Erasmus School of Economics

Thesis

To obtain the academic degree of
Master of Science in Economics & Business
(Major in Marketing)

What Drives the Adoption of Mobile Health Applications?

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Table of Contents

I. List of Figures and Tables

ABSTRACT

The provision of safe and affordable health care to citizens has become one of the most challenging tasks for modern countries. Health care costs currently grow faster than GDPs and will in the long run consume an unsustainable portion of developed nation's wealth. Recent developments in mobile technology fuelled the adoption of mobile devices, such as smart phones and tablets. Consequently, "apps", small programs for these devices, experienced a boom and became a real trend. These small programs opened various new possibilities for companies and governments to communicate with their users. Now, people are able to receive, process and send information virtually anytime, anywhere. This development has the potential to change health care and the way it is delivered: Health applications are the programs for mobile devices called, which can fulfil various purposes, such as remote health monitoring. Due to the novelty of this technology, little research has been done in this field. There is a heated debate on what drives the adoption of mobile apps. Is it driven by consumer trust on the brand behind the launch? Which role does the consistency between the mother brand and the application focus play? Does a marketing campaign boost adoption? How important are user and expert reviews for the success of an app? This thesis aims to contribute to the discussion, by researching the drivers of adoption of mobile health application and further exploring consumers' willingness to pay for such services. A 2x2x2x2 survey experiment was performed to examine the roles of consumer trust, brand consistency, marketing exposure, user feedback and doctor recommendations on the intention to use and willingness to pay for mobile health applications. The results suggest, that trust plays an important role in the adoption process and acts as a mediator. User feedback and doctor recommendations have positive influence on intention to use and willingness to pay. Brand consistency, on the other hand, only has a positive effect on the intentions to use. Surprisingly, marketing exposure has a negative effect on the mediator and consequently on the dependent variables. These finding, however, might be caused by research design and will be discussed in more detail.

1. Introduction

In this chapter, an overview over health care systems and the app market in general will be given. Thereafter, the managerial and academic contribution of the research will be discussed. Finally, the structure of the remainder of this thesis will be presented.

1.1 Problem Statement: An unsustainable healthcare- system

For many countries, the delivery of safe and affordable healthcare to their citizens requires a large part of the national budgets. An analysis of WHO national health accounts estimated, that global annual spend on healthcare would reach about USD 6 trillion by 2011. Healthcare costs of OECD countries in the last 50 years have outpaced their GDP growth by 2 percent points a year and this trend is believed to continue. Therefore, health care is consuming an ever growing and in the long-term unsustainable portion of developed nations wealth (Moss et al., 2010). The situation is drastic: Within the next two decades, larger developed economies could end up spending around 15% of their GDP on health care. Without significant changes, health care spending in OECD countries would reach 30% of GDP by 2070 and in the US already by 2030.

Projected healthcare spend

Percent of GDP

OECD countries	2005	2030	2050	2070
US	15.3	24.9	36.7	65.6
Switzerland	11.6	18.8	27.8	49.8
France	11.1	18.0	26.6	47.6
Germany	10.7	17.4	25.6	45.9
Greece	10.1	16.4	24.2	43.3
Canada	9.8	15.9	23.5	42.0
Netherlands	9.2	14.9	22.0	39.5
Denmark	9.1	14.8	21.8	39.0
Italy	8.9	14.5	21.3	38.2
UK	8.3	13.5	19.9	35.6
Turkey	7.6	12.3	18.2	32.6
Mexico	6.4	10.4	15.3	27.5

<10%
10 - 20%
20 - 30%
> 30%

Figure 1: Health care spend based on Moss et al. (2010), p. 4

However, health care challenges are not restricted to developed countries. Many emerging countries have difficulties to deliver health care for a broad audience and face challenges in providing certain quality and safety standards (Moss et al., 2010).

The general situation shows, that the health sector is in need for urgent and drastic changes. One possible way to overcome this crisis is to make healthcare systems more innovative and inventive in the way they deliver services. Other sectors like banking and telecommunication have heavily invested in IT to reinvent their services. The health care sector could follow this example and adopt new technologies and change the way they deliver their service. In a time, where a customer can access his bank services form virtually anywhere anytime, the question arises if a similar accessibility could also be possible for the medical sector.

Innovations like mHealth have the potential to make a difference. The term mHealth stands for the delivery of healthcare services via mobile communication devices. When talking about mHealth, the term eHeatlh also often appears. Even though there is no official definition of these terms, their general meaning can be explained quite simply: mHealth is primarily focused on providing mobile healthcare and is therefore relying on mobile technologies such as mobile phones, smart phones and tablets. eHealth is the necessary “backbone” of mHealth: It handles the information-exchange between the customer’s mobile end device and the medical network. It can therefore be seen as technology that supports the functions and delivery of mHealth.
Some examples for already existing mHealth realizations are:

- SMS alerts that remind patients to take their pills
- Remote health monitoring (RHM): mobile devices that track medical conditions (e.g. Blood pressure, blood sugar, weight)
- Remote diagnosis and treatment: Often used in rural areas where access to doctors might be strongly limited

The potential of mHealth seems to be limitless: nutrition control, sport support, blood pressure, measure of stress levels, simplified appointment systems, increased patient involvement, drug controls, graphical representations and electronic vaccination records only to name a few.

According to Moss et al. (2010) "mobile" is currently the most widespread communication infrastructure in the world. Consequently, mHealth has the potential to make a significant change in health care delivery and costs. Moss et al. (2010) also provide examples, how mHealth could change health care services:

From traditional health care…	…to a new world paradigm
Patient visits the physician or the ER, taking time off from work when he/she feels serious symptoms	Patient calls caregiver at his/her convenience any time of day/week as soon as symptoms begin
Physician interviews patient in person and conducts a typical hands-on examination	Physician speaks to patient over phone, relying also on data from biometric sensors (m-stethoscope, smart phone- based ultrasound, etc.)
Physician prescribes medicine and hopes patient takes it at prescribed times	SMS reminders ensure that patient takes medicine as prescribed; can report side effects, etc. in real time
Patient gets well and goes back to potentially unhealthy lifestyle	Patient can be monitored remotely and advised if conditions worsen or if lifestyle elements negatively impact the situation
Chronic shortage of (specialized) medical talent	Patient can access global medical expertise in a connected world

Table 1: New world paradigm based on Moss et. al. (2010)

A study conducted by McKinsey in 2009 about consumer interest levels and willingness to pay for a remote monitoring solution (including: SMS medication reminders, remote medical advice, phone-prompted drug delivery, and health watch) showed, that interest and willingness to pay vary globally. However, the study also revealed, that there is interest in this service in both, emerging and developed markets. Further, based on the results of the studies, McKinsey estimated a market potential of up to USD 30 to 35 billion within OECD and BRIC countries.

In summary, mHealth has the potential to make a necessary change in global health care systems, being beneficial for both, patients and governments. For the patients quality of delivered health care can be enhanced, making it easier to access and use medical services. For governments, high-level health care comes at lower costs, due to higher efficiency. Further, mHealth cannot only help to deal with diseases, but also offers various tools to help people to prevent diseases before they occur.

1.2 Research Area – A novel market: mHealth applications

The amount of mobile phone users is growing year by year. This trend does not only cover the younger generation, as one could expect, but also older generations started to adopt mobile phones. According to Statista (2013), every generation in the US has a rather high mobile phone penetration, with the “golden generation”, representing the oldest generation in the US, having the lowest penetration of “only” 85%. Even though, the mobile phone penetration is higher for younger generations, reaching the peak of 97% for the “generation Y”, it can be said that mobile phone usage is common among all age categories.

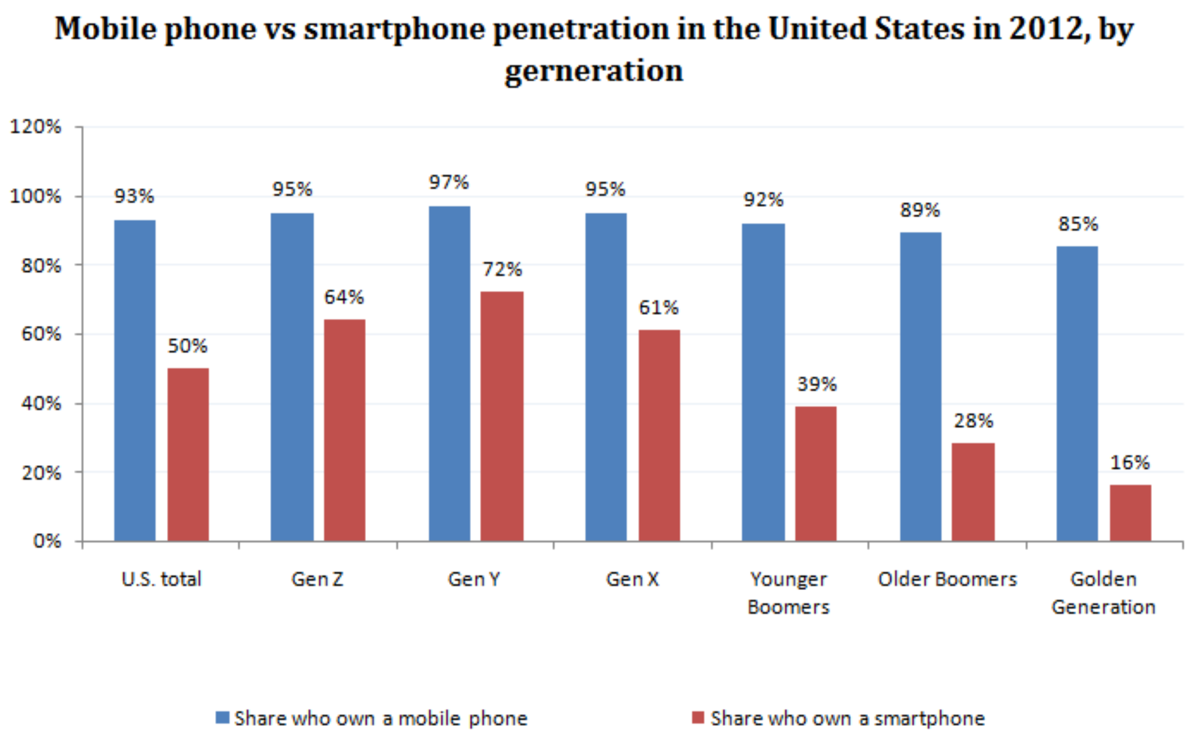


Figure 2: Smart and mobile phone penetration in the US, based on Statista 2013

The release of the first IPhone from Apple in 2007 was a turning point for the mobile phone market. With the IPhone, Apple launched the very first smart phone with broad commercial success. Even though the IPhone was by far not the first smart phone on the market, it became the norm for a new generation of smart phones. Every smart phone nowadays, covers at least the features of the first IPhone, including but not limited to cameras, touch screens, Wi-Fi and other forms of internet access, mobile mailing and the possibility to install and use small programs, called apps.

After the introduction, many mobile phone manufactures followed the example of Apple and launched their own smart phones. Some companies, however, refused to adapt to this new trend and suffered heavy losses in market share, showing the importance that modern smart phones have gained in only a few years. Even though smart phone penetration has risen fast since 2007, they are still not as widespread as mobile phones. Especially in rural and semi-urban areas “standard” mobile phones are often more common as smart phones, due to a lack of broadband availability and net quality. Despite obstacles like that, smart phone have become increasingly popular. In 2010, for example, already 63 million people used smart phones in the United States, which accounts for approximately 20% of US total population. The following graph shows the amount of mobile phone users who use a smart phone in the US.

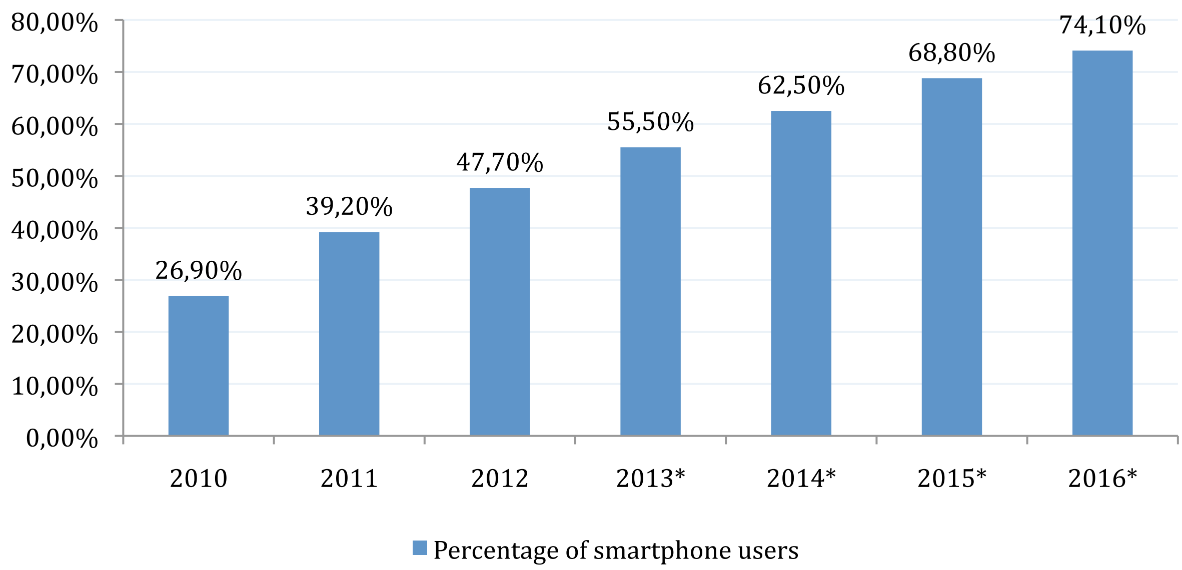


Figure 3: Smart phone penetration among mobile phone users, based on Statista, 2013

Together with the IPhone, Apple launched iTunes and the Apple App Store, which enabled user to download and copy content to their smart phone. iTunes covered a lot of content, such as music, pictures, backups and the App Store the already mentioned apps. Apps rapidly became popular since they were perceived as very innovative and useful and could cover literally any topic. The development of the expression "There is an app for that" highlights the general believe, that there is an app for any topic. The amount of apps available has surged since the launch of the App Store. The figure below shows the number of apps available. According to 148apps.biz, there are currently (March, 2013) 827716 active apps available for download.

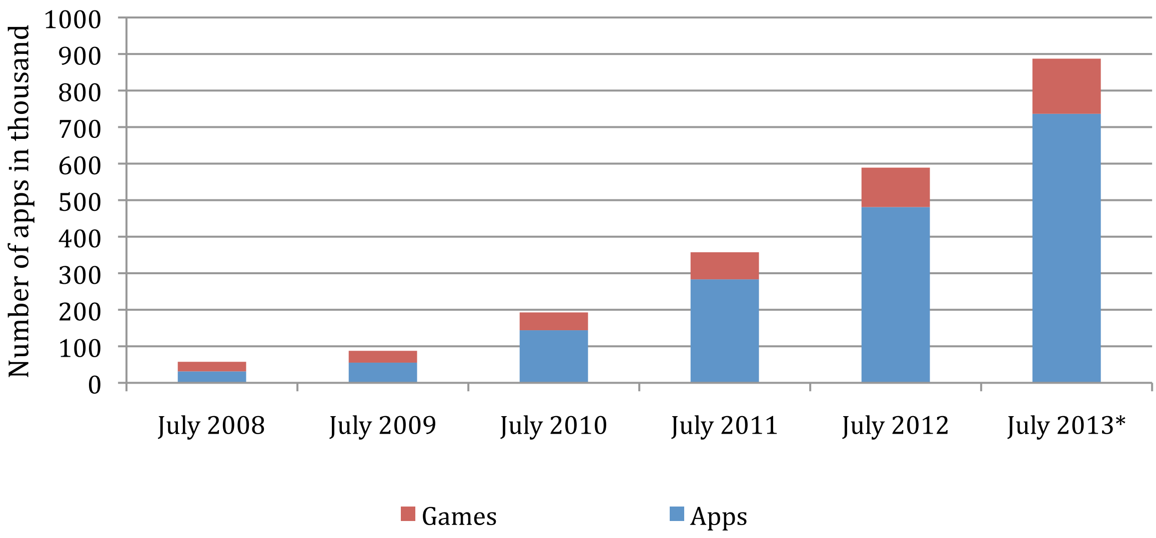


Figure 4: Number of available apps in the App Store, based on Statista 2013

As mentioned earlier, apps are small programs, available for smart phones and other mobile devices, such as tablets, which can easily be installed and deleted. They can be seen as a mix of a homepage and software, since they are in general not very complex and often include contents that would normally be found on websites. For example, a user of the "Billa" app (Billa is a food retailer in central Europe) is able to check where the next store is located, when it is opened and which special offers are currently available. The same information could be found on the company's homepage. But, apps often include additional functions, since they are able to access smart phone specific tools, such as the GPS or camera. To extend the example given, the Billa app can recommend close stores based on the GPS position of the smart phone and the camera can be used to scan product codes to get more information on products.

Stores, like Apple's App Store, are not based on phone manufacturers, but on the system-software, that the smart phone or tablet is using. Currently, there are two major operating systems: Apple's iOS and Android, which is used by brands such as Samsung. Both, Apple's iOS and Android have their own store: the App Store for IOS and the Android Store. Apps can be created and sold by anybody in the stores, as long as the apps fulfil certain norms and quality levels. In the US, the average price of an app downloaded in 2012 was USD 2,47 (statista, 2013).

Apps are organized in categories, in order to enable users to search for them more efficiently. The currently biggest category is "games", whereas the category "health" is sized only average. Even though there is no official definition of "health app", the segment is believed to be one of the fastest growing app categories. Analysts of TechNavio(2012) forecasted the global mobile health application market to grow at a CAGR of 40,4% over the period 2011-1015, opening a lot of opportunities for the development of new and innovative apps. The category "health app" can be split in sub categories such as "health, wellness& fitness" and "medical". Depending on the sub category, the relating apps can cover many different areas. Examples for "health, wellness& fitness" apps are programs that support the user in areas like sport, nutrition or smoking, whereas "medical" apps often monitor conditions, such as blood pressure, pulse or blood sugar levels and provide access to medical information. When analyzing the apps within the category, it can be stated, that apps in the "health, wellness& fitness" category, seem to have great potential in the prevention of diseases, whereas "medical" applications, seem to be used when the health issue has already occurred.

The importance of mHealth has already been pointed out in chapter 1.2. Health applications have huge potential to contribute to mHealth, especially in developed countries, where the penetration of mobile end devices, such as smart phones and tablets, is relatively high. Health applications are particularly suitable for remote health monitoring due to their advanced technology, which alone could save USD 200 billion world wide, according to Moss et. al. (2010). Together with other aspects of mHealth, such as disease prevention, health applications could save even bigger amounts of money and consequently take pressure of national budgets.

1.3 Research Question

Based on the need for changes in the healthcare sector, the novelty of mobile application and the possibilities this new technology provides, the author chose to contribute to the following research question:

Which factors drive the adoption of mobile health applications and what is the willingness to pay for such services?

Finding the drivers of adoption of mHealth apps can help to understand, why and when mHealth apps are successful, since acceptance is the first step towards success. The proposed research shall help to understand, who the target groups of mHealth apps are and how their level of acceptance is influenced by different variables.

1.4 Relevance

In this sub-chapter, the academic and managerial contributions of the research are presented.

1.4.1 Academic contribution

Looking at the published research on mobile technology and the adoption of mobile services, a lot of literature can be found about topics like mobile banking services, games and mobile Internet in general. This is not surprising, given the great opportunities these services are offering. However, compared to these topics, research in the field of mobile healthcare applications seems to be a little bit left behind. Only few articles can be found about the adoption in the mobile health environment, especially in the field of applications. Most published articles about health adoption focus on telemedicine or eHealth in general, but only very few on actual applications. Given the tremendous importance of health care on people's lives, combined with the great opportunities that mobile health care offers, research in this field is highly attractive. Further, given the fact that very little research in this area has been published, this paper has the potential to contribute to science in a field where research is needed.

1.4.2 Managerial contribution

The research in this thesis is also managerial relevant. The result will help to understand the framework that adoption of mobile health services is based on. Furthermore, it will show which role brands and other trust enhancing tools, play in the adoption process. For example, is it easier to launch a mHealth application for a company that is already active in the health sector? How can a company that has not build a brand name so far increase customer trust? Is it even necessary to do so? Another important insight that decision makers get is what the potential target market is and how it differs among demographic factors such as age. Moreover, in ecommerce it is common to strongly rely on recommendation systems, since customers perceive them as a useful and reliable tools (e.g. Smith et.al., 2011; Pathak et. al., 2010). Therefore, the research will also examine the effects of recommendation systems. Further the research will present possible benefits of marketing campaigns to stimulate consumer trust and consequently adoption. The main questions, that a decision maker should be able to answer after reading this thesis, are: What can I do to increase consumer trust for my product? Which tools are effective and how does trust affect pricing and adoption?

1.5 Structure of the Thesis

The remainder of the thesis will be structured as follows: In the next chapter, the conceptual framework will be presented and explained. Previous literature on each variable will be analyzed and based on the findings hypotheses will be developed. In chapter 3, the hypotheses will be summarized. Chapter 4 will present the methodology used for the research. In chapter 5 the data analysis is performed and the results presented. The following chapter include the discussion of the results and the final conclusion, including implications and limitation.

2. Theory and Hypotheses

In this chapter the conceptual framework of the thesis will be presented, followed by the discussion of relevant literature for each variable. Finally, hypotheses will be developed.

2.1 Conceptual Framework & Literature Review

The basis for the conceptual framework is the Technology Acceptance Model from Davis (1989). As literature points out (e.g. Venkatesh and Davis, 2000; Legris et al., 2003; Lu et al., 2003) the model has evolved over time and was often modified to show effects of different variables on the adoption process. The Unified Theory of Acceptance and Use of Technology (UTAUT) model, the Technology Acceptance Model 2 (TAM2) and the Technology Acceptance Model 3 (TAM3) are prominent examples for modified Technology Acceptance Models. For this research, four variables were chosen (brand consistency; marketing exposure; doctor recommendation user feedback) to examine their effects on the acceptance and willingness to pay for mobile health applications, mediated by trust.

The variable “behavioural intention to use”, based on the TAM of Davis (1989), was called “intention to use”, as it is also called in the TAM2. “Actual system use” or “usage behaviour” could not be measured due to the chosen research design. However, instead the consumers’ willingness to pay was chosen as an additional dependent variable. Even though willingness to pay is still an intention or self-reported measure, it reflects something that is much closer to actual usage, since it can be seen as the subjective value that a person assigns to an offered good or service. Consequently, willingness to pay does not only ask for the general willingness to use a product or service, it requires the respondent to make a trade off between the price to pay and the benefit gained by using the technology. The variable “perceived ease of use” was not measured, since it was not relevant for this research for two reasons: First, apps are, as already mentioned in the introduction, wide-spread and quite simple programs. Therefore most people are already used to them. Second, an experimental setting was used, in which the perceived ease of use was kept constant so that there would not have been any differences between the manipulations. The variable “perceived usefulness” was replaced by “trust”.

In the experiment respondents had to rate applications with the same function. As a result the perceived usefulness of the applications would not have varied. Instead, it is hypothesized, that the role of usefulness is taken over by trust in the application. Trust is believed to be an important factor for both, the health related sector and the online world and therefore a potential driver of adoption.

Many authors have already pointed out the immense importance of trust in the online environment and have dedicated research to this field (e.g. Lim et. al., 2006; Kim and Benbasat, 2003; Lee and Turban, 2001, Jarvenpaa et. al., 2000; Smith et. al., 2005). There is a general belief that due to the absence of physical contact and the inability to feel and touch products, a higher level of trust is necessary in the online world, than in the offline environment (e.g. Smith et al., 2005; Häubl and Trifts, 2000). According to Lee and Turban (2001) lack of trust is one of the most cited reasons for customers not to shop online. Therefore it is expected, that measures, such as recommendations, user feedback, branding and marketing exposure could positively influence consumer trust, which in turn could lead to higher acceptance levels and adoption. Further trust is also expected to have a positive impact on the consumer's willingness to pay, since a trustworthy service should add more value for the customer, than a risky one. Pathak et. al. (2010) for example found evidence, that recommendations have a positive effect on prices in the online environment.

Moreover, the chosen independent variables have some similarities with modified Technology Acceptance Models. In the Unified Theory of Acceptance and Use of Technology (UTAUT), the construct "social influence" is used. It stands for the degree to which an individual perceives that important other believe that he or she should use the new system. This construct is similar to the variables doctor recommendation and user feedback, examined in this thesis. Further, in the TAM2 the variable "subjective norm" is used, which also shows similarities to user feedback.

Brand consistency and marketing exposure are two external variables that can affect the image and perceived quality of an application. The image of a technology, relevant for the TAM2 and TAM3, is therefore related to them, since the variables can influence and build the perceived image. Moreover, brand consistency is linked to job relevance (TAM2; TAM3). Job relevance stands for the individual's perception regarding the degree to which a system is relevant to his or her job. In the field of health applications, job relevant can be interpreted as how suitable a program is to fulfil its purpose. An application from a health related brand might therefore be perceived as being more capable to fulfil the user's needs. The figure below summarizes the conceptual model.

Conceptual model:

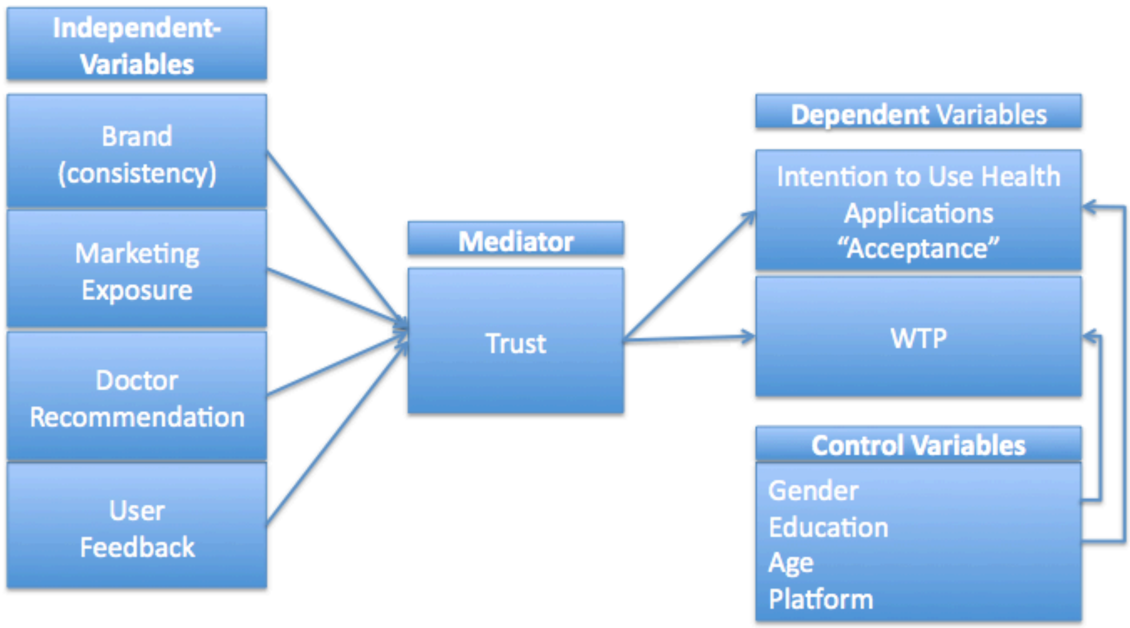


Figure 5: Conceptual model

2.2 Dependent Variables

As already pointed out in the conceptual model this research examines two dependent variables: The **acceptance** of health applications and **willingness to pay**. Previous literature and research on the variables will now be presented and discussed.

2.2.1 Acceptance of health application

Research has paid substantial attention to the acceptance and adoption of information technologies. This interest resulted in several research streams with many competing models and different sets of acceptance determinants. These models have their scientific roots in information systems, psychology and sociology (Venkatesh et. al, 2003). Some of the most prominent research models exploring user acceptance are the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behaviour, the model of PC utilization, the innovation diffusion theory and the social cognitive theory.

Even though, the researched drivers of adoption vary between the research streams, intention to use or actual usage is always the key dependent variable. According to Venkatesh et. al (2003) the basic concept underlying user acceptance models is the following:

Figure 6: Basic Concept underlying User Acceptance Models based on Venkatesh et al. (2003)

As can be seen in the figure, the final goal of the models is to understand and explain usage as the dependent variable. Due to research design and information availability it is not always possible to measure actual usage directly and research has to rely on the intention to use information technology instead. This, however, does not pose a major problem: "The role of intention as a predictor of behaviour (e.g. usage) is critical and has been well established in information systems and the reference disciplines." (Venkatesh et al., 2003).

For the research of this thesis, sixteen fictive apps were created, which are, of course, not really available for customers. Consequently the key dependent variable will be the intention to use the application, since it is not possible to measure the actual use of a not existing service.

2.2.2 Willingness to pay

The second dependent variable of this study is willingness to pay. Having knowledge about the willingness to pay of customers for a product plays a crucial role in many areas of marketing management, such as pricing decisions or new product development. Many different approaches to measure willingness to pay with differential conceptual foundations and methodological implications have been presented in relevant literature so far (Breidert et al. 2006).

In general, the willingness to pay denotes the maximum price a buyer is willing to pay for a given quantity of a good or service (Wertenbroch and Skiera, 2002). Willingness to pay can also be seen as the subjective value that a potential buyer assigns to an offered good or service. If a buyer is faced with a set of alternatives, he or she chooses the item, for which the subjective willingness to pay exceeds the purchase price the most. In other words, the customer chooses the product, which adds most value at the best (lowest) price (Wertenbroch and Skiera, 2002).

Choosing a fitting measurement for willingness to pay, however, is not an easy task. As the research of Breidert et al. (2006) shows, a huge variety of competing approaches and corresponding analytical techniques for measuring WTP have been added to the realm of marketing literature in the past. (e.g. Wertenbroch and Skiera, 2002) The biggest challenge in choosing the right model is to provide an incentive to customers to reveal their true WTP. Every method of measuring WTP has both, advantages and disadvantages. According to Voelckner (2006) there is no simple answer to the question which method should be used, because a customer's true WTP is an unobservable construct. All methods only represent the attempt to come as close as possible to the truth.

There is no unified framework of WTP measurements in current literature, but many researches active in the relevant field are using similar constructs: Breidert et al. (2006) for example, use a framework in which they distinguish between "revealed preference measurements", such as experiments and market data and "stated preference measurements", such as direct surveys and indirect surveys.

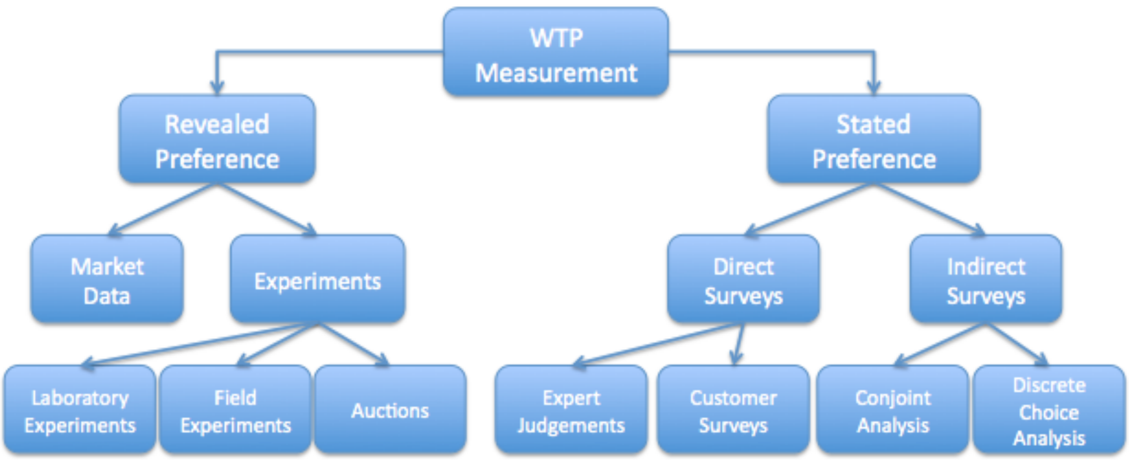


Figure 7: Classification framework of methods to measure willingness to pay based on Breidert et al. (2006)

Voelckner (2006) on the other hand, distinguishes between "real" WTP measurements and "hypothetical" ones. "Real" WTP measurements, such as auctions and the Becker, DeGroot Marschak procedure, require a real economic commitment from the respondent, whereas "hypothetical" measurements, such as contingent valuation and conjoint analysis do not have any financial consequence for the respondent. Some studies provide evidence that hypothetical WTP is higher than real WTP (e.g., Neill et al., 1994; Botelho and Pinto, 2002; Johannesson, Liljas and O'Conor, 1997; Wertenbroch and Skiera, 2002), but it is in general likely that different methods result in different WTP estimates (Voelckner, 2006). In their research, Wertenbroch and Skiera (2002) also differentiate between different measurement methods and highlight advantages and disadvantages for each, but do not use umbrella categories to structure them at a broader level.

Taken possible advantages and disadvantages of different methods into account, the author decided to measure willingness to pay for this thesis with a customer survey in a two-step approach, which will be explained in more detail in the methodology section.

2.3 Independent Variables

In the following chapters the independent variables will be discussed, the mediator presented and hypotheses developed.

2.3.1 Brand (consistency)

According to Bellman et al. (2011) marketers have developed increased interest in creating branded apps, which display a brand identity, often via the name of the app and the appearance of a brand logo or icon, throughout the user experience. One reason for the popularity of branded apps is, that they can be seen as a marketing device with a high level of user engagement and the positive impact this has on the attitude towards the mother brand (Hutton and Rodnick, 2009). Further, it can be noted, that in contrast to other forms of advertising, a branded app is often welcomed as "useful", which suggests that they may be one of the most powerful forms of advertising.

However, this point of view understands an app more as a marketing tool, rather than viewing it as an own product or service. In this research, mobile applications will be seen as an own independent service, and not just as a marketing channel. Like with any other product or service, branding mobile applications can have positive and negative effects, for both, the branding company and the customers. Launching an application as a brand extension is only favourable, if the parent brand is linked to positive feelings, thoughts, images, beliefs, perceptions or opinions. In other words: the parent brand should have positive customer-based brand equity. Customer-based brand equity is defined as the differential effect that brand knowledge has on consumer response to the marketing of that brand (Keller, 1993). It can also be understood as brand equity in terms of consumer behaviour. A brand has positive customer-based brand equity, when consumers react more favourably to a product and the way it is marketed when the brand is identified than when it is not. Consequently, a brand with positive customer-based brand equity might result in customers who are more accepting a brand extension, less sensitive to price increases and more willing to seek the brand in a new distribution channel. Contrary, a brand has negative customer-based brand equity if consumer react less favourably to marketing activity of the brand compared with an unnamed or fictitiously named version of the product (Keller et. all 2012).

Since a brand extension "borrows" the associated brand image of the parent brand, it is important, that the parent brand has positive brand equity, since it could harm the success of the brand extension otherwise. Keller et al. (2012) identified possible advantages and disadvantages of brand extensions for customers and parent brands. The most important and suitable ones for mobile health applications are listed below:

Advantages of Extensions	Disadvantages of Extensions
Aid new product acceptance	Can confuse customers
Improve brand image	Can fail and hurt parent brand
Reduce risk perceived by customers	Can dilute brand meaning
Enhance parent brand image	Lost chance of new brand development
Bring new customers to the franchise	
Permit subsequent extensions	

Table 2: Advantages and disadvantages of brand extensions

In addition, to successfully transfer associations from the parent brand to the brand extension, a certain degree of “fit” is needed. Park et al. (1991) identifies two different bases that consumer use to evaluate an extension’s “goodness of fit”. These bases are product feature similarity and brand concept consistency. If the extension “makes sense” in the mind of the consumer, associations from the parent brand are transferred more easily. If there is no fit perceived by the customer, the brand extension might confuse the customer. Consequently, the beneficial effects of a brand extension do not occur and the extension might also harm the parent brand by diluting the brand meaning. As an example, imagine that the brand “Sony”, which is known for innovative and high quality consumer electronic products, launches Sony branded diapers. Such a move would probably confuse customers since there is no “fit” and pose the question what the brand “Sony” actually stands for.

If there is a “fit” and the parent brand has positive brand equity, association, such as quality, can be transferred to the brand extension. The resulting familiarity with the brand extension reduces the risk for the customer (e.g. Keller et al., 2012). Further, transferred values from the parent brand result in a higher perceived value of the product or service by the customer (e.g Dodds et al., 1991). Both of these effects should lead to a higher intention to buy and a higher willingness to pay, since the customer receives a product with a higher subjective value at reduced risk. Doddes et al. (1991) found that a positive perceived brand name has a positive effect on perceived value, which in turn leads to a higher willingness to buy. Further, Bellman et al. (2011) stated, that users would be unlikely to download apps from unfamiliar brands and found, that branded mobile phone applications increase purchase intention.

H1: Brand consistency has a positive effect on the acceptance of mobile health applications.

Moreover, reduced risk due to familiarity and added value from the parent brand are believed to result in a higher willingness to pay.

H2: Brand consistency has a positive effect on the willingness to pay for mobile health applications.

2.3.2 Marketing Exposure

There are many different ways, how a customer can be exposed to a company's marketing. Often, when the term marketing exposure comes up, the first thought coming into mind are typical ads in TV, radio and magazines. But marketing exposure is more than that. Marketing exposure can be seen as the result of a company's effort to communicate certain messages or values to the customer in any possible way. A lot of research has been done in the field of marketing exposure, trying to better understand the underlying effects and consequences for both, the customer and the company (e.g. Keller et al., 2012; Rust et al., 2004; Prasad and Ring, 1976; Marks and Kamins, 1988). There are various possibilities for a company to communicate with the customer. Some classic marketing communication options adopted from Keller et. all (2012) are:

- Media advertising (TV, Radio, Newspaper, Magazines)
- Direct response advertising (e.g. Mail, Telephone)
- Online advertising (Websites, Interactive)
- Place advertising (Billboards and Posters, Product placement)
- Point of Sale advertising (e.g. Shelftalkers, Shopping trolleys, In-store radio, TV)
- Trade promotions (e.g. Trade shows)
- Consumer promotions (e.g. Samples, Coupons)
- Event marketing (e.g. Sports, Arts)
- Personal Selling

This list, however, is not holistic and only intended to give a feeling for the vast number of possibilities, how a company can communicate to their customers. Beside these "classic" communication options, there are also other ways to communicate to the customer: Shop appearance, staff training, corporate social responsibility, endorsement, the use of fair trade ingredients and similar constructs are also suitable to deliver certain messages and values to customers. Further, also the way and amount of service a company offers, can affect the image of a company. Marketing has the power to influence what customers know, believe, feel and ultimately, how they behave (Rust et al., 2004). According to Clow and Baack (2012) there are three basic message strategies to deliver a message: Cognitive message strategies present rational arguments or information to consumer (e.g. "the safest car 2012"). Affective strategies try to utilize emotions to reach customers and link them to the product or service (e.g. showing happy and smiling people in a commercial). Finally, conative strategies are designed to lead directly to some type of consumer response (e.g. “buy now, only 200 pieces left!”). Matching a message strategy with a suitable marketing communication option is not an easy task and depends on the purpose of the campaign. Since there is a higher level of risk invloved in the online environment, cognitive strategies can be used, for example, to provide product information to the customer, which as a result reduce uncertainty and perceived risk (Murray, 1991). Similar to the effect of a brand, marketing exposure should consequently be able to add value to a product or service and reduce the customers` perceived risk. Following Rust et al. (2004), marketing expenditures can influence customer-centred elements, such as customer satisfaction, the attitude towards a product, which in turn can change market share and sales, win new and retain existing customers and drive the overall financial performance.

H3: Marketing exposure has a positive effect on the acceptance of mobile health applications.

H4: Marketing exposure has a positive effect on the willingness to pay for mobile health applications.

2.3.3 Doctor Recommendation

Another possibility for companies to build trust, reduce perceived risk and ultimately influence consumer choice is to provide professional recommendations for their products or services (e.g. Smith et al, 2005; Clow and Baack, 2012). This means that a spokesperson, expert or a person with high expertise in the relevant field, simply put a “source”, recommends the product or service. In the field of mHealth a source for a professional recommendation could be a healthcare professional, such as a doctor. Using recommendations can consequently be seen as a special form of endorsement. According to Clow and Baack (2012) there are four typical “sources” of endorsement:

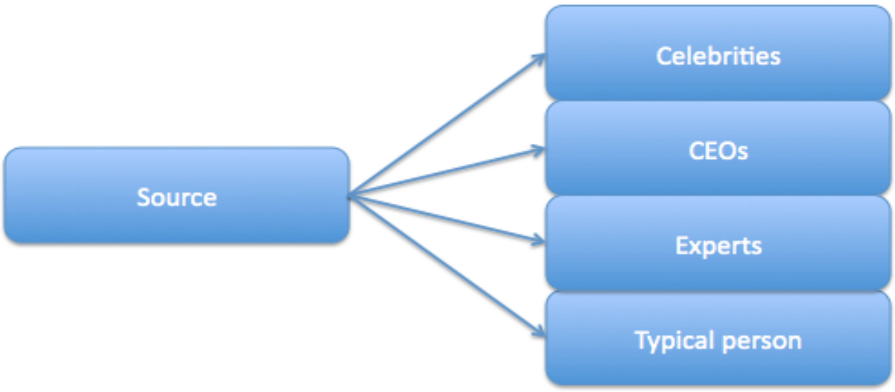


Figure 8: Sources and spokespersons based on Clow and Baack (2012)

Every source has its own advantages and disadvantages. A celebrity spokesperson, for example, can be used to improve brand awareness, create emotional bonds and help to define a brand personality. Typical persons, on the other hand, can help to build trust, because perceived similarities (e.g. between source and customer) are significant factors in affecting trustworthiness (Brock, 1965; Feick & Higie, 1992; Gilly et al., 1998). CEOs and experts can be used to enhance credibility and serve as authoritative figures. The effectiveness of a "source" depends on its characteristics, listed in the figure below:

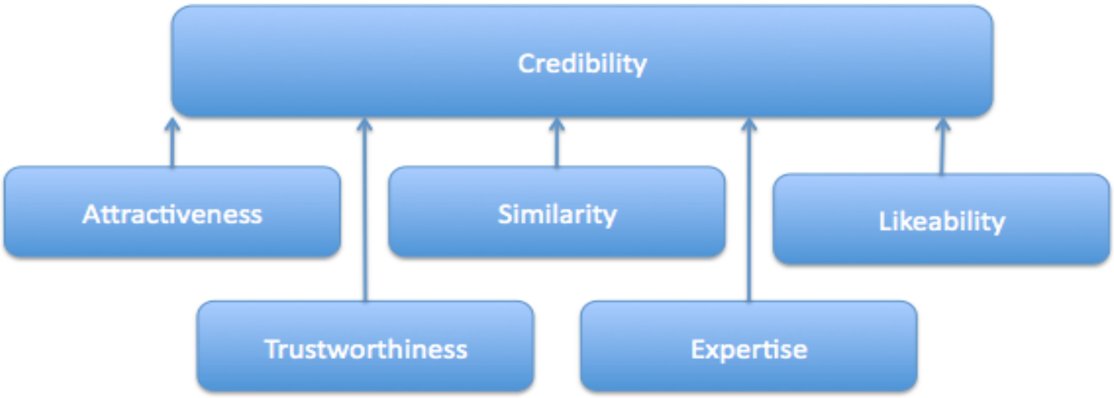


Figure 9: Characteristics of effective spokespersons based on Clow and Baack (2012)

The source's credibility is the result of the composition of attractiveness, similarity, likeability, trustworthiness and expertise. Credibility affects the acceptance of the source and it's message. Only a credible source is believable. Obviously, not every source has a high score on all attributes, but it should score highly on multiple characteristics to be considered as credible.

For this thesis, an expert was chosen as a source, since experts are helpful in promoting healthcare products and other high involvement products (Clow and Baack, 2012). An expert source should score high on trustworthiness, expertise and likeability and thus have a high level of credibility. Recent research further indicates, that experts are more believable than celebrities for high technology products. Consequently, the use of an expert source reduces the level of perceived risk in purchasing the product, which in turn means that they are most helpful when consumers face high levels of risk, like in the online environment (Biswas et al, 2006). Moreover, a brief look into the world of movies, games, books, cars and similar categories also shows the importance of professional recommendations. Whole TV shows and magazines are created to professionally support customers in decision-making and help them to find fitting products and services. Critics release professional book and film reviews on a daily basis and there are even own companies, with the sole purpose of testing and recommending products. All this supports the importance of perceived expertise of those who provide advice and recommendations. Further, a lot of research has shown the distinct association between the source's level of expertise and perceived trustworthiness as well as with the perceived influence of the endorser (e.g. Feick and Higie, 1992; Gilly et al., 1998; McCracken, 1989; McGinnies and Ward, 1980). Due to the ability of an expert source to reduce perceived risk by creating trustworthiness, a credible expert source adds value to a product or service, which in turn should lead to higher levels of acceptance and willingness to pay.

H5: A doctor recommendation has a positive effect on the acceptance of mobile health applications.

H6: A doctor recommendation has a positive effect on the willingness to pay for mobile health applications.

2.3.4 Rating (User Feedback)

The last independent variable observed is user feedback in the form of ratings. User feedback in the online environment can be seen as a special form of word of mouth, sometimes also called "word of mouse" (e.g. Dellacoras, 2003; Clemons et al., 2006). This form of feedback can be, similar to a professional recommendation, seen as a form of endorsement. In the categorization of Clow and Baack, 2012 presented in figure 8, user feedback would be a form of “typical person” endorsement. In general, this form of endorsement is becoming more common, since there has been an overuse of celebrities endorsers, which consequently lead to loss of credibility.

In the online world, there are two typical widespread forms of word of mouse: Most online shop portals and stores provide the customer with the possibility to simply rate the received product or service. A typical rating normally consists of a five star scale, with one star being the lowest value and five stars representing the highest value. Simply put, a one star rating is very negative, whereas a five star rating is very positive, with three stars meaning average, neutral, or neither good nor bad. The second possibility is to provide users with the option to write a (short) review, in which the experiences with the product or service can be expressed. Further, some platforms (e.g. Amazon) provide a mixed form of these two tools: The user can rate the product and optional also write a review. In the years since the upcoming of the World Wide Web, a lot of research has been dedicated to the field of reviews, ratings and user generated content in general (e.g Lim et al, 2006; Chevalier and Mayzlin, 2006; Clemons et al., 2006; Dellacoras et al, 2007; Hong, 2011; Tsang and Prendergast 2009; Smith et al, 2005). Both forms of word of mouth have some advantages and disadvantages. A rating system for example, can be evaluated easier and faster by the customer, but obviously provides less information. Reviews on the other hand take a longer time to read through, but they can provide important additional information to the customer, such as the reason for the (dis-) satisfaction or personal information about the source itself.

Despite the possible advantages that word of mouse offers, unlike professional recommendations, user feedback can also bring several disadvantages: As already pointed out, user can rate and write products reviews positively, but also negatively. This means that negative experiences and dissatisfaction are also shared between customers and could have a negative effect: Instead of building trust and consequently increasing the likelihood to buy, negative user feedback can decrease trust and prevent customers to purchase. Research points out (e.g. Basuroy et al, 2003; Tsang and Prendergast, 2009) that negative content can hurt more than positive can help. This is also consistent with research in other areas: Kahneman and Tversky (1979) found, that value functions are asymmetric regarding gains and losses: A loss of $1 provides more dissatisfaction than the gain of $1 provides satisfaction. Further, Yamaguchi (1978) proposes that consumers tend to accept negative opinions more easily than they accept positive ones.

Despite the potential risks of user feedback, it is a powerful tool in creating trust and influencing consumer choice (Smith et al. 2005). Research has also suggested that peer recommendations have a superior status as trustworthy information source compared to other types of resources (e.g. Wathen & Burkell, 2002; West et al., 1999; Smith et al., 2005) Further, findings of Smith et al. (2005) showed that customer prefer peer recommendation over editorial recommendation and that recommendations in general are more trustworthy than ads. Since the information-intensive inpersonal and intangible online environment creates substantial uncertainty (Häubl and Trifts, 2000), the provision of a peer recommendation can serve as a precious information resource for consumers, especially when they are overwhelmed by the information variety during the online shopping experience (Smith et al, 2005). Further, Lim e. al (2006) highlighted the effectiveness of peer recommendations in trust building and consequently willingness to buy and stated that one possible reason is that people trust those who share common characteristics with themselves more than those who do not. Also Smith et al. (2005) found evidence that a strong rapport has a positive effect on trust towards the peer recommender.

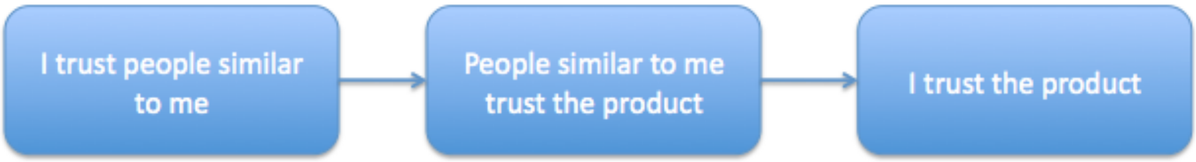


Figure 10: Trust building process based on Lim et al. (2006)

Consequently, positive user feedback is believed to generate trust, which in turn should lead to higher levels of acceptance and willingness to pay. This assumption is in line with other studies, which linked positive user feedback to an increase in purchase intentions or sales directly (Elberse and Eliashberg, 2003; Chevalier and Mayzlin, 2006; Lim et al. 2006), as well as the positive effect of word of mouth on purchase probability (Arndt, 1967).

H7: A high user rating has a positive effect on the acceptance of mobile health applications.

H8: A high user rating has a positive effect on the willingness to pay for mobile health applications.

2.3.5 Trust as Mediator

The final variable discussed in this section is trust. The literature analysis of the independent variables has shown, that trust plays a substantial role for each of them. Some variables were shown to reduce a customer's perceived risk, whereas others reduced uncertainty by providing information, opinions and experiences. Some also acted as cues, which customers could use in the decision making process. In one way or another, the idea of building consumer trust or related constructs has always been present. A lot of research has been done on trust and the role it plays in the online environment and the adoption of e-commerce since the rising of the World Wide Web (e.g. McKnight et al. 1998; Jarvenpaa et al., 2000; Lee and Turban, 2001; McKnight et al., 2002; Ba and Pavlou, 2002; Kim and Benbasat, 2003; Koufaris and Hampton-Sosa, 2004; Perea et al., 2004; Smith et al., 2005; Park et al. 2005; Lim et al., 2006; Chen and Barnes, 2007). Despite the variety of research in this area, one problem remains: trust is a very vague construct with lots of different definitions. Following the question what trust really means Keen et al. (1999) stated, that it is very easy to speak about, but very hard to pin it down. Trust is difficult to define and measure (e.g. Rousseau et al. 1998; McKnight et al., 2002). The state of trust definitions has further been called a "confusing potpourri" (Shapiro, 1987, p625), a "conceptual confusion" (Lewis and Weigert, 1985, p 975) and a "conceptual morass" (Barber, 1983, p1). Further, there is no unique view whether trust is a unitary concept (e.g. Rotter, 1971) or a multidimensional one (e.g. Mayer at al, 1995; Rousseau et al, 1998). The lack of a consistent definition of trust can also be seen in research on online trust. The inconsistent definitions of trust make it difficult to compare results of different studies.

Despite the different definitions and concepts, trust has been identified as an important factor in e-commerce. According to Lee and Turban (2001) lack of trust is one of the most cited reasons for customer not to shop online. McKnight et al. (2002) further state, that adoption in the online world is not only driven by perceptions of technology (e.g. perceived usefulness and ease of use; Davis et al., 1989), but also by other factors, like trust. Generally, consumers associate a greater level of risk with online shopping compared to with traditional shopping due to the unique challenges of online environments (Smith et al., 2005). First, the inability to physically check offered products may cause uncertainty about product- characteristics and quality (e.g. Häubl and Trifts, 2000; Lee and Turban, 2001; Perea et al., 2004; Smith et al., 2005). A second reason is that the advantage of the Internet of providing a lot of information and choices may overwhelm customers (Häubl & Murray, 2003). Further, due to the absence of "real" employees and the impersonal characteristics of the online world, consumers may feel a lack of customer service and therefore possibility to remove uncertainty. Finally, the fact that a customer has to disclose private information to make an online purchase (e.g. name, address, credit card information) may also make them feel uneasy (Van den Poel & Leunis, 1999). To successfully overcome these obstacles, consumer-trust has to be created. In their paper, Kim and Benbasat (2003) developed a framework and examined ways for companies to build consumer trust. Among others, third party certificates, consumer feedback, advertising reputation and utilizing trust transfer are mentioned as useful tools to create consumer trust. In this thesis the effects of similar concepts are assumed to influence adoption and willingness to pay, mediated by trust. This assumption is supported by other recent research, which has linked trust or related constructs to adoption and premium prices. Jarvenpaa et al. (2000) found that trust has a negative relationship to risk perception, which in turn had also a negative effect on willingness to buy. In other words, trust reduced perceived risk, which resulted in a higher willingness to buy. Also Park et al. (2005) found that perceived risk has a negative effect on purchase intention. Another positive link between trust and purchase intention was found by Chen and Barnes (2007). A study conducted by Ba and Pavlou (2002) showed that trust promotes price premiums. Simply put, a higher level of trust can be used to charge higher price premium.

Following the findings of the presented research, it is assumed in this thesis that the effects of the previous discussed independent variables are mediated by trust. Therefore each presented hypotheses will be supplemented by "mediated by trust", resulting in the final hypotheses summarized in the next chapter.

3. Hypotheses

This chapter summarizes the final hypotheses developed based on the previous chapters. Further, the expected relationships are presented in the conceptual model below.

Independent Variable	Hypotheses
Brand (consistency)	**H1:** Brand consistency has a positive effect on the acceptance of mobile health applications, mediated by trust. **H2:** Brand consistency has a positive effect on the willingness to pay for mobile health applications, mediated by trust.
Marketing Exposure	**H3:** Marketing exposure has a positive effect on the acceptance of mobile health applications, mediated by trust. **H4:** Marketing exposure has a positive effect on the willingness to pay for mobile health applications, mediated by trust.
Doctor Recommendation	**H5:** A doctor recommendation has a positive effect on the acceptance of mobile health applications, mediated by trust. **H6:** A doctor recommendation has a positive effect on the willingness to pay for mobile health applications, mediated by trust
User Feedback	**H7:** A high user rating has a positive effect on the acceptance of mobile health applications, mediated by trust. **H8:** A high user rating has a positive effect on the willingness to pay for mobile health applications, mediated by trust.

Table 3: Summary of the final hypotheses

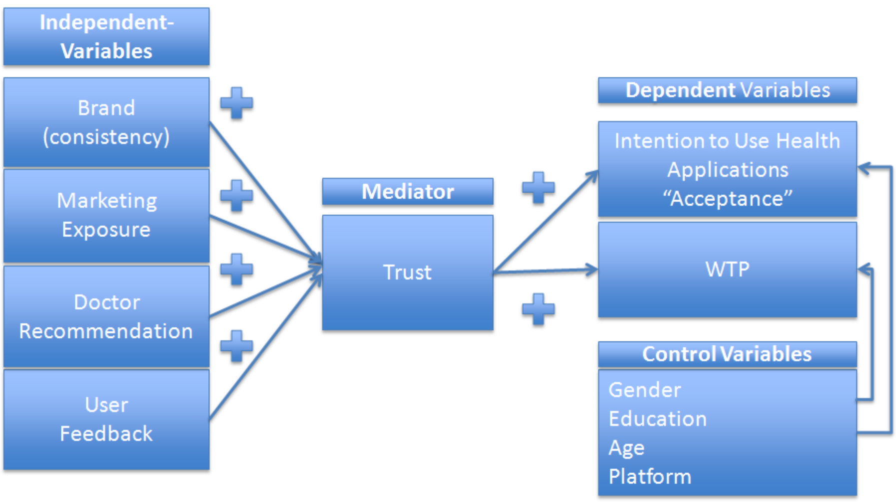


Figure 11: Conceptual framework, including expected relationships

4. Methodology

In this chapter, the experimental design will be presented. First the design of the study will be discussed. In the next step the manipulation development will be presented, followed by the measurement methods for each variable.

4.1 Study Design

The goal of this study was to explore which factors drive adoption and willingness to pay for health applications. To measure these factors, an online questionnaire was created, putting the respondent in a pre-purchase situation. To ensure a high grade of realism, fictional applications were created and presented, rather than just presenting application characteristics in text form. Every respondent was shown four manipulations, with questions about each of them.

A 2x2x2x2 design was used for this study, resulting in a total of sixteen possible manipulations. The manipulated variables were: “Brand Consistency”, “Marketing Exposure”, “Doctor Recommendation” and “User Feedback”. The study used a within- as well as between subject experimental design. Two variables were manipulated between subjects and two variables were manipulated within subjects. The variables manipulated between subjects were brand consistency and marketing exposure. The variables manipulated within subjects were doctor recommendation and user feedback. This experimental design was chosen for two reasons:

First of all, in the simulated pre-purchase situation, customers or subjects are very likely to check several similar applications before making a final purchase decision. Since the customer searches for an application with a specific purpose (in this study an application which keeps track of the pulse), most characteristics of relevant apps are believed to be similar or even the same. However, the customer will use certain cues to be able to differentiate between these similar apps (e.g. Murray, 1991). The most obvious cues for this purpose are ratings (a form of user feedback) and professional recommendations. Both of them cannot be directly manipulated by a company. Customers cannot be forced to give good ratings and neither can professional sources be forced to recommend an application.

The variables manipulated between subjects ,on the other hand, can both be influenced by the releasing company: Marketing exposure can be achieved by launching a marketing campaign to pull attention towards an application. Further, a company can decide whether to launch an application under an already established brand name, rather than using an unknown name. as already mentioned in chapter 2.3.1 Brand (consistency), launching a new product under an already established brand name, is only then beneficial, if there is a certain "fit" between the parent brand and the potential extension. Therefore, the variable manipulated is called brand consistency rather than just "brand", since the brand has to have a consistent meaning with the product category and releasing company to be efficient. If the brand Fanta (soft drink), for example, would decide to release a health application under their brand name "Fanta" it would not add much value to the service and might even confuse customers, since a health application is not consistent with the brand image.

To sum up, customers who search for health application might have been exposed to marketing or might prefer branded applications. Whether they have been exposed to marketing or are looking for well-established brands may vary **between** subjects. However, when it comes to the searching process, customers might face several similar apps. They might have been exposed to marketing for several apps and potentially also several of the apps might have an established brand name. Then customers have to use different cues to gather information and evaluate the applications. User ratings and recommendations will then aid the customer and help to do the purchase decision. Consequently, each respondent was assigned to one out of four groups (2x2; Brand consistency, marketing exposure). In each of the groups, respondents were then shown four different applications, which they were asked to rate (2x2; User feedback, doctor recommendation). To avoid order effects, the order in which the applications were shown was randomized.

As already mentioned in the introduction, health application is a broad term. It covers a lot of different areas and it is not easy to draw borders between similar categories. However, for this research, a health application in the "fitness" subcategory was chosen. This decision was made due to the fact that fitness apps appeal to a large audience and are well established. For applications with very specific purposes (e.g. an application for a diabetes), it might have not been possible to gather sufficient data.

4.2 Manipulations

For the study, sixteen different applications were designed, to avoid the possibility of bias due to familiarity to an already existing application. Each application had a very similar design to avoid preference variation due to other factors than the manipulated variables. Since this similarity might confuse respondents causing them to think they see the same application several times, each application was given a unique name and an own logo. Again, logos and names were kept very basic to reduce potential influence on preference to a minimal level. Due to the fact that every respondent was assigned to only one out of four groups and they only saw four applications in total. Therefore it was not necessary to create sixteen logos and names, but only four. The following logo-name combinations were used:

Figure 12: Logo- name combinations

These logo-name combinations were the only aspects that varied between the different manipulations despite the manipulated variables.

For each application, the subjects were shown two screenshots and a small text section with additional information. The first screenshot was designed accordingly to what a customer typically finds first when looking for an application. The screenshot contains the application's name, logo, rating, developer and a text providing basic information. In a real setting, this page would normally also show the price of the application. Since one of the study's goals is to explore the willingness to pay for applications, it was decided not to provide information on price. Further, to eliminate concerns of privacy, it is mentioned that the data gathered by the application will not be available to anyone else but the user. The second screenshot shown to the subjects showed the actual functionality of the application. It provided the subjects with an idea of how the application works. This screenshot did not vary between the different applications, since every application should have the same function.

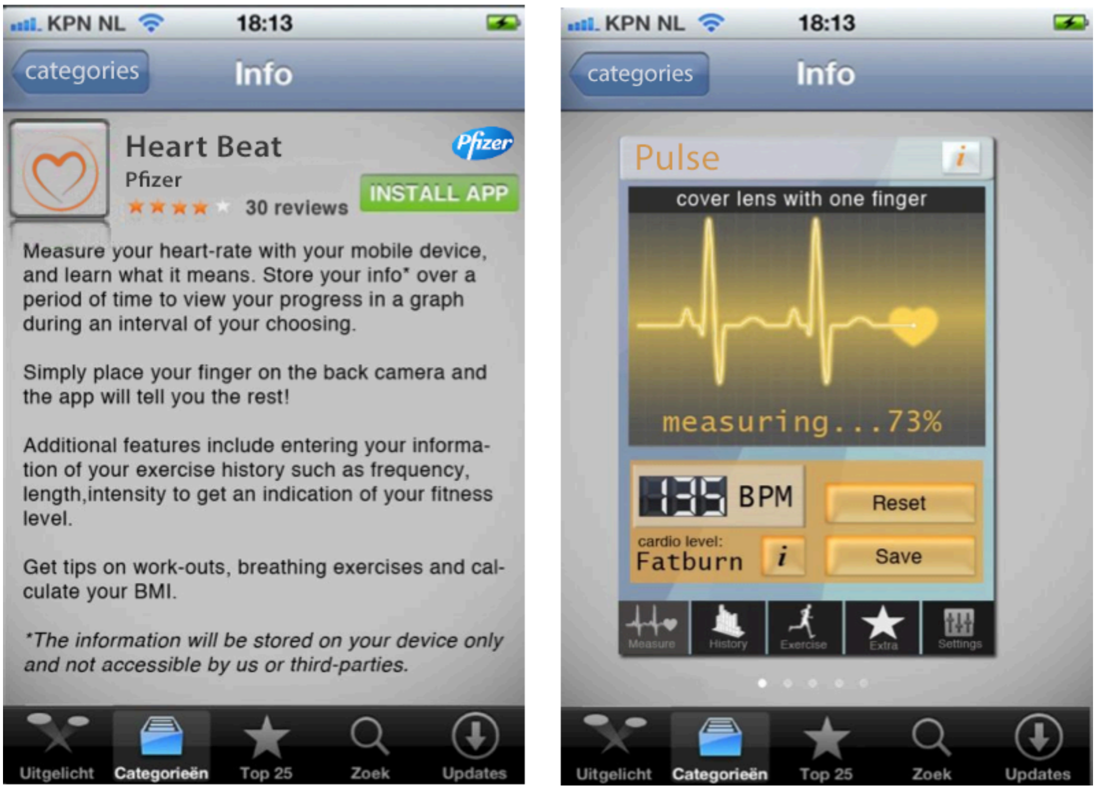
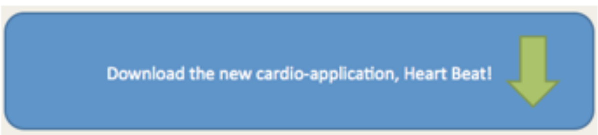


Figure 13: Examples for screenshot one and screenshot two

It is important to highlight, that the screenshots contained only two of the four manipulated elements: brand consistency and user feedback. The other two elements were found in the text beneath the screenshots. The first screenshot in figure 13 shows a manipulation with brand consistency and a "high" rating. Figure 14 gives an example of the text section of the survey with marketing exposure and doctor recommendation.

Additional Information:

This application was created and published by Pfizer, one of the world´s largest pharmaceutical companies. Further, you have already seen commercial banners like the following one on different homepages:



Moreover, while reading through the app description, you also find the following information:

This application is recommended by health-care professionals!

Users rate this app with an average of 4 out of 5 stars.

Figure 14: Text section manipulation with marketing exposure and doctor recommendation

The text section summarizes some of the information provided in the screenshot and contains the final two variables: A commercial banner (marketing exposure) and a recommendation. As already pointed out, each manipulated variable had two levels. Since it is not efficient to show all sixteen combinations of the manipulated variables, the following section will present each variable with its levels separately.

Brand Consistency

The variable had two levels: The brand was either consistent or it was not. If the brand was consistent, the first screenshot showed that "Pfizer" was the developer of the application. If the brand was meant not to be consistent, a made up developer name was shown: Lobartonic. Subjects could not perceive brand consistency between Lobartonic and the application, since they had no brand image or any other associations with Lobartonic. Pfizer, on the other hand, is one of the biggest and well-known pharmaceutical companies worldwide. They are active in the health sector and have already launched several health related applications. To address the problem that a subject might not know Pfizer, the Pfizer Logo was also included in the first screenshot and the text-section provides the information that Pfizer is active in the health related sector.

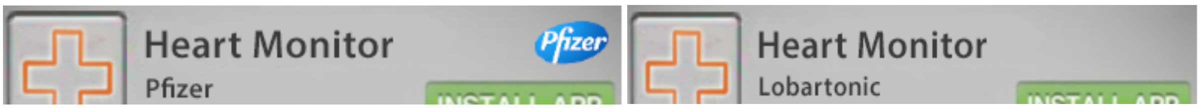


Figure 15: Brand consistency manipulations

Marketing Exposure

To simulate marketing exposure, a basic straightforward advertising banner was created. Marketing exposure had two levels as well: Either the subject has never been exposed to any marketing for the application, in which case marketing exposure was not mentioned, or the subject was informed in the text section, that he has already seen commercial banners for the application. A banner was chosen as form of marketing exposure, since it seemed to be the most suitable form of advertising for an application. Further, since this study also deals with trust in the online environment, an online form of advertising was favoured.

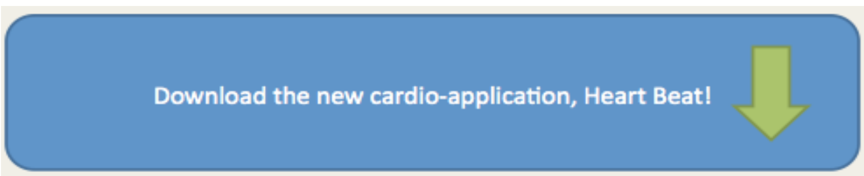


Figure 16: Advertisement banner

Doctor Recommendation

Similar to marketing exposure, the variable doctor recommendation had two levels. If the application was recommended, this information was shown in the text section:

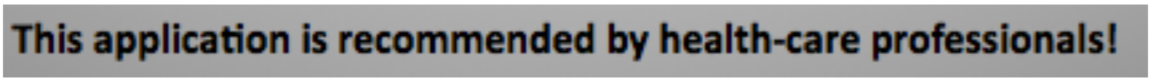


Figure 17: Doctor recommendation

If the application was not recommended, this information was not shown to the subject.

User Feedback

Ratings were chosen to represent user feedback. The ratings were manipulated to have either two stars (low) or four stars (high). These numbers of stars were chosen, since they represent a distinct positive (four stars) or negative (two stars) feedback, without going to the extreme. A pure five or one star rating could decrease the credibility of the rating, since it is not realistic, that everybody shares the same (extreme) opinion about an application. In addition to showing the rating on the first screenshot, the rating is also mentioned in the text-section, to address the fact that the brand is also shown in both, the screenshot and text-section. Further, researchers found evidence, that not only the average of a rating, but also the amount of ratings can be influential. To address this issue, the amount of ratings was kept stable among all applications.

4.3 Sampling

The survey was created and distributed with the established survey platform "Qualtrics". Due to the, for the research necessary, randomization process, the survey could only be distributed online. Consequently, the survey was mainly allocated via social networking pages and e-mails. This method allowed quick distribution and offered the advantages that respondents could easily share the survey and decide themselves when to fill in the survey. The distribution in international, groups within social networking pages, allowed gathering of data across borders. To further encourage distribution among age and nationalities, the survey was handed to some influencers, which were asked to share the survey in their networks as well.

4.4 Measurement

Despite the in the theory part illustrated variables, the survey also measured some additional constructs, which were intended to gain further insights. This section describes all items used to measure both, main and also control variables. The first three presented measurements were asked for every shown application (four times per survey), whereas the remaining variables where measured per subject. To see the survey please refer to the Appendix.

Trust

Trust was measured on a per application base: For each application presented to a respondent, the perceived trust towards the application was measured. To measure trust, respondents were asked to which extend they agree or disagree with five statements, using a seven point Likert scale. The statements were adapted from previous research on trust (e.g. Jarvenpaa et al. 2000; Chen and Barnes, 2007).

Willingness to Pay

As already mentioned in the corresponding theory section, there are various ways of measuring willingness to pay with all of them having some advantages and disadvantages. Taken these potential advantages and disadvantages into account, the author decided to measure willingness to pay for this thesis with a customer survey in a two-step approach. In the first step, the subject is asked directly for his willingness to pay for the presented application (WTP1). The subject can choose any amount from EUR 0 up to a maximum of EUR 10 with one decimal point (e.g. EUR 1,5). In the second step, the subject is given information about the typical price range of professional applications, which lies between EUR 3 and EUR 10. The subject is then asked about the likelihood to purchase the application at a fixed price of EUR 5 on a seven point Likert scale (WTP2).

Intention to Use

The intention to use measurement was adapted from the technology acceptance model by Davis (1989) and Venkatesh and Davis (2000). The subjects were asked for their willingness to use the application on a 7-point Likert scale, ranging from "definitely would not” to “definitely would”.

General Willingness to Adopt

To examine whether a customer is in general willing to use a health application, respondents were asked, how likely they are to use a health application on a seven point Likert scale.

Value of the Application

Subjects were asked if they would expect, that using a health application would change their health related behaviour, to test whether they see value in using a health application. A five point Likert scale was used, ranging from “I would be less careful with my health” to “I would be more careful with my health”.

Stinginess

To measure a subject’s level of stinginess, respondents were asked if they could identify either with having troubles limiting spending or having trouble spending money on a five point Likert scale. Adapted from Scott et al (2008).

Health Status

Since the health status of a customer could have impact on adoption of health applications, it was measured using a five point Likert scale form the Ambulatory Care Experience Survey ACES (2003)

Health Motivation

Further, the health motivation of a respondent was measured based on the method used by Moorman and Matulich (1993).

Customer-Initiated Informational Empowerment

The last construct measured was customer-initiated informational empowerment. Subjects were asked to what extent they agree or disagree with 3 statements on a five point Likert scale, adapted from Lerman et al. (1990)

Demographics

Finally, respondents were asked about their age, gender, nationality and education level.

4.5 Pretest

To make sure, that the survey was clear, understandable and free form mistakes, it was handed to people of different ages, nationalities and backgrounds in English and mobile applications. As the feedback showed, persons with higher age tended to have some problems with the instructions given in the survey. To address this issue, the instructions were revised and updated in collaboration with the corresponding persons and then tested again, to make sure that the instructions were still understandable for the younger generations. After a third and final test round, the survey was launched. Previous to the launch collected data was deleted due to the possibility of bias due to reformulations of some questions.

5. Data Analysis

In this chapter the collected data is presented. First, some general aspects of the sample are discussed. Then the two-step analysis is presented: In the first step, one way ANOVAs were run to show the basic relationships between dependent and independent variables. In the second step, multivariate general linear models were performed to confirm and strengthen the findings of the ANOVAs and to check for the expected mediation effects, as well as effects of control variables.

5.1 Sample

Data was collected online with "Qualtrics Survey Software". A total of 248 surveys were collected. However, only 158 surveys were completed (63,7 %). The remaining surveys were not successfully completed. Some of them were started without any questions answered, but the majority of surveys were filled until the very last part, demographics. Only very few of the not completed surveys were abandoned after answering several questions. A possible explanation for these findings might be, that many respondents decided at the very beginning of the survey whether they want to participate or not. After having decided, they left the survey or continued to the very last part, demographics. At this point, some respondents seemed to have changed their mind and closed the survey, without answering the final questions. Maybe some demographic questions made the respondents feel uneasy (e.g. age; education level) and even tough answering these questions was not mandatory, they decided to quit the survey rather than finishing it. To address this problem in future research, it could be highlighted that the demographic part is optional to fill in. After analysing the data set it was decided to only use the fully filled surveys for further analysis.

66% of the respondents were male, 34% female. Most respondents were from Europe, except for some respondents from North America and Asia. The majority of respondents within Europe were from Austria (48%), Germany (17%) and the Netherlands (12%). The respondents further had a rather high education level: 26,4% had a Bachelor-degree, 39,6% a Master degree and 5,7% had a doctor title. Only 23,9% had high school or a professional degree as highest education form.

5.2 ANOVAs

The first analyses run were ANOVAs. For these analyses, the mediator "Trust" was treated like a dependent variable. For each manipulated variable, one ANOVA was run to check their relationships with the dependent variables. As already stated in the methodology section, two different measures for "Willingness to pay" were used. Since it is not possible to combine them into one variable, they were treated like two different, dependent variables. The table below summarizes the dependent and manipulated variables used for the ANOVA.

Manipulated Variables	Dependent Variables
Brand Consistency (BC)	Trust
Marketing Exposure (ME)	Intention to use (Intention)
User Feedback (Rating)	Willingness to pay (WTP)
Doctor Recommendation	Willingness to pay 2 (WTP2)

Table 4: ANOVA variables

The first ANOVA was run for the manipulated variable **Brand Consistency**. Brand consistency was significant for Trust (p= 0,006), but had no significant effects on Intention (p=0,231), WTP (p=0,854) or WTP2 (p=0,308).

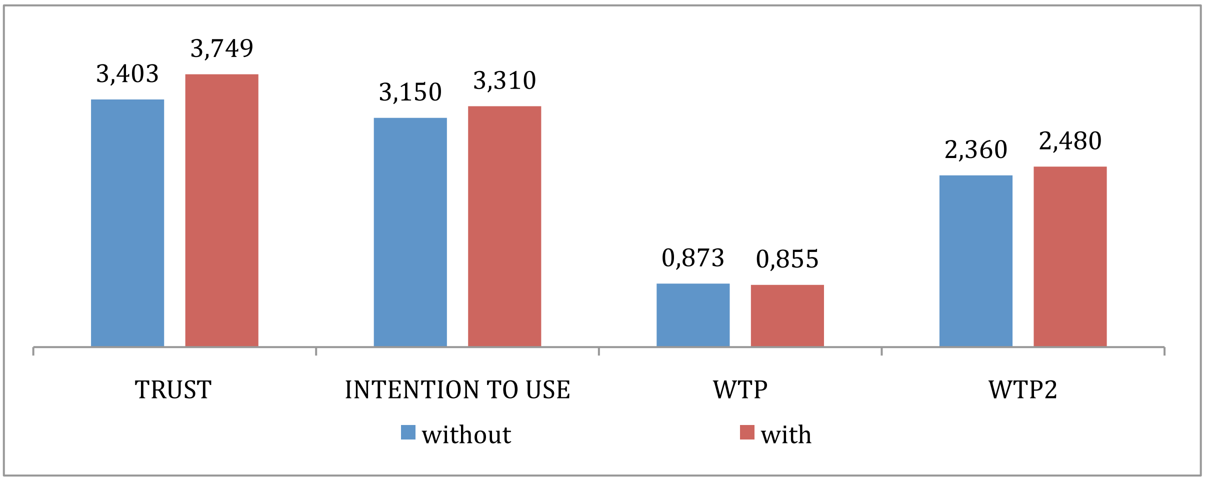


Figure 18: Effects of brand consistency

The second ANOVA checked for the effects of **Marketing Exposure.** It showed significant effects on Trust (p= 0,025), WTP (p=0,000) and slightly significant effects on WTP2 (p=0,097). No significant effects were found for Intention to use (p=0,202)

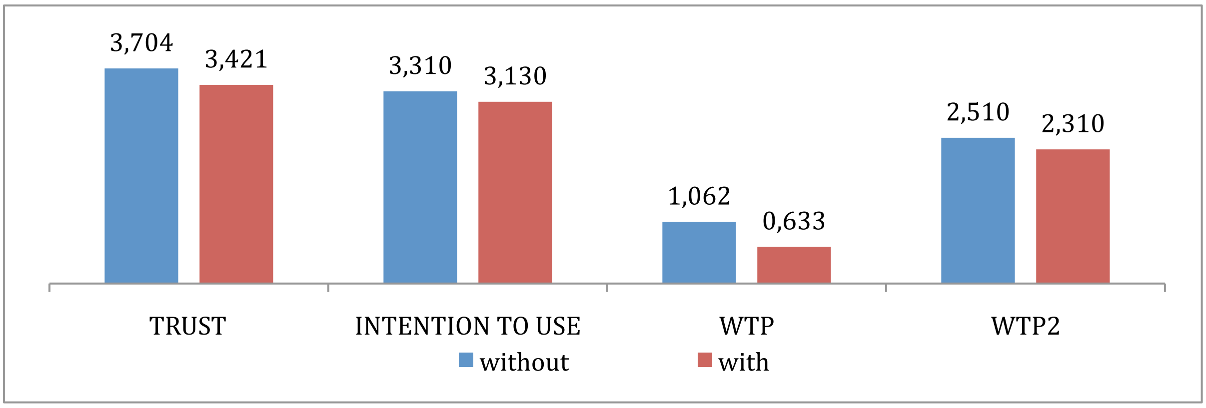


Figure 19: Effects of marketing exposure

Surprisingly, the comparison of the means shows, that the means are higher in the absence of marketing exposure, rather than when subjects were exposed to marketing. This result will be discussed in more detail in the following chapters.

The third ANOVA, showed that **User Feedback (Ratings)** had highly significant effects on all dependent variables (p=0,000).

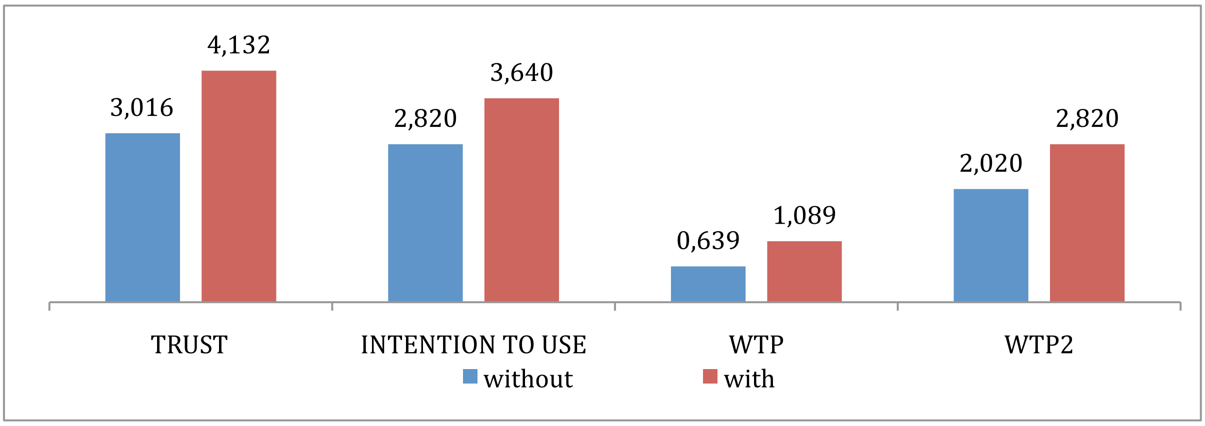


Figure 20: Effect of user feedback

The fourth and final ANOVA for **Doctor Recommendation** showed similar results. The manipulated variable had significant effects on Trust (p=0,001), Intention (p=0,002), WTP (p=0,009) and WTP2 (p=0,022).

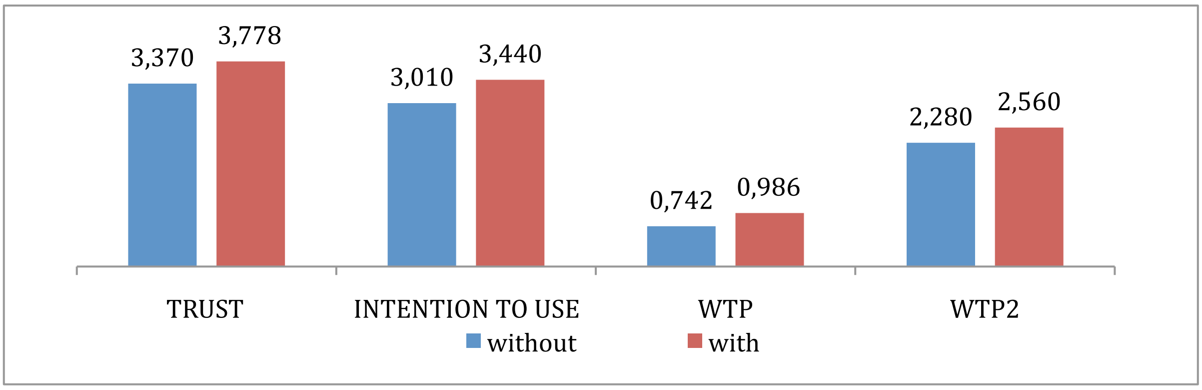


Figure 21: Effects of doctor recommendation

The following figures summarize the effects on the dependent variables and recall the most important information on each.

TRUST

All variables showed significant effects on trust. Marketing exposure showed a "reverse-effect", lowering the mean if present.

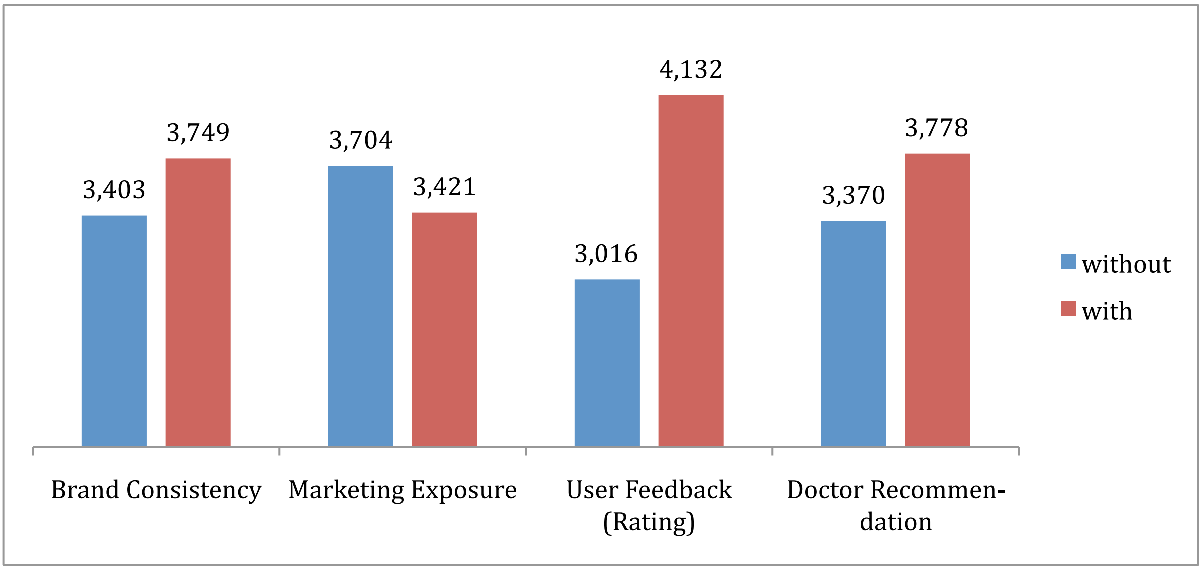


Figure 22: Effects on trust

INTENTION TO USE

User feedback and **doctor recommendation** were significant. Brand consistency and Marketing exposure showed no significant effects.

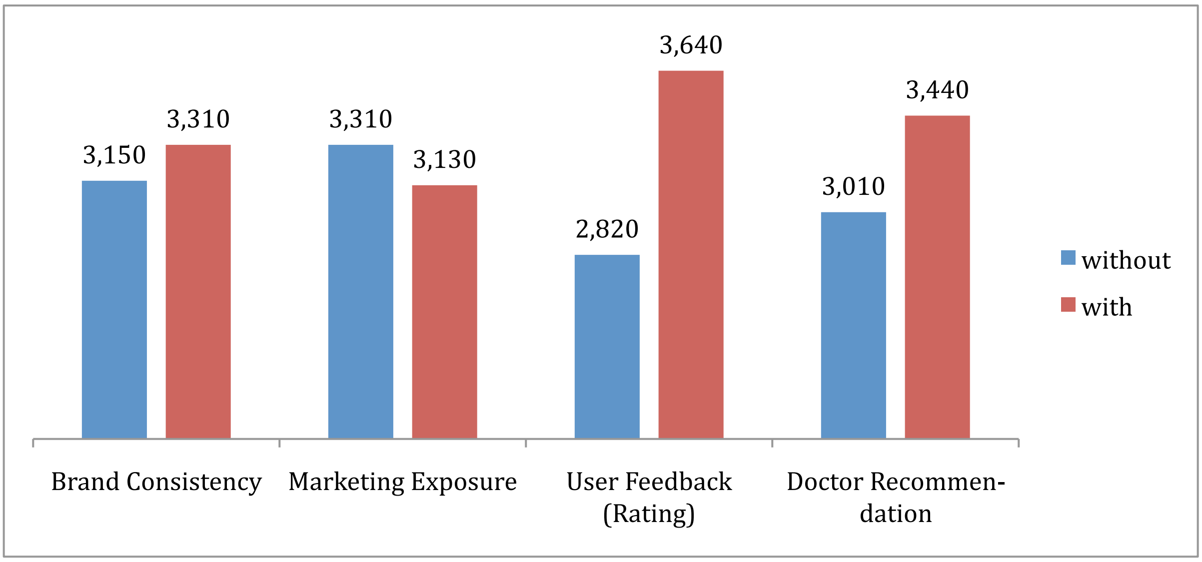


Figure 23: Effects on intention to use

WTP

Marketing exposure, **user feedback** and **doctor recommendation** showed significant effects. Again, the presence of Marketing Exposure resulted in a lower mean. Brand consistency was not significant.

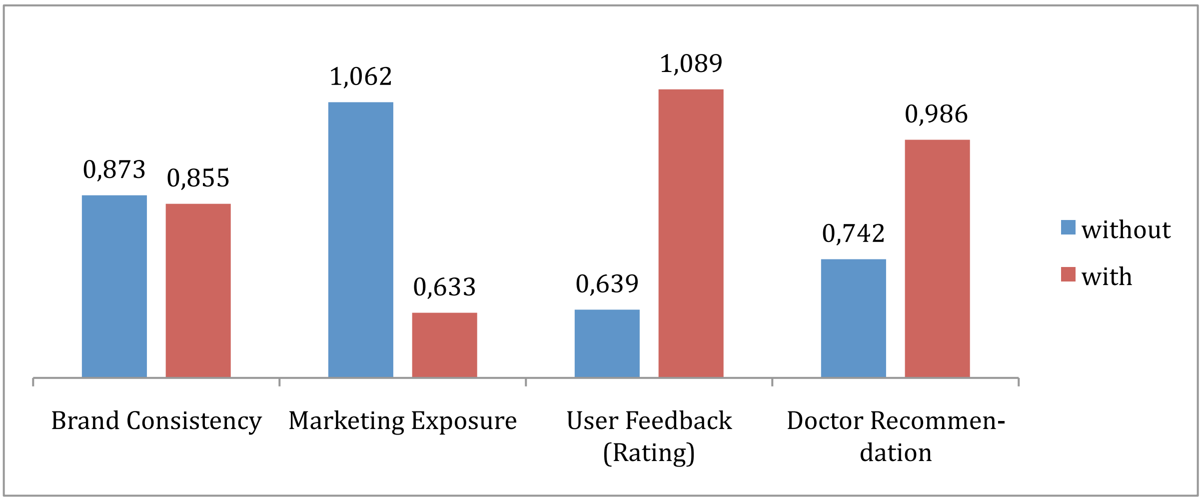


Figure 24: Effects on WTP

WTP2

User feedback and **doctor recommendation** were highly significant, **marketing exposure** only slightly significant, with a lower mean when present. No significant effects were found for Brand Consistency.

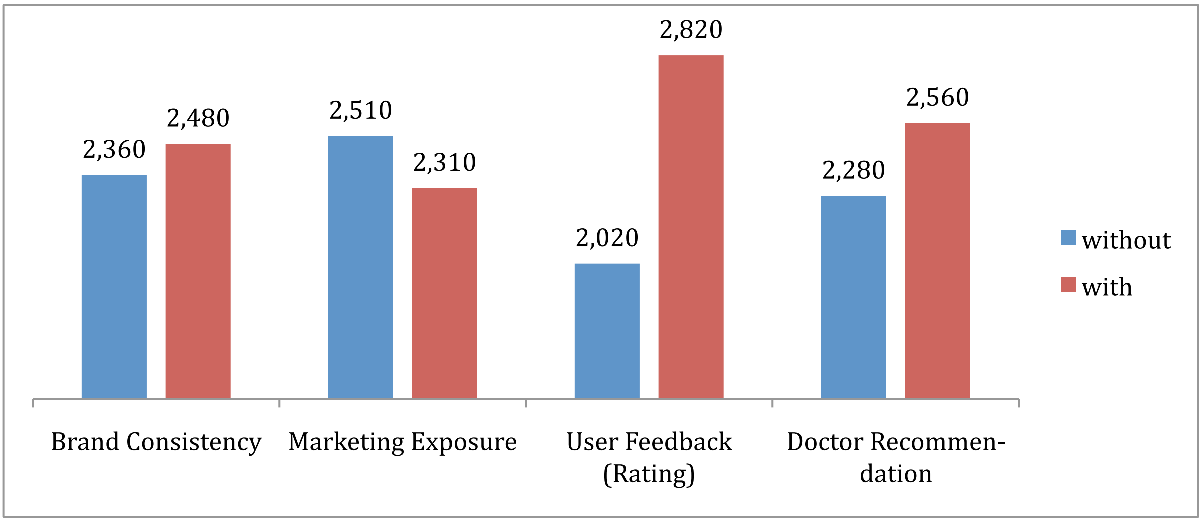


Figure 25: Effects on WTP2

The presented results show, that trust seems to play an important role in the adoption process. It was the only variable, for which all manipulated variables showed significant effects. Furthermore, User feedback and doctor recommendation had significant effects on all dependent variables, whereas brand consistency was only significant on trust.

Marketing exposure was significant for trust, WTP and WTP2, but shows an unexpected effect: Different than initially hypothesised, the means are significantly lower, when the subject was exposed to marketing.

5.3 Multivariate General Linear Models

To further investigate and strengthen the results of the ANOVAs, multivariate general liner models were run. In addition, this method also allowed checking for the expected mediation effect of trust with the approach of Baron and Kenny (1986). To test for mediation three major steps are necessary: First, the direct effects of the independent variables, sometimes also called antecedent variables, on the dependent variables have to be shown. This step establishes that there is an effect that may be mediated, called main effect. In the second step, the mediator (trust) is treated like a dependent variable. This step is necessary to show that the independent variables are correlated with the mediator. Finally, the independent variables and the potential mediator are combined in an equation and tested for their effects on the dependent variables. Thereby the mediator is treated like an independent variable. If the main effects, now that the mediator is included as an independent variable, become insignificant, a mediating effect is found.

The remainder of this chapter is structured as followed: Based on the results of the ANOVAs and to keep a clear reading flow, the analysis starts with Step 2 of the mediation test of Baron and Kenny (1986): Showing that the mediator is correlated with the independent variables. In the thereafter-following subchapters, step one and step three of the mediation analysis are performed based on the dependent variable: First, the main effects are presented (step 1) and then the alterations, if trust is included as an independent variable (step 3). This structure allows discussing the mediation effect for each dependent variable one by one.

5.3.1 Effects of the Antecedents (Independent Variables) on Trust (Mediator)

The ANOVAs showed that all manipulated variables had a highly significant effect on "Trust". To strengthen these findings, a multivariate GLM was run, including control variables with Trust as the dependent variable. The results of this analysis confirmed the findings. All independent variables, brand consistency (β=0,462; *p*=0,000), marketing exposure (β= -0,415; *p*=0,001), user feedback (β=1,183; *p*=0,000) and doctor recommendation (β=0,443; *p*=0,000) had highly significant effects on trust. Marketing exposure had, as supposed by the ANOVA, a negative β-value. In addition some other variables showed significant effects: The number of apps installed (β= 0,006; *p*=0,012), the number of apps purchased (β= -0,031; *p*=0,023), health status (β=0,267; *p*=0,001), health motivation (β=0,377; *p*=0,000) and age (β=0,028; *p*=0,000) were also significant. These results show, that there is indeed a strong relationship between trust and the manipulated variables, as well as some control variables.

Dependent Variable: Trust			
Variables:	**β**	**Std. Error**	***p***
Brand Consistency	0,462	0,114	0,000
Marketing Exposure	-0,415	0,120	0,001
User Feedback	1,183	0,111	0,000
Doctor Recommendation	0,443	0,111	0,000
Gender Male	-0,009	0,134	0,949
Rank	0,030	0,050	0,541
Education	0,061	0,046	0,189
AppsIns	0,006	0,002	0,012
AppsBuy	-0,031	0,014	0,023
purchased	0,004	0,005	0,346
General Adoption	0,025	0,039	0,522
Value of App	0,178	0,103	0,084
Hstatus	0,267	0,081	0,001
Hmotivation	0,377	0,075	0,000
Stinginess	-0,063	0,077	0,415
Ppower	-0,066	0,077	0,391
Age	0,028	0,007	0,000
R Squared = ,327 (Adjusted R Squared = ,306)			

Table 5: Effects on Trust

5.3.2 Mediation Analysis on Intention to use

With the now presented multivariate GLM, the main effects of the independent and control variables were tested on the intention to use. The analysis revealed, that all independent variables, brand consistency (β= 0,388; *p*=0,003), marketing exposure (β= -0,237; *p*=0,047), user feedback (β=0,877; *p*=0,000) and doctor recommendation (β=0,469; *p*=0,000) had highly significant effects. Moreover, the number of app installed (β=0,006), health status (β=0,385), health motivation (β=0,520), stinginess (β= -0,223), customer-initiated informational empowerment (β= -0,225) and age (β=0,017) also showed significant effects (*p*<0,050).

In the following multivariate GLM, trust was included as an independent variable, leading to the following results: Trust had a highly significant effect (*p*=0.000; β=0,745), whereas brand consistency (*p*=0.668), marketing exposure (*p*=0.736), user feedback (*p*=0.969), doctor recommendation (*p*=0,155), age (*p*=0,452) and the number of apps installed (*p*= 0,566) became insignificant.

Consequently, **Brand Consistency**, **Marketing Exposure**, **User Feedback**, **Doctor Recommendation**, age and number of apps installed have mediated effects on **Intention to use**, whereas health status, health motivation, stinginess and customer-initiated informational empowerment have direct effects. As a result, **Hypothesis 1, Hypothesis 5 and Hypothesis 7 are supported.** Even though the effect of marketing exposure was significant as expected it has an unexpected negative effect. Therefore Hypothesis 3 is not supported.

	Intention to use			Intention to use (including Trust)		
Variables	**β**	**Std. Error**	***p***	**β**	**Std. Error**	***p***
Brand Consistency	0,388	0,131	0,003	0,043	0,101	0,668
Marketing Exposure	-0,273	0,137	0,047	0,035	0,105	0,736
User Feedback	0,877	0,127	0,000	-0,004	0,106	0,969
Doctor Recommendation	0,469	0,127	0,000	0,139	0,098	0,155
Gender Male	0,21	0,153	0,171	0,217	0,117	0,063
Rank	-0,007	0,057	0,898	-0,030	0,043	0,489
Education	0,091	0,053	0,086	0,046	0,04	0,258
AppsIns	0,006	0,003	0,037	0,001	0,002	0,566
AppsBuy	-0,009	0,016	0,570	0,014	0,012	0,231
purchased	-0,001	0,005	0,820	-0,004	0,004	0,269
General Adoption	0,084	0,045	0,062	0,065	0,034	0,056
Value of App	0,038	0,118	0,747	-0,095	0,090	0,291
Hstatus	0,385	0,092	0,000	0,186	0,071	0,009
Hmotivation	0,520	0,086	0,000	0,240	0,067	0,000
Stinginess	-0,223	0,088	0,012	-0,176	0,067	0,009
Ppower	-0,225	0,088	0,011	-0,176	0,067	0,008
Age	0,017	0,008	0,029	-0,004	0,006	0,452
Trust	xxx	xxx	xxx	0,745	0,037	0,000
	R Squared = ,247 (Adjusted R Squared = ,224)			R Squared = ,567 (Adjusted R Squared = ,553)		

Table 6: Mediation Analysis on Intention to use

5.3.3 Mediation Analysis on WTP

In the next analysis, the main effects on WTP were tested. Brand Consistency was not significant (*p*=0,457), whereas marketing exposure (β= -0,398; *p*=0,000), user feedback (β=0,474; *p*=0,000), doctor recommendation (β=0,267; *p*=0,003), health status (β=0,187; *p*=0,004) and age (β=0,038; *p*=0,000) showed significant correlations.

When Trust was added as an independent variable, trust was highly significant (β=0,330; *p*=0,000) whereas the effects of user feedback (*p*=0,343), doctor recommendation (*p*=0,142) and health status (*p*=0,097) became insignificant. Marketing exposure continued to show a significant correlation with WTP. However, the correlation became weaker (β= -0,262; *p*=0,003) and is therefore also mediated.

To sum up, brand consistency shows no significant effect on WTP. **Marketing Exposure, User Feedback, Doctor Recommendation** and **Health Status** have mediated effects on WTP. Age on the other hand, has a direct effect on WTP. These findings support hypotheses H6 and H8, whereas H2 and H4 are not supported.

	WTP			WTP (including Trust)		
Variables	**β**	**Std. Error**	**p**	**β**	**Std. Error**	**p**
Brand Consistency	0,068	0,091	0,457	-0,084	0,085	0,318
Marketing Exposure	-0,398	0,096	0,000	-0,262	0,088	0,003
User Feedback	0,474	0,089	0,000	0,085	0,089	0,343
Doctor Recommendation	0,267	0,089	0,003	0,121	0,082	0,142
Gender Male	0,086	0,107	0,424	0,089	0,098	0,366
Rank	0,063	0,040	0,113	0,053	0,036	0,144
Education	0,083	0,037	0,026	0,063	0,034	0,066
AppsIns	0,002	0,002	0,421	0,000	0,002	0,796
AppsBuy	-0,001	0,011	0,910	0,009	0,01	0,369
purchased	-0,001	0,004	0,825	-0,002	0,003	0,505
General Adoption	0,034	0,031	0,287	0,025	0,029	0,379
Value of App	-0,130	0,082	0,114	-0,189	0,075	0,012
Hstatus	0,187	0,064	0,004	0,099	0,059	0,097
Hmotivation	0,048	0,060	0,425	-0,076	0,056	0,177
Stinginess	0,038	0,062	0,541	0,059	0,056	0,300
Ppower	-0,035	0,061	0,574	-0,013	0,056	0,818
Age	0,038	0,005	0,000	0,028	0,005	0,000
Trust	xxx	xxx	xxx	0,330	0,031	0,000
	R Squared = ,225 (Adjusted R Squared = ,201)			R Squared = ,356 (Adjusted R Squared = ,335)		

Table 7: Mediation Analysis on WTP1

Mediation Analysis on WTP 2

Since WTP was measured with two items, the next paragraphs will investigate if the results for WTP2 are in line with the current findings.

Another multivariate GLM was run to test the effects on WTP2. Similar to the analysis of WTP in the previous paragraphs, brand consistency had no significant effect (*p*=0,209), whereas marketing exposure (β= -0,214 *p*=0,000), user feedback (β=0,873 *p*=0,000) and doctor recommendation (β=0,311; *p*=0,008) showed significant results. Further the general willingness to adopt (β=0,123 *p*=0,003), health status (β=0,300 *p*=0,000), health motivation (β=0,159 *p*=0,044), stinginess (β=0,209; *p*=0,010) and age (β=0,019; *p*=0,005) showed significant correlations.

Again, when trust was added, it showed a highly significant correlation (β=0,526; *p*=0,000). The effects of marketing exposure (*p*=0,971), doctor recommendation (*p*=0,444), health motivation (*p*=0,582) and age (*p*=0,449) became insignificant. Health status (β=0,160; *p*=0,031) and user feedback (β=0,251; *p*=0,024) showed still significant effects, but the correlations were substantially weaker. Stinginess (β=0,242; *p*=0,001) and the General Willingness to adopt (β= 0,110 *p*=0,002) kept showing nearly unaltered results.

Consequently, **Marketing Exposure, User Feedback, Doctor Recommendation, Health Status, Health Motivation** and **Age** have mediated effects on WTP2, whereas Stinginess and the General Willingness to adopt are not mediated by trust and have direct effects. Again, Brand Consistency is insignificant on willingness to pay. These findings are in line with the results on WTP in the previous part. Once more, H6 and H8 are supported, whereas H2 and H4 cannot be supported.

	WTP2			WTP2 (including Trust)		
Variables	**β**	**Std. Error**	**p**	**β**	**Std. Error**	**p**
Brand Consistency	0,151	0,12	0,209	-0,092	0,105	0,382
Marketing Exposure	-0,214	0,126	0,090	0,004	0,110	0,971
User Feedback	0,873	0,117	0,000	0,251	0,111	0,024
Doctor	0,311	0,117	0,008	0,078	0,102	0,444

Recommendation						
Gender Male	-0,16	0,141	0,256	-0,156	0,122	0,203
Rank	0,040	0,052	0,439	0,024	0,045	0,590
Education	0,057	0,049	0,240	0,025	0,042	0,551
AppsIns	-0,001	0,002	0,625	-0,004	0,002	0,044
AppsBuy	0,002	0,014	0,897	0,018	0,012	0,145
purchased	0,005	0,005	0,327	0,002	0,004	0,557
General Adoption	0,123	0,041	0,003	0,110	0,036	0,002
Value of App	0,019	0,108	0,860	-0,075	0,094	0,427
Hstatus	0,300	0,085	0,000	0,160	0,074	0,031
Hmotivation	0,159	0,079	0,044	-0,039	0,070	0,582
Stinginess	0,209	0,081	0,010	0,242	0,070	0,001
Ppower	-0,090	0,080	0,264	-0,055	0,070	0,427
Age	0,019	0,007	0,005	0,005	0,006	0,449
Trust	xxx	xxx	xxx	0,526	0,038	0,000
	R Squared = ,212 (Adjusted R Squared = ,188)			R Squared = ,410 (Adjusted R Squared = ,391)		

Table 8: Mediation Analysis on WTP2

5.3.5. Result table

The following table summarizes the results

Hypotheses	
H1: Brand consistency has a positive effect on the acceptance of mobile health applications, mediated by trust.	**Supported**
H2: Brand consistency has a positive effect on the willingness to pay for mobile health applications, mediated by trust.	**Not Supported**
H3: Marketing exposure has a positive effect on the acceptance of mobile health applications, mediated by trust.	**Not Supported**
H4: Marketing exposure has a positive effect on the willingness to pay for mobile health applications, mediated by trust.	**Not Supported**
H5: A doctor recommendation has a positive effect on the acceptance of mobile health applications, mediated by trust.	**Supported**
H6: A doctor recommendation has a positive effect on the willingness to pay for mobile health applications, mediated by trust	**Supported**
H7: A high user rating has a positive effect on the acceptance of mobile health applications, mediated by trust.	**Supported**
H8: A high user rating has a positive effect on the willingness to pay for mobile health applications, mediated by trust.	**Supported**

Table 9: Result table

An unforeseen finding is, that marketing exposure had, as expected, significant mediated effects on the dependent variables, but **negative** ones. A possible explanation for this phenomenon will be given in the next chapter.

6. Conclusion

In this chapter, the findings of this research will be discussed and the academic contribution as well as the managerial implications will be presented. Finally the research's limitations and directions for future research will be pointed out.

6.1 General Discussion

The results of the analysis give interesting insights in the world of mHealth application adoption. The majority of the hypotheses were supported and robust evidence was found that trust is an important driver of adoption decisions in the context of mHealth applications. Two different approaches were used and both led to the same conclusions, reinforcing the strength of the empirical evidence this thesis provides. All manipulated variables had a strong relationship with trust. Even if the direct effects on the dependent variables were insignificant, the relationship with trust was significant. Consequently, all manipulated variables were of substantial importance for building consumer trust. The next interesting result is, that brand consistency was significantly related to trust and the intention to use a mobile health application, but had no significant effect on WTP. This suggests that people are more likely to use a branded health application, since it is perceived trustworthy, but they are not willing to pay a price premium. Another unforeseen finding is, that even though marketing exposure had significant mediated effects on the dependent variables, they were not positive, as expected, but in contrary negative. Marketing exposure consequently had a negative effect on the intention to use mobile health applications and willingness to pay, mediated by trust. One possible explanation is that the advertisement used in the experiment seemed unprofessional, and respondents therefore believed that the whole application might not be of high quality. Further, the choice of advertising form could have strengthened this effect: Internet banners might not be perceived as particular trust building in general, since they are often also used for dubious or even illegal products and services. The combination of a poor advertisement design combined with the chosen form of advertisement, might have caused the reverse effect: It lowered the subjects' expectations instead of increasing them. User feedback and doctor recommendations on the other hand showed the expected effects: Both built trust in the service, which in turn lead to higher acceptance ratings and willingness to pay a higher price. This shows that both forms of recommendations are of substantial importance in creating and retaining consumer trust online. In general, user feedback had the strongest effects on consumer perception, followed by doctor recommendations.

Additional findings

Beside the manipulated variables, also some control variables showed significant effects on building trust, acceptance and willingness to pay. The number of apps installed on the device of a subject showed a significant positive correlation with the intention to use a mobile health application, mediated by trust. It seems like the more experience a user has in dealing with applications the more trustworthy an application is perceived, which in turn lead to a higher intention to use the application, but not in a higher willingness to pay. An experienced user is therefore more likely to adopt mobile health applications.

Another interesting finding is, that the health status of a person seems to have a strong effect on the person's intention to use and willingness to pay for health applications. A person, who has to visit doctors more often, is consequently more likely to use an application and also willing to pay a higher price than a "healthy" person. Further, health motivation had a highly significant direct effect on the intention to use mobile health applications. People, which actively try to protect themselves against health hazards or prevent health problems, are more likely to use health applications, since they are suitable and practical tools to achieve that.

Stinginess showed a negative direct effect on the intention to use a health application. A possible explanation for these findings might be that people in general expect health applications to be expensive and therefore are less willing to use them, when they are concerned about their spending. Surprisingly, the first WTP measure had no negative relation with stinginess. This might be caused by the research design: The item asked the respondent to choose a price between EUR 0 and EUR 10. Consequently they could choose "0", so that the app was free. Astonishingly, stinginess had even a positive effect on the second WTP measurement. The stingier a person was, the likelier he or she was to buy a health application on a pre-stetted price, when informed about usual price ranges of such services.

Customer-initiated informational empowerment had a negative direct effect on the intention to use the applications as well. People, who normally inform themselves about procedures and give their opinions about treatments, are less likely to use health applications. This might be result of the inability to question the underlying concept of health applications. Different than doctors, applications cannot respond to agreement or disagreement with a proposed treatment or answer medical questions.

Finally, also age showed some significant correlations. Age had a significant mediated relationship to the intention to use health applications. With higher age, people were more willing to use these programs. Further age was also positively correlated with WTP. A possible explanation for these findings might be, that persons with higher age might in general be more willing to spend money on healthcare and are also more willing to explore new tools to prevent and fight health problems.

6.2 Academic Contribution

This research is intended to offer an empirical contribution to the literature on adoption of mobile health applications. As the literature review showed, there is an ongoing debate on what drives adoption of online services. Especially the role of trust, brands, marketing efforts, feedback and recommendation systems are recurring topics in the literature. Is adoption driven by consumer trust on the brand behind the launch? Which role does the consistency between the mother brand and the application focus play? Does a marketing campaign boost adoption? How important are user and expert reviews for the success of an app?

Looking at the published research on mobile technology and the adoption of mobile services, a lot of literature can be found about topics like mobile banking services, games and mobile Internet in general. However, in the mobile healthcare application field, little research has been done so far. Published articles about mobile health care mainly focus on topics like telemedicine or eHealth in general, but not particular on applications. This thesis shall help to close this gap, by exploring the drivers of adoption of mobile health application and the consumer's willingness to pay for such services.

Further, since previous literature highlighted the importance of trust in the online environment, the role of it was examined too. The results of this thesis contribute to the academic literature: The findings support that trust plays a substantial role in the World Wide Web. Trust was found to have a mediating role and therefore supports research done by Smith et al. (2005), who also found that trust acts as a mediator. Further, the findings of this research contribute to the branding literature. Brand consistency was found to have a positive effect on the intention to use products or services. This result is in line with expectations, built on existing literature. However, brand consistency did not have a significant effect on the willingness to pay. This finding contradicts the prevailing view in the literature that established brands could charge a price premium.

Finally, this thesis backs up literature on online word of mouth and recommendations. The expected importance of user feedback and professional recommendations in building consumer trust, increasing willingness to pay and acceptance, is supported by the results of this study. However, an unexpected result of this study is, that marketing exposure had negative effects on trust, willingness to pay and acceptance in general. This effect, however, is likely to be caused by the research design and will be discussed in the limitation section.

6.3 Managerial Implications

According to the Mobile Health Market Report 2013-2017 published by research2guidiance.com, currently more than 97.000 mHealth applications are listed in app stores. The top 10 mHealth applications generate up to 4 million free and 300.000 paid downloads per day. The US top 10 iPhone mHealth apps generate 5.5 Mio lifetime downloads on average. The app user base grows 15 times faster than the stationary Internet user base, with a CAGR of 251% over the past 5 years. By 2018, the mHealth market is predicted to be a mass market with a reach of more than 3,4 billion mobile end devices with access to mobile applications. Approximately 50% of their users will have downloaded an mHealth application by that time.

Additionally, the mHealth market revenue will have grown by 61% (CAGR) to USD 26 billion by the end of 2017. These figures highlight the importance and potential of the mHealth market. Choosing the right strategy to launch an application can be key to success. The results of this thesis can help marketers to understand the underlying concepts of mHealth adoption and willingness to pay and have therefore managerial relevance.

The results show, that trust is indeed a key tool to success in the online world. When shopping online, consumers face higher levels of risk than in the offline environment, which makes trust an even more important factor. The present research, found three measures, which can be used by companies to increase consumer trust: Brand consistency, user feedback and professional recommendations proofed to be successful tools in building consumer trust.

What is more, it was found, that feedback and recommendations also had a positive impact on the acceptance and willingness to pay for mobile health applications. Brand consistency, on the other hand, was effective in increasing intention to use health applications, but not willingness to pay. Additional findings suggest, that the mobile health application market might not be limited by age. People of higher age seem to be willing to use health applications and are even ready to pay more for those services. No significant differences in the acceptance of health applications were found among educational levels and gender.

The substantial importance of user feedback suggests, that companies should take good care of their customers. Their word of mouth, in form of ratings, was found to be the strongest influencer of trust and consequently acceptance and willingness to pay. Therefore, existing satisfied customers have the potential to be one of the main driving forces to build trust, acquire new customers and consequently to charge price premiums. Further, the results show that poorly designed advertising can impair trust, acceptance and willingness to pay. Therefore it might be more beneficial for companies to just refrain from advertising, rather than launching not well-designed ads. On popular social media sites, such as Facebook, a lot of advertisement banners are shown. Often, these banners have a very unprofessional appearance and are even not correctly translated. In the light of the findings of this thesis, banners like these, might do more harm than good.

6.4 Limitations and Directions for Future Research

The present research has several limitations. First, the sample consisted of 158 persons with a tendency towards young Austrian respondents. Further the majority of the sample was male with a rather high average educational level. Another limitation is that the presented screenshots were designed for iOS devices. Even tough, the other systems have a similar appearance and structure; it is not exactly the same. This could have resulted in unfamiliarity for non-iOS users, resulting in a higher time needed to find relevant information. To address this problem, important information was also summarized in a text below the screenshots. Moreover, the study was performed without any financial support. Even though the screenshots were designed professionally, the advertisement-banners shown in the “Marketing Exposure” manipulations, were not. Due to the lack of graphical skills of the author, the banner was designed in Microsoft Power Point. Consequently, the banner was kept simple, which might have caused it to appear unprofessionally. The results illustrate, that subjects who saw the banner, showed lower levels of trust, acceptance and willingness to pay. Future research could address these limitations. A study with manipulations for every mobile system and professionally designed content could bring additional insights, and potentially confirm, that the negative effect of marketing exposure was caused by poor graphical design. Further, a bigger study could focus on between subject manipulations only, rather than using within subject manipulations too.

7. References

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