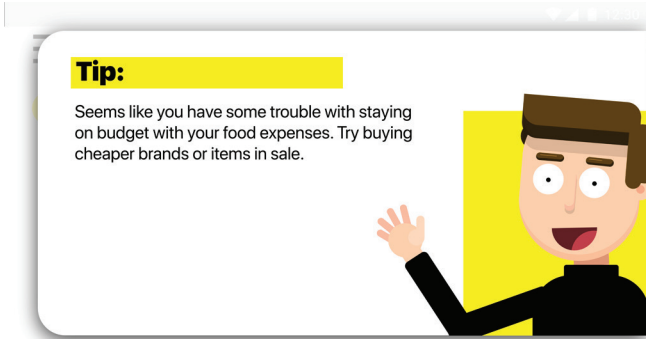


Figure 8 - Example tip for purchasing strate-

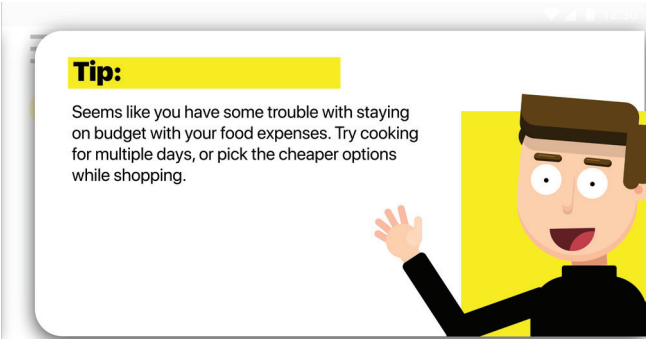


Figure 9 - Example tip for alternate behaviour

EVALUATION GOALS

Several evaluation goals were selected. Firstly, on an interaction level we advise to evaluate the user satisfaction. Next, on intervention level, self-efficacy and competence are chosen to be evaluated of which the first is an important determinant of the goal setting theory. Lastly, the commitment of the users to their goals should be evaluated. For these evaluations we assume a fully working system. Since making a budget is in this intervention a monthly activity, we plea for a more longitudinal study.

Satisfaction

Bartholomew (Bartholomew & Mullen, 2011) indicates that if a behavior change intervention is not used correctly, its effectiveness drastically decreases. Therefore, we suggest evaluating the user satisfaction while interacting with the intervention. This definition of satisfaction should not mistakenly be interpreted as discussed in the goal setting theory (Locke & Latham, 2002). Thankfully, suitable measures in this regard have already been created. We suggest the use of a Human Computer Interaction Satisfaction Questionnaires [source], to see how satisfied the users are with the fully working application. This questionnaire can be administered halfway the study, as the users have become familiar with the interface.

Self-efficacy and competence

Important evaluation questions on an intervention level are: are they confident in their creation? Are young adults, who use the intervention, able to create healthy budgets? These questions relate to their self-efficacy and their competence (psychological capabilities) (Michie et al., 2014) respectively. Self-efficacy is a strong moderator from the goal setting theory; therefore, the first question is to check if the mechanism works as intended. The second question is to control if the intervention has the desired effect.

Self-efficacy is an indicator as much as an outcome measure in this case. Although the skill in budgeting can be improved overtime, which is in line with Bartholomew's (Bartholomew & Mullen, 2011) statement that interventions require time to develop, an increase in self-efficacy could be measured in a relatively short timeframe. An indicator of the ability to create healthy budgets is the quality of the realized budgets.

To answer the evaluation questions, we propose to administer self-efficacy questionnaires before the implementation of the intervention, halfway of the study and at the end of the study. Even though it requires time to develop a skill through an intervention (Bartholomew & Mullen, 2011), the self-efficacy could be measured in a relatively short timeframe. The self-efficacy questionnaire that will be used should be tailored to our case according to Bandura's self-efficacy guide (Bandura, 2006). Furthermore, having the quality of budgets evaluated by researchers compared to heuristics of a financial expert before the start of the intervention, halfway and after the intervention could be a valid measure. A within subject comparison for each participant could show if their capabilities improved.

Self-efficacy is a strong determinant from the GST, however if they are very confident but create faulty budgets, we do not improve their financial mismanagement. Therefore we recommended is to evaluate with both measures.

Commitment

A final important evaluation question is: are the young adults who use the intervention committed to act according to the budget goals they set? Firstly, users should create personal budgets to get a better grip on their financial behavior. However, if they do not stick to the created budget, these efforts are in vain. Hence the importance of the above-mentioned question. The determinant which relates most from the goal-setting theory (Locke & Latham, 2002) is goal commitment, which was also the base of many design decisions.

Clear indicators of the commitment of users can be found in the intervention. Meeting weekly and monthly targets is a clear indication of their commitment. Substantially not meeting the targets shows a lack thereof. Active reviewing of progress or the budget could be indicators, although likely less valid. Lastly, related to the determinant but a less clear indicator can be the time spent or amount of, self-set budget goals.

We propose to use data from the app as measures for the evaluation. Easily extractable data types from the intervention that can be used as measures are if users meet their weekly and monthly budget goals. Since this data is gathered by usage, it could be seen as a direct measure. Measures for self-reported goal commitment already exist (Hollenbeck, Klein, O'Leary & Wright (1989), which, if revised and deemed

applicable, could be used alongside the above-mentioned measures for more validity.

THE PROTOTYPE AND EVALUATION

Besides the proposition of an evaluation plan for the suggested budgeting application, a first step was already made. For this evaluation we focused on a single design element: "the educative tips". Related to the second evaluation goal described in section 3, these tips were designed to increase the determinant self-efficacy and were deemed as evaluable in the set time frame.

We were aware that finance is a private topic, therefore all participants were asked to use percentages of their income instead of real amounts of money in euro's. Besides, the participants were asked to fill in a consent form stating that no personal information will be shared beyond the research team (appendix II).

We set out to create an efficacy questionnaire by the guidelines of Bandura (Bandura, 2006). First, we conducted three informal open interviews to find possible hurdles for our at-risk population to perform the target behavior, making and keeping a budget. Afterwards we created a self-efficacy questionnaire with elements we extracted from the conversations (appendix III). The questionnaire items and the setup of the study were evaluated in a pilot with two participants.

The pilot study existed of a between-subject-study where out the control group filled in the questionnaire, then made a budget and filled in the questionnaire again. The experimental group had the same procedure, except educative tips were included before they were asked to make their budget. These tips were derived from (O'Shea, B & Schwahn, 2019, Cruze, 2019), see an example in figure X. We hypothesized that making a budget would increase the self-efficacy in and of itself, hence the two groups. We found however, that without access to one's financial history and expenses, it was very hard to create a budget. This had a evident negative impact on the self-efficacy, therefore making a budget was excluded from the formal experiment.

For the formal experiment we chose to have a feasible total amount of 10 participants. Every single participant filled in a self-efficacy questionnaire to generate a baseline. The filled in questionnaires from the control group had no other purpose then that those were used to determine whether individu-

als from the experimental group did not have abnormal self-efficacies at start. Then only the 5 participants in the experimental group, got to read the educational tips. After shortly studying those they finally filled in the self-efficacy questionnaire again. We then compared their second questionnaire with the baseline.

We acknowledge this is a very limited setup and it is hard to create strong conclusions. Nonetheless, we found the following: the initial average self-efficacy from the experiment group (59,9) matched with the average self-efficacy from the control group (57,7). Therefore, the average self-efficacy of the experiment group after education through tips (60,7) could provide insightful outcomes. Unfortunately, the increase in self-efficacy was very minimal. Reasonable argumentations could be the small number of participants, a random sample of participants who already had a reasonable self-efficacy in making and keeping a budget (all participants study at the Technical University of Eindhoven), and the quality of the tips possibly did not resonate sufficiently with this group of participants. However, the self-efficacy questionnaire (appendix III) itself provided divergent answers with an average deviation per item of 53,45 on a 0 to 100 scale. This conceivably demonstrate that the questionnaire had been developed properly and can be reused.

So far, a feasible first step in evaluating the proposed concept, testing a single design element (educational tips), has been made. Future steps in evaluating this specific determinant (self-efficacy and competence) we recommend to apply the established questionnaire to all other design elements developed to increase self-efficacy. Ethical considerations

ETHICAL CONSIDERATIONS

If our intervention was to be implemented, we believe many ethical considerations must be made. Important stakeholders that we have identified are the intervention users, their friends and parents, the banks they use, the development company of the intervention and the government.

The last four operate in a delicate ecosystem with the user regarding legislation, privacy, transparency and security. In our money driven society, finance is a sensitive topic and having your data leaked to the public is often seen as very undesirable. Therefore, governments will have to create strict legislation regarding the handling of financial data by third

parties, which helps to assign accountability to the involved parties. Preferably, the amount of parties that handles the data is minimized. If a bank was to publish the app, the data would have to be transferred between fewer parties which is preferable. Besides, that would give them a competitor's advantage, playing in on their desire to make profits. The app would be less available for the general public, however.

It is important that users actively consent to share their data, as well as that it is possible to retract their agreement at any time, to ensure the users stay autonomous and keep power over their data. Users would have to give quite some trust to these corporations and sacrifice some of their privacy, which, in current day and age, is of high value. This creates a potential conflict between interest and values, as well as a significant hurdle for the implementation of this intervention. Whoever would publish the app or handle its data would be required to guarantee security of the data and provide transparency about who is able to access the data and where it goes.

In a more social aspect, we see relationships between the users, their parents, partner and friend. Parents often provide support for their children if they struggle to make ends meet, however from the age of 18, parents are no longer financially responsible for their children (Juridisch loket). If a user lives together with their partner, it is likely they share rent and fixed expenses. If either conducts serious financial mismanagement, they could both be affected by for example debt collection. However, this can be considered as an edge case. The partner and friends are likely to (unintentionally) exert high social pressure on the user's expenses. A serious conflict of values, however, is unlikely.

We see the following statements as of most importance:

- It is important users give active consent to share their financial data and be able to cancel the agreement at any moment.
- Great effort has to be made to protect the privacy of the user.
- A clear division of accountability should be created in case of security breaches.

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APPENDIX | BEHAVIOUR CHANGE TECHNIQUE TAXONOMY

No.	Label	Definition	Examples
2.2	Feedback on behavior	Monitor and provide informative or evaluative feedback on performance of the behavior	Inform the person of how many steps they walked each day(as recorded on a pedometer) or how many calories they ate each day(based on a food consumption questionnaire).
2.3	Self-monitoring of a behavior	Establish a method for the person to monitor and record their behavior(s) as part of a behavior change strategy	Ask the person to record daily, in a diary, whether they have brushed their teeth for a least two minutes before going to bed.
2.4	Self-monitoring of outcome(s) of behavior	Establish a method for the person to monitor and record the outcome of their behavior as part of a behavior change strategy	Ask the person to weigh themselves at the end of each day, over a two week period, and record their daily weight on a graph to increase exercise behaviors.
2.7	Feedback on outcome(s) of behavior	Monitor and provide feedback on the outcome of the performance of the behavior	Inform the person of how much weight they have lost following the implementation of a new exercise regime.
4.1	Instruction on how to perform a behavior	Advise or agree on how to perform the behavior	Advise the person how to put a condom on a model of a penis correctly.
5.1	Information about health consequences	Provide information about health consequences of performing the behavior.	Explain that not finishing a course of antibiotics can increase susceptibility to future infection. Presen the likelihood of contracting a sexually transmitted infection following unprotected sexual behavior.
5.2	Salience of consequences	Use methods specifically designed to emphasise the consequences of performing the behavior with the aim of making them more memorable(goes beyond informing about consequences)	Produce cigarette packets showing pictures of health consequences e.g. diseased lungs, to highlight the dangers of continuing to smoke
7.1	Prompts/cues	Introduce or define environmental or social stimulus with the purpose of prompting or cueing th behavior. The prompt or cue would normally occur at the time or place of performance	Put a sticker on the bathroom mirror to remind people to brush their teeth.
15.3	Focus on Past Success	Advise to think about or list previous successes in performing behavior	Advise to describe or list the occasions on which the person had ordered a non-alcoholic drink in a bar

experience increased fiscal responsibility. Therefore, the findings of this test should inform the persuasive technology implemented within a designed application. This application should support the target population in regard to making a budget and keeping to it.

As a participant of this test you provide information for research executed for the course DDM110 at the faculty of Industrial Design, at the Technical University of Eindhoven. You are asked to fill in a questionnaire.

Questionnaire outcomes will be used for educative purposes and other provided information can be quoted in research outputs.

You can refuse to answer questions and you can withdraw from the study at any time, without having to give a reason.

Please tick the appropriate boxes

Taking part in the study

I have read and understood the study information, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves a survey questionnaire.

Yes

No

☐

☐

☐

☐

☐

Use of the information in the study

I understand that information I provide will be used for educative purposes. Information would not be used for publications, websites, video channels, etc.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my replies can be quoted in research outputs.

Future use and reuse of the information by others

The questionnaire outcomes that I provide will be archived so it can be used for future research and learning. Due to regulations data will be stored for a maximum of five years on a local hard drive.

Signatures

Name of participant

Signature

Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Researcher name

Signature

Date

Study contact details for further information:

Inventory of Fiscal Responsibility

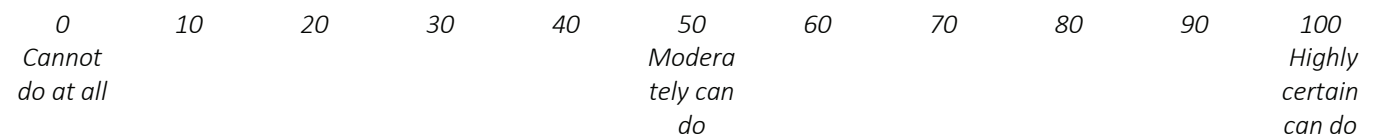
| participant ____

This survey is intended to get a fundamental insight on how young adults feel about making and keeping a budget on a regular basis. This is relevant since the researchers aim to find key elements for the design of a system to support users to manage this behaviour.

Practice rating

To familiarize yourself with the rating form, please complete the practice item first. If you were asked to resist unhealthy snacks **right now**, how certain are you that you can in situations as described below?

Rate your degree of confidence by recording a number from 0 to 100 in 10-unit intervals using the scale given in the example below:



Resist unhealthy snacks	Confidence (0-100)
When I feel tired	_____
When it is offered	_____
When everybody is eating a snack	_____

Formal rating

A number of situations are described below that can make it hard to routinize making and keeping a budget. We define making a budget as writing down your incomes and expenses to manage your financial health. Please rate in each of the blanks in the column how certain you are that you can get yourself to make a healthy and feasible monthly budget and revise this on a regular basis (once a week).

Rate your degree of confidence by recording a number from 0 to 100 in 10-unit intervals using the scale given below:


0	10	20	30	40	50	60	70	80	90	100
Cannot do at all					Moderately can do					Highly certain can do

Confidence
(0-100)

I can make a budget	_____
I can keep a budget	_____
I can plan a weekly session to manage my budget	_____
I can monitor my purchases	_____
When I am feeling tired	_____
When I am feeling under pressure	_____
When I am very busy	_____
When I have too much other things to do at home	_____
When there are other interesting things to do	_____
When I am not at home	_____
When I am not alone	_____
When I am feeling depressed	_____
When I am feeling anxious	_____
When I have no mental energy	_____
When I did not reach my earlier budget-keeping goals	_____
When it took too much time the last time	_____
When it was too complex/impractical to use the last time	_____
When I just did a big purchase	_____
When I just did an impulsive purchase	_____
When I just earned my salary	_____
When I am tight in my budget	_____
When my friend/relative asks me to spend money on something	_____

Tip:

You stayed under your budgeted food expenses for three months in a row. Way to go! Take that into account when you adjust next month's budget. You could put some of that money to places where you'd like to spend some more.



Tip:

Seems like you have some trouble with staying on budget with your food expenses. Try buying cheaper brands or items in sale.



Tip:

Seems like you have some trouble with staying on budget with your food expenses. Try buying cheaper brands or items in sale.



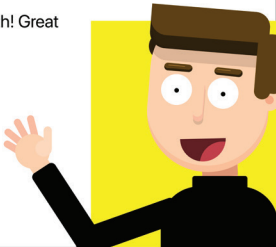

Tip:

A healthy budget has some room for unexpected expenses. If you don't have to spend that money, you can save some extra or treat yourself!




Congragulations!

You have stayed in your budget this month! Great job, keep it up!



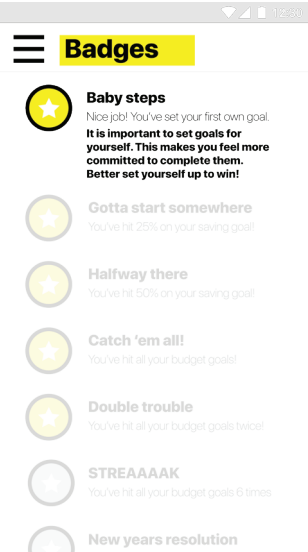
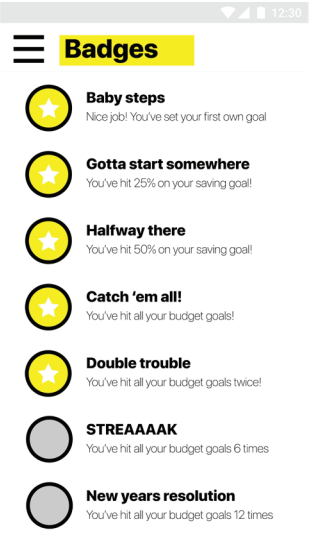
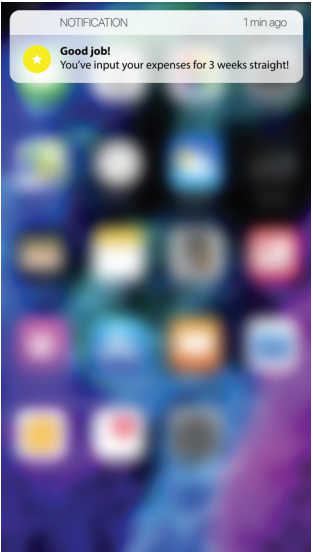
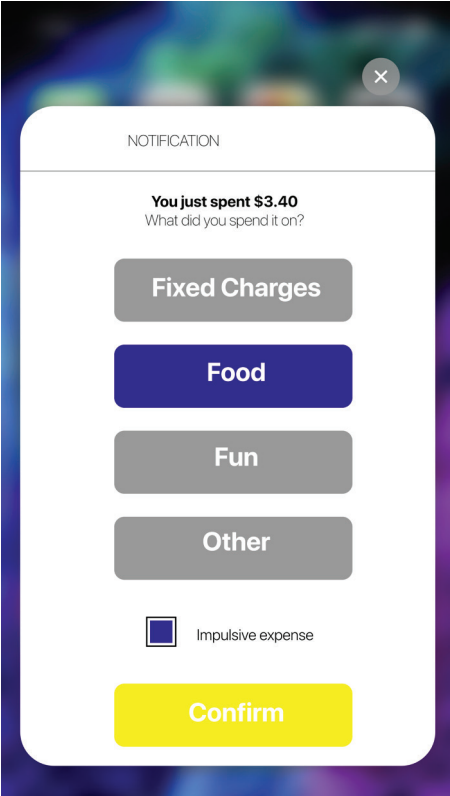
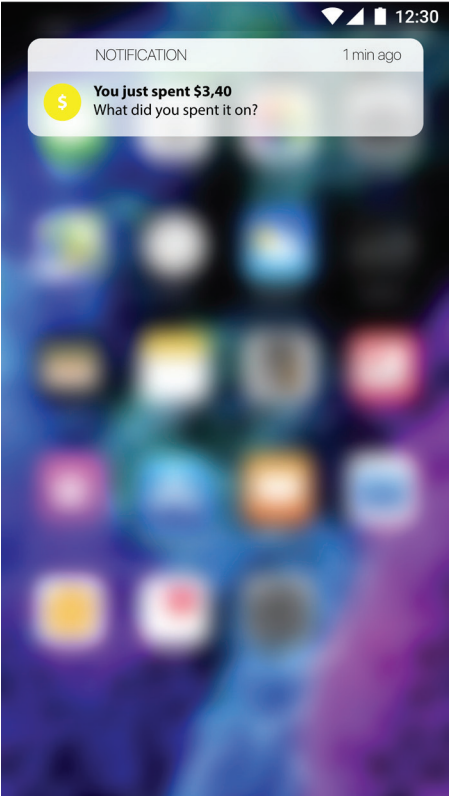
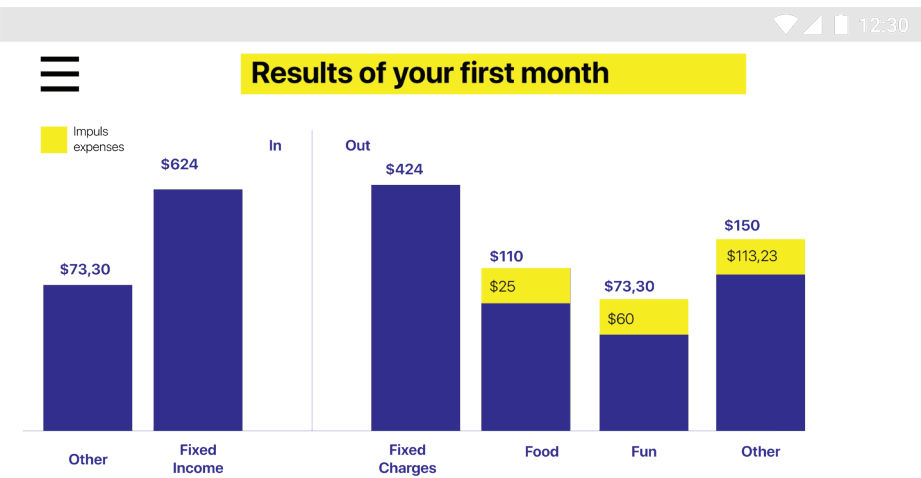
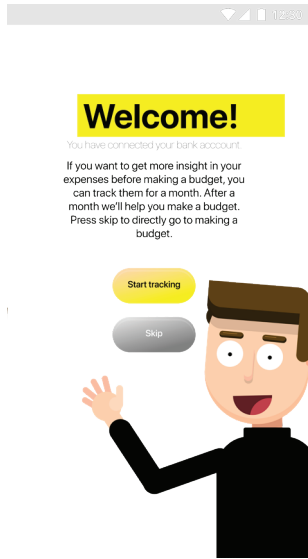
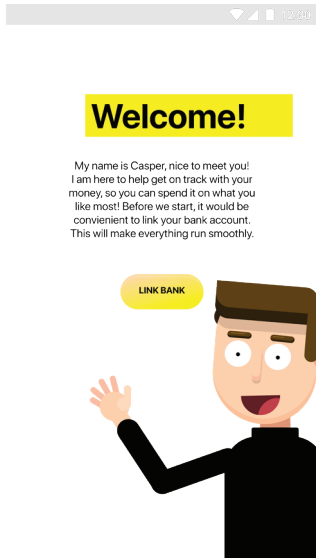
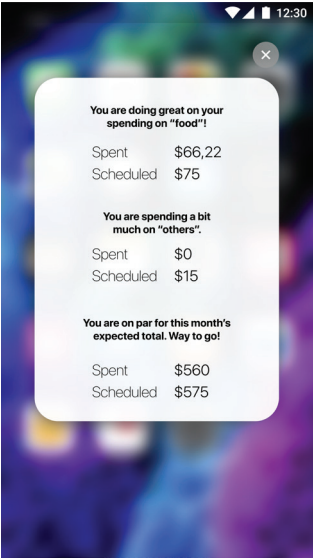
Tip:

Seems like you have some trouble with staying on budget with your food expenses. Try cooking for multiple days, or pick the cheaper options while shopping.

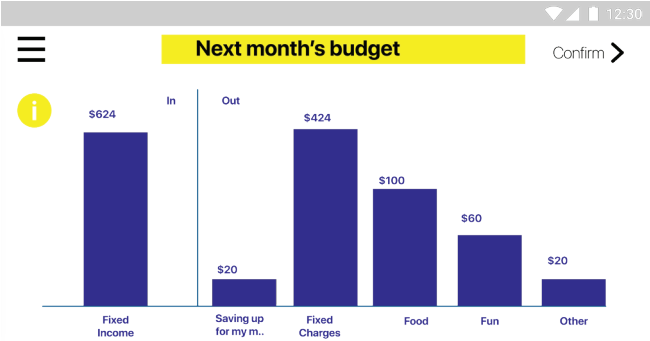
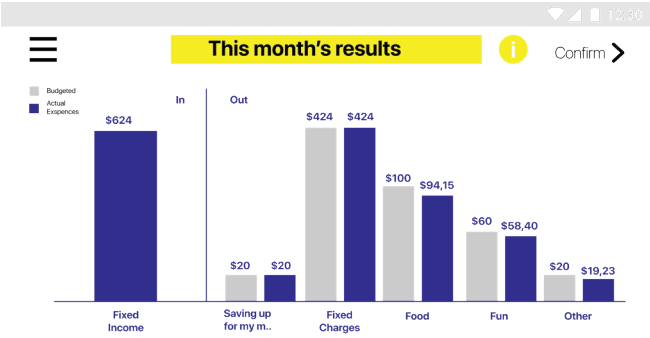
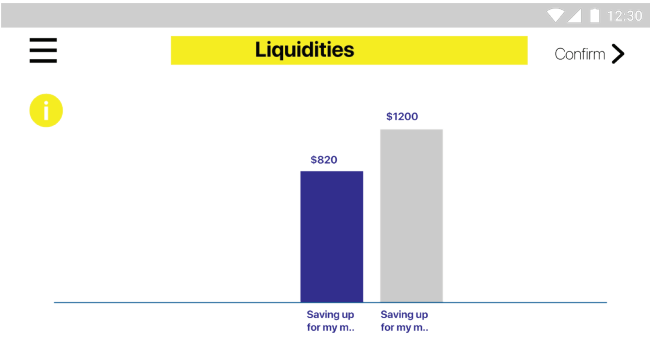




APPENDIX IV ALL DESIGNED MOCKUPS



APPENDIX IV ALL DESIGNED MOCKUPS



Mobile app mockup showing a screen titled "What do you find important or want to achieve?". The screen has a yellow header bar with the title "What do you find important or want to achieve?". The main content area contains a paragraph of text and two yellow buttons: "I would like to be able to spend more on..." and "I want to safe for..".

What do you find important or want to achieve?

It is helpful to set goals for yourself. Do you want to safe up for that holliday, or have some more money to do fun things? We will add this to your budget, but don't worry, you can always change it later.

I would like to be able to spend more on...

I want to safe for..

Mobile app mockup showing a screen titled "I want to save for...". The screen has a yellow header bar with the title "I want to save for...". The main content area contains a text input field with the text "My motor bike drivers licence|". Below the input field is a virtual keyboard.

I want to save for...

My motor bike drivers licence|

Mobile app mockup showing a screen titled "I want to save for". The screen has a yellow header bar with the title "I want to save for". The main content area contains a text input field with the text "My motor bike drivers licence". Below the input field are two yellow buttons: "Edit" and "Confirm".

I want to save for

My motor bike drivers licence

Edit

Confirm