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ABSTRACT

OBJECTIVE: The globalization of economy has led to the increased importance of data exchange. Data exchange occurs in multiple transactions. This research focuses on data exchange when downloading a running app. The objective of this research is to identify the impact of three variables, being country-of-origin (COO), familiarity and nature of access on trust, risk perception and intention to download. Furthermore, a second analysis was conducted to test the mediation and direct effects of trust and risk perception on download intention, as well as the effect of trust on two types of risk.
METHOD: The product that was used to test these relations is a smartphone running app. The research was conducted by means of a 2 (COO: Netherlands vs United States of America) x 2 (familiarity: familiar vs. unfamiliar) x 2 (nature of access: paid vs. free) experiment. A total of 323 responses were collected. All respondents are Dutch and between 18 to 35 years old. They were randomly assigned to one of the eight conditions. A scenario was sketched in which the respondent was on the verge of downloading a running app. In order to test the formulated hypotheses, familiarity, COO and nature of access have been manipulated.
RESULTS: The findings revealed two significant main effects, being COO on trust and nature of access on privacy risk. Respondents indicated to have higher trust in American apps and to perceive less risk with paid apps. No two-way or three-way interaction effects were discovered. These main effects contradict the hypotheses, which resulted in all hypotheses to be rejected. The results of the second analysis show significant effects for: trust on download intention; privacy risk on download intention and trust on privacy risk. The main effects of the additional analysis support the hypotheses. The higher the perception of trust, the higher the likelihood of downloading the app. Furthermore, the higher the perception of risk, the lower the intention to download the app. Regarding the relationship between trust and risk, higher trust resulted in a perception of less privacy risk.
CONTRIBUTION: A contribution of this research is that it has been proven that privacy risk is still an important issue, although the sharing of personal data has become more common. The direct effects of the second analysis gave an insight into the relationships between trust, risk perception and intention, which can be used by companies/organizations that have products that request and/or deal with personal data.
CONCLUSION: In the case of running apps, Dutch people do not have a preference for Dutch apps. Furthermore, a paid app does not necessarily induces higher trust. Most important result is the crucial role of trust for both risk perception and download intention.

KEYWORDS: trust, download intention, risk perception, COO, familiarity, nature of access.

CONTENT

1. INTRODUCTION

In the current mobile world, individuals prefer to use smartphone applications, abbreviated ‘apps’, instead of surfing traditional web sites. A research by Statistics Netherlands (2013) shows that the usage of smartphones for internet access rose from 11 per cent in 2005 to 72 per cent in 2013, whereas the usage of computers for this purpose decreased from 78 per cent in 2007 to 71 per cent in 2013. The increasing offer of apps available to download for different mobile operating systems such as iOS, Android and Windows, promotes this tendency.

There is a wide range of apps available to download. In January 2017, a number of 2.2 million mobile apps were offered in the Appstore, which is used by Apple clients (Statista, 2017) and 2.8 million apps for android users. In their chart, Statista shows that the number of available apps for download increased by 200.000 from June 2016 to December 2016. Other figures from their research show that in December 2016, the most popular apps were gaming apps with a share of almost 25 per cent of all available apps (Statista, 2016). Next to gaming apps, the Apple Appstore categorizes its apps into twenty-four other categories, such as travel apps, sport apps and business apps. Thus, mobile apps exist for numerous purposes.

The app-category this study focuses on are health and fitness apps, more specifically: running apps. Running apps have been chosen, since the current society increasingly focuses on a healthy lifestyle (The Hartman Group, 2015), in which these apps are frequently used and might play an important role. Accordingly, mobile health tools potentially better the quality of healthcare (Becker, Miron-Shatz, Schumacher, Krocza, Diamantidis & Albrecht, 2014).

To provide an insight into the health and fitness app category, a calculation by Statista (December, 2016) showed that a share of 2.97 per cent of all total apps available could be assigned To this category. This percentage indicates that, by using the numbers of June 2016, at least 65 thousand health and fitness apps were available by then. Following the trend of an increasing number of apps every month, one can assume the number to be higher than 65 thousand at the moment of writing.

Running apps assist individuals before, during and after their work-out. The app uses GPS information to display and outline the route and registers the users’ pace, exercise duration and the amount of calories that have been burnt. Next to these basic features, many extras and other features are offered, such as training schedules and interval training. Logically, apps differ in their features. Because of the lack of published numbers, we are not able to provide information concerning the current usage of running apps in specific. However, an earlier unpublished research has shown that running apps are used in multiple age categories, in multiple countries (Schwarte, 2015). This can be explained with the disposal of running apps all over the world, for every person that owns a smartphone and has internet access. Additionally, a study by PricewaterhouseCoopers (2015) showed that mobile health apps will be among the top three biggest mobile trends of 2016, and have a significant impact on healthcare in the United States of America. Furthermore, this study also indicates that trust in health apps will grow

continuously and that it becomes essential for health professionals to adapt to digital healthcare tools. This as well confirms the importance of this topic.

However there is an increased acceptance towards mobile transactions among people (Markets Insider, 2017), people's privacy concerns should be taken into account. As mentioned above, personal data/information is shared with the running app. Whether it is GPS-data or the user's personal agenda, for most people it is unknown whom the information is shared with. The relevance of describing the influencing factors on these concerns is high.

Although apps are thus downloaded extensively, app designers logically remain interested in particular elements. Among those elements lies consumer trust. It is critical to be aware of the predictors of trust, as trust creates satisfaction and fulfills expectations among consumers. Lewicki and Bunker (1966) add that trust is an essential aspect of most relationships, regardless of its nature. Nevertheless, in order to gain trust, app developers are required to be aware of consumers´ concerns and risk perceptions, especially in the case of apps that involve personal details (Milne, Pettinico, Hajjat & Markos, 2016).

Perhaps the most challenging task for app developers is put forward here. Why do individuals trust certain running apps more than other? On the contrary, it is important to have understanding of factors that increase or decrease the level of risk that (potential) consumers perceive when they are on the verge of downloading a running app. In the end, the eventual goal of app-development companies is that apps are actually downloaded by consumers and that they are happy with their purchase. It is essential for them have knowledge of the stimuli and hindrances of download intention.

The purpose of this study is to provide understanding into the factors that influence consumers' trust and risk perception, as well as their intention to download running apps. Studies of the past have already identified multiple antecedents of trust and other behavioral outcomes (Beldad, De Jong & Steehouder, 2010; Mayer, Davis & Schoorman, 1995; McKnight & Chervany, 2002; Rotter, 1971). However, these studies did not focus on mobile apps, let alone running apps.

The selection of constructs for this study has been influenced by a global tendency. Data exchange has increased in relevance over the last years. A reason for that is the globalization of economy and thus production. To illustrate, product parts are manufactured in multiple countries around the world, distribution centers are established abroad and customer-bases are expanded internationally. This globalization changed companies' needs, efforts and ability to monitor and measure their businesses properly. Decision makers have to be able to base their decisions on up-to-date and reliable data. The importance of this topic led to the organization of a conference in Geneva for national accountants in which the topic of measuring the global economy was discussed. The accountants were in agreement that solutions for sharing data among statisticians were highly needed (UNECE, 2017).

However the importance of these solutions was recognized, other essential factors have to be taken into consideration, such as trust, which is indispensable for data exchange. Since data exchange is managed according to different national legislations, possible solutions could not be implemented yet. Therefore, expert groups are working on principles for statistics in all countries. The importance of data exchange on a global level has now been described. This research however, focuses on an individual perspective. The country of development of the app determines the processing of personal data that will be shared by the user, as legislation for this differs between countries. It is interesting to investigate what impact the COO has on the intention to download the running app. Furthermore, it is important to be aware of the influence of the COO on the perception of trust and risk in the app. This point of research was also encouraged by Rosenbloom and Haefner (2009). The importance of the COO and its influence on data processing has made it become the scientific focus of this research.

The relevance of COO could be influenced by other constructs, such as familiarity. It is assumable that when people want to download an app, the familiarity of the app plays a large role in the decision to download the app. Therefore, in the case of a running app, it would be interesting to see what the influence of familiarity is when the COO is known, as data exchange and data privacy are very important. Will the COO is of the same importance when individuals are familiar or unfamiliar with the app, just as the other way around. Furthermore, the perception of risk when the person is familiar with the app, although that person is aware of the less-developed privacy legislation of that country, is interesting to research as well. Familiarity has been identified to be closely connected to trust (Luhmann, 1979), and thus risk perception (Mieres, Martin and Gutierrez, 2006) and download intention (Laroche, Kim and Zhou, 1996). Furthermore, familiarity is an important variable to take into account, because the growing number of online media platforms resulted in an increased likelihood of coming across the concerning apps and thus getting familiar with them.

The impact of the COO of the app could also be influenced by the difference in access to the app, meaning whether one has to pay for it or not. Therefore, third independent construct that has been selected for this research is called nature of access. Additionally, nature of access has been selected since people have to make a decision whether to download a free app or a paid app, since both are at their disposal. Nature of access is interesting as this variable seems to be a simple yes-or-no matter, which is not the case for this research, because of the importance of personal data. For instance, it is interesting to know whether potential consumers associate paid apps with higher trust, even though the app was made in a country with less privacy legislation.

Furthermore, it is assumed that COO is moderated by another variable. The attitude that individuals have toward domestic and foreign products could have an impact on the effect of COO. This can be operationalized as consumer ethnocentrism. What impact does their level of ethnocentrism have on their preference for the country of development of the product? Studies of the past (Baughn & Yaprak, 1993; Verlegh & Steenkamp 1999) already discovered the existence of a bias against products from

abroad and also one in favor of domestic products. Balabanis and Diamantopoulos (2004) and Jaffe and Nebenzahl (2001) claimed that the extent to which individuals are ethnocentric differs per product category. Thus it is analyzed whether ethnocentrism exists for a mobile app.

The case of running apps in combination with these variables is a new approach in science and therefore encouraging to conduct research into. The importance of data exchange nowadays increases the relevance of this research. Furthermore, the increasing tolerant attitude towards mobile transactions and downloads addresses the importance of research in this field for both consumers, and app developers. The primary research question of this study is: "to what extent do country of origin, familiarity and nature of access (free vs paid) influence risk perception, trust and download intention?"

Next to the effects of the manipulations on the dependent variables, another analysis will be performed. In previous research, the predictors of intention have been investigated extensively. It has been documented that trust mediates the effect of independent variables on intention. In the studies of McKnight et al., (2002), Pavlou, (2003), Qureshi, Fang, Ramsey, McCole, Ibbotson and Compeau (2009) and Ganguly, Dash and Cyr (2009), trust has been identified to function as the mechanism through which independent factors increase intention. Furthermore, risk has been identified as a mediator for online purchase intention as well (Park, Lennon & Stoel, 2005); Moreover, trust and risk perception have proven to be direct predictors of intention. Therefore, an additional analysis will be performed to provide insights into the mediating role of trust and risk, as well as the direct effects of trust and risk perception on download intention.

These relations are expressed in the following research question: "To what extent do trust and risk mediate the effects of the manipulations and what is the influence of trust, privacy risk and technical risk on each other and on download intention? This study will be the first to explore the mediating role of trust and risk on the effects of COO, familiarity and nature of access on download intention. The theoretical framework will elaborate on previous studies that focused on these variables. The hypotheses belonging to this additional analysis will be presented in the theoretical framework as well.

The theoretical framework starts with further insights into mobile apps and health – and running apps. Then, the relation between these apps and risk perception, trust and intention to download is described. The subsequent section describes the independent variables of this research and their relation to the dependent constructs. Furthermore, the interactions between COO, familiarity and nature of access are described here. After the independent constructs, the dependent variables are described more thoroughly. After the theoretical framework, the research methodology of this experiment is described, after which the results of both analyses are displayed. This article ends with a discussion and conclusion section, including research implications and future research recommendations.

2. LITERATURE REVIEW

Although the introduction provided insights into the world of mobile apps, this literature review elaborates further on this topic. Furthermore, the independent variables COO, familiarity and nature of access are further described as well as dependent constructs risk perception, trust and download intention.

2.1 Mobile apps

Having described the particular group of apps of this research focuses on, more considerations should be taken into account. Although it is been done extensively, downloading an app could not be as safe as people might think it to be. Whether the app is effective, whether it works, whether it gives the right information and the risks related to downloading the app, should be considered as well.

Health apps in general and running apps specifically, often collect and process a substantial amount of sensitive and personal data in order to let its features be utilized optimally. Running apps request access to users' mobile cameras, contact details, locations, and sometimes even agendas, working schedules and eating habits, which is highly private information. Again, the number of requests made depends on the features the app offers. Thus, this insinuates that the more services offered by the app, the higher the level of risk could be.

The following sections will elaborate on the independent variables COO, familiarity and nature of access, and their effect on the dependent variables. Also, the interaction between the three independent constructs will be investigated. Hypotheses will be presented for both the main effects as the interaction effects. Afterwards, the relationships between trust, risk perception and download intention will be described, including hypotheses.

2.2 Country of origin

COO is especially typified by the 'made in ___' phrase. As this research does not deal with a tangible product, it is the country in which the app has been developed to be considered as the COO. Perhaps for some people the COO might not be very important when it concerns physical products such as a laptop or a glass table. For this research however, given the privacy and security issues with running apps, COO could play an important role, as not every country deals with privacy similarly.

As above is indicated, the importance of COO might differ per product (category). This distinction has already been documented in studies of the past (Etzel & Walker, 1974; Hampton, 1977; Nagashima, 1977). Balabanis and Diamantopoulos (2004) found in their study among British respondents that the British favored food products from their home country over food products from foreign countries, whereas they indicated that not Britain, but other countries were preferred for other product categories, such as cars, clothing and TV's. Chao and Gupta (1995) even proved that COO effects not only differ per product category, but per model within a product category as well.

This still raises the question why people would have more privacy concerns when the app has not been made in their COO. In a study of Bilkey and Nes (1982) citing Hampton (1977), it is shown that perceived risk is higher for products made abroad, compared to similar products that are made in the consumers' COO. An explanation for this was given by means of taking the level of development of the country into account. Products from less developed countries are perceived to be more risky than products that are made in more developed countries. It also entails the degree of involvement with the product. When buying a table for instance, people do not have to upload their location, whereas they have to when downloading a running app.

As previously mentioned, privacy issues play an important role for running apps, as personal data need to be protected carefully. Countries differ in their national legislation for the protection of personal data. In this research, apps from the United States of America and from the Netherlands are used, meaning two different privacy policies can be distinguished (USA vs. EU). An important difference between the USA and the EU approach to privacy protection is the presence of a covering data privacy and protection framework, which is the case in the EU, but not in the USA (Weiss & Archick, 2016). Furthermore, it is allowed to collect and process personal data in the USA as long as it does not cause harm. In the EU however, according to the European Commission (2016), it is not allowed to process personal data, unless there is specific legal support that makes this possible. This relates to the argumentation of Hampton (1977) about the level of development of the country being an influence factor of the level of perceived risk. For the case of this research, the USA are not underdeveloped in comparison to the Netherlands economically. However, taking the legislation concerning privacy into account, the Netherlands are ahead of the USA.

The previous section indicates that privacy risk is an important factor for the COO construct. Phar (2005) and Usinier and Cestre (2007) claim that COO is inescapably connected with product evaluation and purchase intention. This connection can either be positive or negative. It depends on other factors that influence consumers' perceptions of the country, such as the overall image the consumer holds of the country. Furthermore, the economic situation in that particular country (Rezvani, Dehkordi, Rahman, Fouladivanda, Habibi & Eghtebasi, 2012) could play a role also. Product purchase and intention to download can be considered to be similar. One of the greatest differences lies in the fact that free apps are available as well. Although there is no monetary risk, the risk of privacy loss is still present.

As already put forward in the introduction, the presence of COO as a variable for this research increases the importance of Dutch consumer ethnocentrism. Previous studies have documented the role of COO as a determinant of a consumer's unfavorableness of the product (Baughn & Yaprak, 1993; Verlegh & Steenkamp, 1999). Balabanis and Diamantopoulos (2004) claim in their study that a country its competitiveness influences the way consumers perceive that particular country as a COO. Wright (2000) states that individuals which are low in ethnocentrism are more willing to buy products

from countries that have a dissimilar culture. Sharma et al. (1995) add that cultural similarity between countries might blur the effect of ethnocentrism between a products' COO and an individuals' home country. Therefore, COO is considered to influence behavioral outcomes in the following way:

> *H1a:* Apps developed in the consumers' COO will generate a) less risk perception, b) higher trust and c) *higher* intention to download instead of apps developed abroad.
>
> *H1b:* The effect of COO on a) risk perception, b) trust and c) download intention is moderated by the level of ethnocentrism of the consumer.

2.3 Familiarity

In modern society, different large-scale communication platforms are used by consumers to gain and provide insights into products, services and companies that provide them. Social media speeds up the communication among consumers (C2C) and between consumers and businesses (B2C) extensively. Due to the constant provision of information on these different media platforms, familiarity with an app is obtained more easily and rapider than before.

According to Luhmann (1979) who conducted a study on the relation between familiarity and trust, familiarity can be operationalized as an understanding of current actions of other individuals or objects. Most of the time these understandings are based on previous experiences. In the case of this research, familiarity can be operationalized as the extent to which respondents know about the existence of the app, based on information from other people (Beldad, Karreman & Behrens, 2016).

Similar to trust, familiarity reduces uncertainty, thus the perception of risk in a situation, by creating structure (Luhmann, 1979). Additionally, increased brand familiarity results in less risk perception according to Mieres et al., (2006). Another study by Nepomuceno, Laroche and Richard (2014) which tested the effect of brand familiarity and product knowledge on perceived risk, showed that brand familiarity decreases risk perception, although the effect of product knowledge was stronger. Thus, out of the literature can be concluded that brand familiarity tends to reduce risk. However, this does not immediately mean that this is also the case for running apps as well, which makes it therefore highly important to study the effect of familiarity in the case of running apps.

Trust and familiarity are, as indicated in the previous paragraph, connected with each other. They both decrease uncertainty. According to Siegrist, Gutscher and Earle (2005), trust involves risk and vulnerability, which is important when an individual's familiarity with the product or company is low. Additionally, trust is based on confidence, which in turn is based on high levels of familiarity. Familiarity is considered to be a precondition for trust (Luhmann, 1979). It is considered as a precondition for trust, as familiarity creates a background to which trust can be anchored. In addition, Gefen (2000), Komiak and Benbasat (2006) and Benedicktus, Brady, Darke and Voorhees (2010) indicated that higher familiarity increases trust.

A study by Laroche, Kim and Zhou (1996) also indicated that brand familiarity influences purchasing decisions. Furthermore, multiple studies have conducted research into the effect of brand familiarity on purchase intention, and have shown brand familiarity to have a significant positive impact on purchase intention (Kamins & Marks, 1991; Park & Stoel, 2005; Hajli, Sims, Zadeh & Richard, 2017). Therefore, the effect of familiarity on risk perception, trust and download intention is worthwhile to investigate.

The positive connection between high familiarity and behavioral outcomes is described in hypothesis 2. Familiarity with an app can also include a corresponding COO of the product and the consumer.

Hence, the following is hypothesized:

> *H2: High* familiarity with the app will result in a) lower perception of risk, b) higher trust in the app and c) *stronger* intention to download the app.

2.4 Nature of access

Besides familiarity and COO, nature of access has been entered into the research as the third independent variable. Although free apps are available, it is interesting to find out how the nature of access influences downloading decisions and other behavioral outcomes, as well as how nature of access interacts with familiarity and COO. People might be willing to pay for an app when it is familiar to them and/or has been developed in their own country, instead of downloading a free app from a country they do not trust their personal data to.

Nature of access is perhaps the most straightforward influence factor of download intention of an app. In this research, nature of access can be defined as whether a potential app-downloader has to pay for an app or not. Thus, access through payment or access through free downloading. Especially because the majority of apps is free, there are enough reasons to not buy an app, but to choose a free alternative. According to literature, the availability of alternatives has an influence on consumer behavior. In their study, Campo, Gijsbrechts and Nisol (2000) found that the disposal of alternatives results in higher likelihood of choosing other products. Additionally, Hsu and Lin (2015) proved that free alternatives to paid apps negatively influence the intention to purchase apps. This clearly indicates that, in the case of apps, a free alternative might definitely influence consumer behavior.

Lu, Lin and Lin (2016) found out that users of IOS operating systems downloaded more paid apps than Android users. In their study, it is stated that free apps increase in popularity, but paid apps certainly still generate profit. Main source of revenue are advertisements and the downloading of paid upgrade versions without advertisements.

For this research, a paid app could engender a perception of high quality, instead of the perception of ‘wasting’ money on an app, of which a similar free version is available as well. Especially in the case of running apps, in which the sharing of personal data takes on an important role, quality and trustworthiness are desired by consumers. Trust is important, as Wang et al. (2003) found out that trust

could stimulate people to commence online transactions and share personal information. An important issue is put forward here, because which app is more trustworthy, the free or the paid one? In their study, West, Hall, Hanson, Barnes, Giraud-Carrier and Barret (2012), concluded that more expensive apps were considered to be more trustworthy and more recommendable than less expensive, or free apps. This finding is explained by stating that apps with many functions simply carry a higher price. The paid apps that were used in that study however, offered more functions than their free alternatives, which might have accounted for a large share of the finding.

Additionally, Lichtenstein, Ridgway and Netemeyer (1993) advanced that consumers attach more quality to a higher price. Quality in its turn positively influences purchase behavior according to their research. However, since the offer of apps is immense, and because it is more common to download free apps, it is not assumed that when an app has to be paid, it stimulates consumers' download intention.

With regard to risk perception, nature of access could be vital. Downloading a paid app includes, to a certain extent, monetary risk. However in most cases the price of an app is not high, it is assumable that consumers choose free alternatives. However, this assumption might not account for the present study, as monetary risk might be undervalued in comparison to privacy risk. Whether the app is paid or free, privacy risk is taken when downloading a running app. This does not count for other apps (e.g. gaming apps). Thus, the level of risk, but certainly the level of trustworthiness is under scrutiny in the case of running apps. People might perceive more risk in downloading free apps, because of a perception of lower trustworthiness. This, and the statements from literature suggest the following hypothesis:

> *H3:* A *paid* app generates a) lower risk perception, b) *higher* trust and c) *higher* intention to download than a free app.

2.5 Interactions between independent variables

2.5.1 Interaction between COO and familiarity

The interaction between COO and familiarity has been of interest for many years already. Samiee (1994), conducted an extensive literature study on this relation and concluded that familiarity is connected to the interpretation of a COO. According to Roth and Romeo (1992), the image of a country tends to be influenced by the familiarity consumers have with foreign products. Additionally, Balabanis Mueller and Melewar (2002) claim that the more an individual is in contact with a foreign country or its products, the more positive those products are perceived. This could be important for this research as Dutch people are in contact with America extensively. American sports brands and sports in general have found their way into Dutch culture, mainly via television and the internet. According to Han (1989), COO has a direct influence on consumer attitudes as the level of familiarity increases. However, the above addressed literature originates from before smartphones, and thus apps,

were on the market. A study by Ahmed and d'Astous (2008) showed that it was familiarity with the products that most strongly influenced country perceptions, not other variables such as the manufacturing process. The literature that is put forward in this section strongly indicates the influence of familiarity on the effect of COO. Therefore, the following is hypothesized:

> *H4:* Familiarity with an app significantly influences the effect of the COO of the app on a) risk perception, b) trust perception and c) download intention.

2.5.2 Interaction between COO and nature of access

Next to the interaction between COO and familiarity, this research will also look into the interaction between COO and nature of access. However no theoretical foundation exists for this interaction, it is assumed that the effect of COO on the intention to download an app is influenced by its nature of access. The difference in privacy legislation could become less important to (potential) consumers when the app is paid, since a paid app generates a perception of higher quality. However it is stated in literature that free alternatives are favored because the risk of making a wrong decision, with respect to the monetary loss which is not there, this might not be the case in this research. The risk of monetary loss might not be there, however the risk of privacy loss might become greater for free apps. At least, the perception of privacy loss might increase, since a free app might be associated with lower privacy standards. These considerations are described in the following hypothesis:

> *H5*: The nature of access of the app significantly influences the effect of COO of the app on a) risk perception, b) trust perception and c) download intention.

2.5.3 Interaction between familiarity and nature of access

Third interaction that will be considered is that of familiarity and nature of access. The level of familiarity is likely to influence the consideration of buying an app or downloading it for free. Especially since the price of the app is low most of the times, people might choose for the familiar app instead of the free app. In the case of this study, the price is only €0,99, which could increase the importance of familiarity with the app. It is therefore assumed that familiarity influences the effect of nature of access on the dependent constructs in such a way that people are more willing to download a paid app when they are familiar with it. This is expressed in hypothesis 6:

> *H6*: Familiarity with an app significantly influences the effect of nature of access of the app on a) risk perception, b) trust perception and c) download intention.

Furthermore, a three-way interaction between COO, familiarity and nature of access should be considered as well. Therefore, a research question has been formulated to address this interaction:

"To what extent is the effect of COO on a) risk perception, b) trust and c) download intention influenced by familiarity and nature of access?"

The following sections address the dependent variables and the relationships between them. This elaboration is accompanied with hypotheses concerning the relationship between trust and two types of risk perception, trust and download intention and two types of risk perception on download intention. Afterwards, the research model is presented.

2.6 Download intention

Dependent variable download intention, or in other studies formulated as purchase intention is an often defined construct. There is a difference between attitudes and intentions, as intentions concern *"the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behavior"* (Eagly and Chaiken 1993, p. 168). Attitudes on the other hand are considered as summary evaluations (Spears and Singh, 2004). Based on the previous conceptualizations, the following definition of download intention has been formulated: *"download intention is the sensible plan of an individual to put in effort to download an app".*

2.6.1 Online and offline market

When conducting research into the field of download intention, it is necessary to distinguish between online and offline consumer behavior. Morrissette, McQuivey, Maraganore and Lanpher (1999) state that in the online setting, customer loyalty is low in general. This is mainly caused by the demanding and utilitarian character of the online shopper. Another major difference between both frameworks is the inability to use all senses when purchasing products online. The consumer is limited to information from the web, whereas in offline transactions the consumer can address all his/her senses before buying the product (Koufaris, 2002). Furthermore, a logical but important difference is that consumers online have to deal with technological devices in order to buy their desired product (Van der Heijden, Verhagen and Creemers, 2003). Possibly the most important difference between online and offline transactions for this research is the risk that is attached to a purchase in both worlds. There is no risk of credit card fraud, receiving wrong or no products when the purchase is done in the offline market.

2.6.2 Attitudinal constructs on behavioral outcomes

Attitudinal constructs and their relation with behavioral outcomes such as purchase intention have been the focus of many studies in the past. Perhaps the most comprehensive study concerning the influence factors of intention that has been documented is that of Ajzen (1991), in which the Theory of Planned Behavior (TPB) is described. A theory that, according to Dainton and Zelley (2015), can provide a template for a way to persuade people to change their behavior. The TPB found its roots in the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1972). TRA can be used to predict human behavior. This model proposes that human beliefs indeed influence intentions, which in their turn influence actions. The connection between trust and behavioral intentions has also been found in other studies (McKnight, Choudhury & Kacmar, 2002; Pavlou, 2003). Additionally, in the TPB, Ajzen (1991) concludes a positive correlation between behavioral intentions and actions.

2.7 Risk perception

Perceived risk in an online setting, just as trust, appeared to be an important influence factor of behavioral outcomes such as intention. Before discussing existing literature on risk, it is essential to distinguish those types of risk that are important to this research. Jacoby and Kaplan (1972) distinguished three types of risk for web shopping in their study on the components of perceived risk, namely financial risk, product risk and information risk, which involves security and privacy issues. Two of those are applicable to the present study, being product risk and information risk.

Product risk, in this research operationalized as technical risk, was defined by Bhatnagar, Misra and Rao (2000) as *"consumers' belief regarding whether the product would function according to their expectations"* (p. 98). Dini Martinelli, Matteucci, Petrocchi, Saracino & Sgandurra, (2013) proved that malicious apps could leak personal data and harm the smartphone or tablet where it is installed on. Consumers cannot be entirely sure whether the app functions and delivers as they expect it will, as they might have based their purchase on electronic information, which can be incorrect. Consumers can also be misled by third institutions which have given deficient information concerning the app. Even the app itself could even give false information. It is assumed that technical risk is especially salient in free apps.

Information risk is certainly present because of the sharing of personal information (Culnan & Armstrong, 1999; Pavlou, 2003). Information risk, or privacy risk in this case, logically deals with the compromising of personal data by the app. Dinev and Hart (2006) defined privacy risk as *"the perceived risk of opportunistic behavior related to the disclosure of personal information submitted by internet users in general"* (p. 64). As a considerable amount of personal data is disclosed to the running app, privacy risk is important to this study.

2.7.1 Perceived risk and intention

As previously mentioned, risk has been identified as an influence factor of intention. A disparity between the role of risk in the online and offline market has been detected. Tan (1999) and Samadi and Yaghoob-Nejadi (2009) mentioned that risk is more present in online transactions than in traditional, offline transactions. According to Kim et al., (2008), perceived risk has a negative impact on intention. Other literature reviews have documented the negative role of risk in relation to intention as well (Antony, Lin & Xu, 2006; McKnight et al., 2002; Van der Heijden, 2003;). These relations have been translated into the situation of running apps in the following hypotheses:

H7a: The higher the level of privacy risk, the lower the intention to download the running app.

H7b: The higher the level of technical risk, the lower the intention to download the running app.

With regard to the mediating role of risk on the effect of the manipulations on download intention, three additional hypotheses have been formulated.

H10a: Higher privacy risk perception negatively impacts the effect of a) COO, b) familiarity and c) nature of access on download intention.

H10b: Higher technical risk perception negatively impacts the effect of a) COO, b) familiarity and c) nature of access on download intention.

2.8 Trust

Trust in a relationship basically entails a trustor and a trustee which aim for obtaining mutual benefit and therefore rely on each other. To realize this mutual benefit, willingness to take risk is required. Mayer, Davis and Schoorman (1995) advanced in their study that to be able to live in risky situations, trust is essential. These authors also state that individuals will enter a relationship which involves risk, when their level of trust is superior to their perceived risk. Here, the relation between trust, risk, and download intention has been indicated. However trust is domain specific (Zand, 1972), it is clear that trust is an important factor in the field of this research.

Throughout the years, trust has been researched extensively and defined in multiple ways as a result of its broad context and the increased interest in this concept. In this study, the operationalization of trust by Mayer et al. (1995) has been adjusted to the current field of study: "*the willingness of a consumer to be vulnerable to the actions of a running app based on the expectation that the running app will perform a particular action important to the consumer, irrespective of the ability to monitor or control the running app"* (p. 712). The profusion of definitions has led to a distinction of trust conceptualization. This implies that trust is either based on a perception of the trustee's character or on integrity and competencies (Lieberman, 1981). Therefore, trust has been distinguished into character-based trust, and competence-based trust. Character-based trust refers to the trustor (app-user) his/her perception of the trustee (app) its adherence to principles that are acceptable to the trustor (Mayer et al., 1995). Competence-based trust refers to the perception of the trustor that the trustee is competent to do what is expected by the trustor (Butler & Cantrell, 1984).

2.8.1 Trust and intention

When addressing the relationship between trust and purchase intention, existing literature studies have focused on this topic extensively. A positive relation between trust and online purchase intention has been documented in multiple studies (Jarvenpaa et al., 1999; Lim, Sia, Lee & Benbasat, 2001; McKnight et al., 2002; Verhagen, Tan & Meents, 2004). Kim, Ferrin and Rao (2008) also found that trust has a strong impact on purchase decisions in e-commerce. For the present study, this has led to the following hypothesis:

H8: The higher the level of trust, the higher the intention to download the running app.

With regard to the mediating role of trust on the effect of the manipulations on download intention, three additional hypotheses have been formulated.

H12: Higher trust positively increases the effect of a) COO, b) familiarity and c) nature of access on download intention.

2.8.2 Effect of trust on risk perception

In the past, researchers have been concerned with the relationship between trust and risk extensively. Featherman (2001) concluded in his research that having trust in the company results in a lower rate of perceived risk when buying a product online. Trust has shown to lower perceived risk in multiple product groups: gene technology (Siegrist, 1999, 2000); nuclear and hazardous waste disposal (Groothuis & Miller, 1997) and online consumer behavior (Fukuyuma, 1995). For this research, the same relation between risk and trust is expected. Therefore, the following is hypothesized:

H9: The higher the level of trust, the lower the level of a) privacy risk and b) technical risk.

With exception of the mediation hypotheses, the previous sections and hypotheses of the different variables are illustrated in the model, displayed in figure 1.

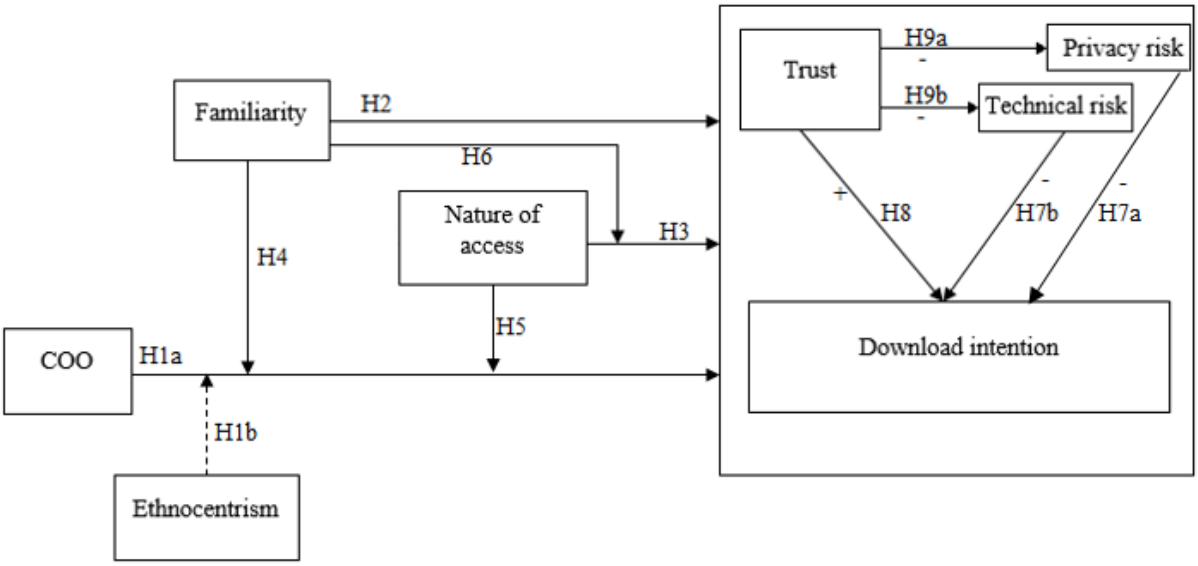


Figure 1. Research model

3. RESEARCH METHODOLOGY

3.1 Experimental design

A 2 (free app vs. paid app) x 2 (familiar app vs. unfamiliar app) x 2 (app from the Netherlands vs. app from the United States of America) between-respondent experiment was performed online. The respondents were randomly assigned to one of the eight conditions, using the randomizer of the program that was used. The experiment tests the effects of independent constructs COO, familiarity and nature of access. Dependent variables are trust, risk and download intention, with risk split up into privacy risk and technical risk.

In this experiment, the familiar app that is developed abroad includes “Runkeeper”, which is a popular app with more than fifty million users worldwide that was developed by American company named FitnessKeeper. Furthermore, according to Runningshoesguru (2017), Runkeeper is one of the favorite running apps among professional athletes in the United States. Runkeeper is offered for free in the Appstore (iOS) and the Google Play store (Android), but in-app purchases are possible. A fictional app was then designed to function as the unfamiliar counterpart in this case. The unfamiliar app its design does not differ a lot from that of the familiar app, in order to control for design effects. Furthermore, the app-ratings are set equally to control for rating effects.

In the case of a familiar app developed in the home country of the respondents, the app “Looptijden.nl” was used. Looptijden.nl is a Dutch app, available for free in the Appstore and Google Play store and is comparable to Runkeeper in terms of its features. Just as for the abroad condition, a fictional app was designed to function as the unfamiliar counterpart. Furthermore, design- and rating effects are controlled. In both cases, nature of access has been manipulated as well, by adding a price into the fictional designs.

3.2 Procedure

When clicking the link of the questionnaire, participants were told about the purpose of the study, and which demographic details were requested. After participants were informed about confidentiality, the questionnaire started. Participants were randomly assigned to one of the eight conditions by the randomizer of Qualtrics.com. Great differences were detected in the time participants used to complete the questionnaire. Extreme cases left out, participants completed the questionnaire within fifteen minutes. There was no debriefing. However, participants were given the possibility to get in contact with the researcher by sending an e-mail if there were any questions.

3.3 Experiment participants

In order to define the target group for this experiment, user statistics of running apps were consulted. In a study by Flurry Analytics (2014) which included a sample of 100.000 devices using fitness apps, it was concluded that a small majority of the users was female (62 per cent). Therefore, no distinction in gender needs to be made concerning the participants for this study. Furthermore, a survey on wearable fitness bands turned out that the age group of 18 to 34 represented almost half of the participants (Nielsen, 2014). Since there are no exact age statistics of the apps used for this research, a comparable age category is used, namely 18 to 35. Looking at other studies learned us this age group represents most possible respondents.

Data has been collected from a total of N=323 Dutch participants. Next to 'age', the other condition for permission to participate in this research was possessing the Dutch nationality. This was necessary to be able to scrutinize possible effects between Dutch and American apps. However this was indicated in the introduction of the questionnaire, it was asked again to be certain. In total, 457 responses were recorded. Three respondents were excluded from the research as they indicated to have a different nationality than Dutch. After deducting those that did not finish the survey (131), a total of 323 valid respondents remained, resulting in a response rate of 70,67 per cent. Respondents' age-characteristics show a range between 18 and 35, with a mean of 23,80 (SD = 3,952). Further demographic information is presented in table 1.

Table 1. Gender and age characteristics of N = 323 respondents per condition and overall.

Condition	**Gender: number / %**	**Mean age**
Dutch-familiar-free (Looptijden.nl)	Female: 15 / 35,7% Male: 27 / 64,3%	24,98
Dutch-familiar-paid (Looptijden.nl)	Female: 15 / 44,1% Male: 19 / 55,9%	23,68
Dutch-unfamiliar-free (Looptrainer)	Female: 19 / 50,0% Male: 19 / 50,0%	25,42
Dutch-unfamiliar-paid (Looptrainer)	Female: 15 / 37,5% Male: 25 / 62,5%	24,65
US-familiar-free (Runkeeper)	Female: 18 / 47,4% Male: 20 / 52,6%	24,11
US-familiar-paid (Runkeeper)	Female: 21 / 44,7% Male: 26 / 55,3%	25,77
US-unfamiliar-free (Runfast)	Female: 19 / 43,2% Male: 25 / 53,8%	25,27
US-unfamiliar-paid (Runfast)	Female: 17 / 42,5% Male: 23 / 57,5%	24,13
Overall	Female: 139 / 43,0% Male: 184 / 57,0%	23,80

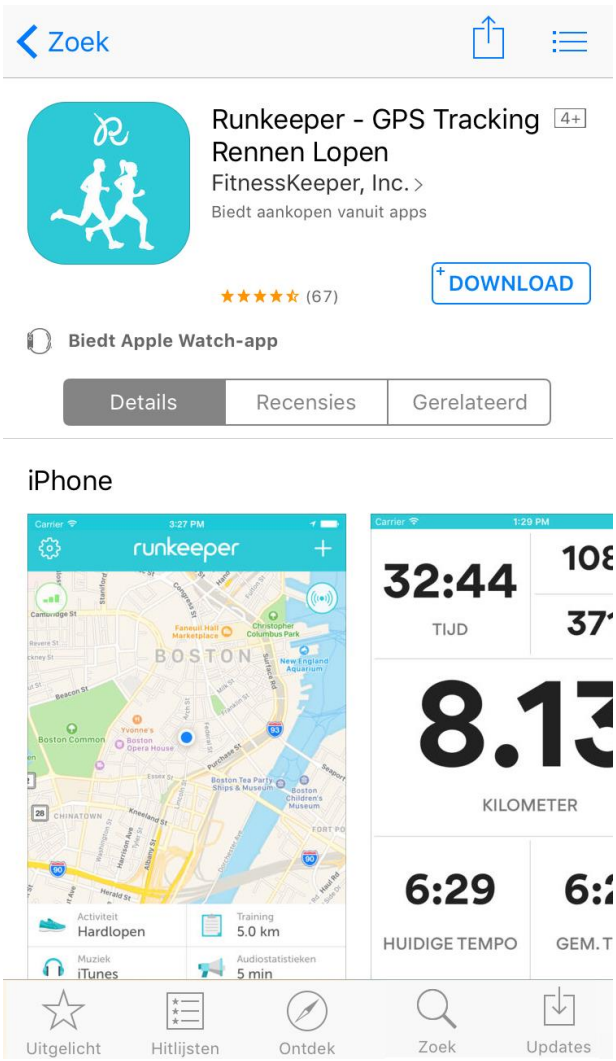
3.4 Pre-test

In order to determine whether the manipulations work, a pre-test was designed and conducted. It was created by using online survey design program Qualtrics.com. The pre-test included manipulation check questions for the variables familiarity, COO and nature of access. It was pre-tested by eight individuals (four males, four females). Eight persons were included in the pretest as eight conditions needed to be tested. The pre-test was conducted to detect typing errors that should be eliminated, as well as to be able to adapt the questionnaire according to the feedback the pre-testers had given. This resulted in the desired functioning of the questionnaire. Feedback that was gathered during the pre-test, as well as the pre-test itself is to be found in appendix A.

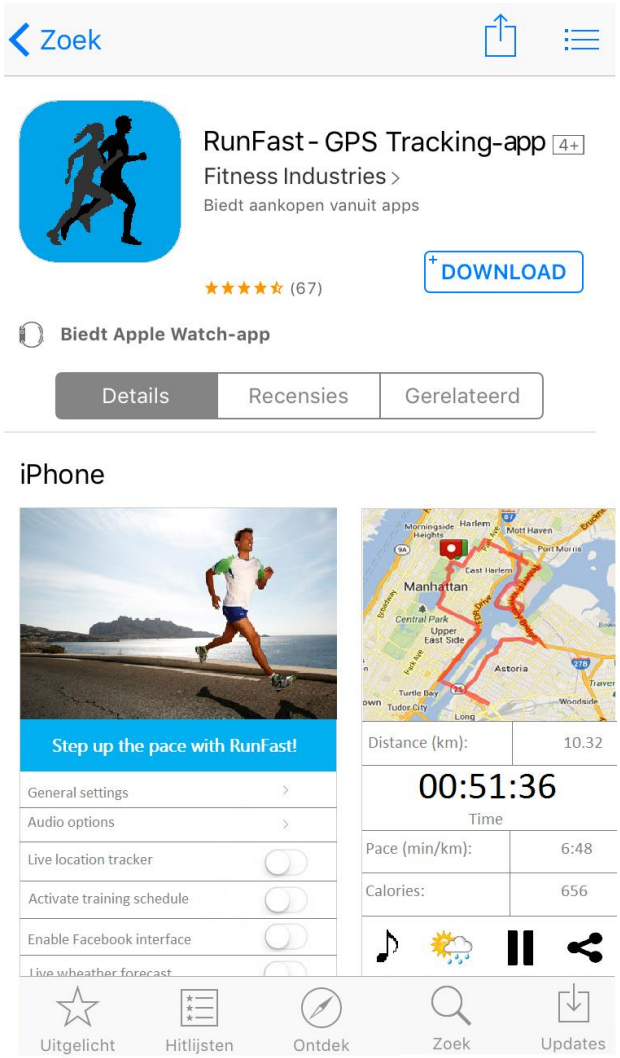
3.5 Manipulations and results of the manipulation checks

Two samples of the manipulations have been displayed below, the others are to be found in Appendix E. The rating and number of reviews are set equally. Furthermore, the design of both versions are identical to clear out biases.

US familiar free app



US unfamiliar free app



3.6 Measurements

3.6.1 Online questionnaire

A total of nineteen items were included in the survey, of which fifteen items measure the independent variables and four items measure downloading intention. Table 2 shows the constructs and their belonging items. As this research only includes Dutch respondents, consumer ethnocentrism has been named Dutch ethnocentrism, as consumer ethnocentrism insinuates a general character. The main questionnaire included ten questions. After a short introductory message in which participation conditions are explained and participants are informed about what the author uses their data for, demographic data from the respondents was collected. Additionally, a question on customer product preferences regarding the product its COO was included. The second block of the questionnaire contained a text in which the focus of this research was explained, as well as information about privacy legislation in the Netherlands and the USA. When participants were finished reading, a scenario was sketched in which the participant was on the verge of downloading a running app. This scenario included a screenshot from the app to which the participant was appointed to by the randomizer. As soon as participants were done inspecting the screenshot, they went on with questions pertaining trust, risk and download intention.

Trust was measured using concepts that measure ability, benevolence and integrity. The items that were used to measure risk and download intention have been, as well as those for trust, entered in table 2. In the questionnaire, all statements were formulated in Dutch. Except for demographic characteristics, all items were measured on a 5-point Likert scale. The complete questionnaire in Dutch can be found in Appendix B Snowball sampling has been used to reach sufficient respondents. The questionnaire was distributed on several online social media with the request to fill it in, as well as to share it with their social network. Facebook, Twitter, LinkedIn and Instagram were all consulted. The questionnaire was posted on several communities on Facebook, such as that of the master corporate communication of the University of Twente. Furthermore, communication platforms such as WhatsApp and Facebook Messenger were used to collect participants as well.

Table 2. Constructs with belonging items

Construct	Items	Code
Dutch Ethnocentrism (DE) *(Klein, J., 2002)*		
	It is wrong to buy foreign products, because it puts Dutch people out of jobs;	CE1
	A real Dutch person should always buy Dutch products;	CE2
	We should buy purchase products that are made in the Netherlands, instead of letting other countries get rich off us;	CE3
	Dutch individuals should not buy foreign products, because this hurts Dutch business and causes unemployment.	CE4
Technical Risk (TR) *(Statements formulated based on the findings of the study by Jorgensen et al., 2015)*		
	The app shortens the battery life of my smartphone;	TR1
	The app could damage my smartphone;	TR2
	The app slows down my smartphone or causes it to freeze;	TR3
	The app takes a lot of storage space.	TR4
Privacy Risk (PR) *(modified items of the original statements by Beldad, Van der Geest, De Jong, & Steehouder, 2012)*		
	I am afraid that this app will use my personal data for other purposes, without my knowledge;	PR1
	I am afraid that this app will share my personal data with other institutions, without having my permission;	PR2
	I have the feeling that my personal data are well protected in this app.	PR3
Competence-based trust *(McKnight, Choudhury & Kacmar, 2002)*		
Ability (ABT)		
	This is a capable app;	ABT1
	This app works very well;	ABT2
	This is a professional app.	ABT3
Character-based trust *(McKnight, Choudhury & Kacmar, 2002)*		
Benevolence (BBT)		
	This app acts in my best interest;	BBT1*
	When I am in need of help, this app would do its best to help me;	BBT2**
	This app is interested in my progress.	BBT3**
Integrity (IBT)		
	This is an honest running app;	IBT1**
	As the app indicates in its privacy policy, my personal data are well protected;	IBT2**
	This app would keep its commitments.	IBT3**
Intention to download (ITD) *(Originally formulated)*		
	The likelihood that I will download this app is high;	ITD1
	I will not hesitate to download this app;	ITD2
	I am on the verge of downloading this app;	ITD3
	I will not download this app.	ITD4

* Item was entered in a different component after reliability analysis

** Item was deleted after reliability analysis.

3.6.2 Reliability of measurement scales

A factor analysis was performed to determine the validity of the constructs. The output of the factor analysis can be found in table 3. The first item of 'benevolence' (BBT1), belonging to character-based trust, loaded with 'ability', or competence-based trust. Consulting the theoretical framework, learned us that this item indeed has a strong overlap with the items to measure 'ability'. It relates to the extent to which the app is able to serve the user in the best possible way. Thus, it has been decided to include item BBT1 among the 'ability' items, where it becomes ABT4. This means only two items were left to measure 'benevolence'. Moreover, those two items had significantly diverging loadings, which made us decide to drop those items as well.

Furthermore, the first item intended to measure 'integrity' (IBT1), turned out to load with the 'ability' items. Since this item relates to the honesty of the app, this is an inexplicable outcome. There is no connection between this item and the items of 'ability', which made us decide to drop this item from the research. The remaining two items showed negative loadings for the same component as 'privacy risk'. Thus, it was inevitable to drop the construct of 'integrity' as well.

After the factor analysis it can be concluded that there are five constructs which have been measured; Dutch ethnocentrism (4 items), privacy risk (3 items), technical risk (4 items), competence-based trust (ability) (4 items) and download intention (4 items). After it has been decided which items were dropped, another factor analysis was performed, which is displayed in table 4. Values below .40 were suppressed and, therefore, not included in the table.

Table 3. Factor analysis

	Construct					
Item	**ABT**	**PR**	**DE**	**ITD**	**TR**	**BBT**
It is wrong to buy foreign products, because it puts Dutch people out of jobs;			*,844*			
A real Dutch person should always buy Dutch products;			*,770*			
We should buy purchase products that are made in the Netherlands, instead of letting other countries get rich off us;			*,835*			
Dutch individuals should not buy foreign products, because this hurts Dutch business and causes unemployment.			*,832*			
The app shortens the battery life of my smartphone;					*,605*	
The app could damage my smartphone;					*,722*	
The app slows down my smartphone or causes it to freeze;					*,780*	
The app takes a lot of storage space.					*,651*	
I am afraid that this app will use my personal data for other purposes, without my knowledge;		*,830*				
I am afraid that this app will share my personal data with other institutions, without having my permission;		*,794*				
I have the feeling that my personal data are well protected in this app.		*,632*				
This is a capable app;	*,771*					
This app works very well;	*,687*					
This is a professional app.	*,686*					
This app acts in my best interest;	*,677*					
When I am in need of help, this app would do its best to help me;						*,514*
This app is interested in my progress.						*,773*
This is an honest app;	*,567*					
As the app indicates in its privacy policy, my personal data are well protected;		*-,640*				
This app would keep its commitments.		*-,594*				
The likelihood that I will download this app is high;				*,829*		
I will not hesitate to download this app;				*,691*		
I am on the verge of downloading this app;				*,834*		
I will not download this app.				*-,800*		

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

Rotation converged in 7 iterations.

The items with red loadings were deleted after the factor analysis

Table 4. Second factor analysis

	Construct				
Item	**DE**	**DI**	**A**	**PR**	**TR**
It is wrong to buy foreign products, because it puts Dutch people out of jobs;	*,835*				
A real Dutch person should always buy Dutch products;	*,775*				
We should buy purchase products that are made in the Netherlands, instead of letting other countries get rich off us;	*,832*				
Dutch individuals should not buy foreign products, because this hurts Dutch business and causes unemployment.	*,836*				
The app shortens the battery life of my smartphone;					*,579*
The app could damage my smartphone;					*,725*
The app slows down my smartphone or causes it to freeze;					*,795*
The app takes a lot of storage space.					*,663*
I am afraid that this app will use my personal data for other purposes, without my knowledge;				*,872*	
I am afraid that this app will share my personal data with other institutions, without having my permission;				*,897*	
I have the feeling that my personal data are well protected in this app.				*,617*	
This is a capable app;			*,797*		
This app works very well;			*,737*		
This is a professional app.			*,722*		
This app acts in my best interest;			*,686*		
When I am in need of help, this app would do its best to help me;		*,840*			
This app is interested in my progress.		*,688*			
This is an honest app;		*,850*			
As the app indicates in its privacy policy, my personal data are well protected;		*,799*			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 5 iterations.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy has a value of 0,743. Following the categorization of Kaiser (1974), a value in the 0,70s is middling, which is acceptable. In order to determine the internal consistency of the constructs, Cronbach's Alpha coefficient was calculated. This coefficient is a common measure for researches in which the items have three or more answer options (Dooley, 2001). With regard to the Cronbach's Alpha scores, George and Mallery (2003) presented the following rules of thumb in their study: > 0.9 excellent, > 0.8 good, > 0.7 acceptable, > 0.6 questionable, > 0.5 poor, and < 0.5 unacceptable. The analysis turned out that the constructs have 'good' to 'questionable' alpha scores. According to Nunnally (1978), alpha scores above 0.7 are considered to be reliable. Rounding up the alpha score of technical risk gives all constructs a reliable alpha score. The reliability descriptives have been entered in table 5.

Table 5. Reliability descriptives

	(N=323)			
Constructs	**Items**	**α**	**M**	**SD**
Dutch ethnocentrism	4	,840	2,031	2,673
Technical risk	4	,650	2,769	2,610
Privacy risk	3	,761	2,983	2,370
Ability (trust)	4	,749	3,556	2,217
Download intention	4	,829	2,603	3,507

Dutch ethnocentrism was included in the model as a binary variable. Based on the results (M = 2,031) it was decided to look into the median value of Dutch ethnocentrism to see whether it was possible to split the mean into high and low. However, the median value was 2 on a Likert scale from 1 to 5, which made it impossible to split. A value of 2 represents a very low level of ethnocentrism. Based on this median value it was decided to remove Dutch ethnocentrism from the model, as it is not possible to use it as a moderator. Therefore, we were unable to test hypothesis 1b.

4. RESULTS

The first set of hypotheses that address the relationship between the manipulations and risk perception, trust and download intention were tested using MANOVA analysis. As already mentioned, the hypothesis for Dutch ethnocentrism was not tested. Additionally, a second analysis was performed to look into the mediation and direct effects of trust and risk perception on download intention, as well as the effect of trust on both types of risk perception. The hypotheses belonging to these relationships were tested using regression analysis. The results of both analyses are presented in the following chapters.

4.1 Multivariate analysis of covariance (MANOVA)

To test the beforehand formulated main hypotheses, a multivariate analysis of variance (MANOVA) was performed. According to French et al. (2008), performing MANOVA is especially useful in experimental studies where one or more independent variables are manipulated. Furthermore, they state that there is a greater chance of determining which factor is most dominant when performing MANOVA instead of ANOVA.

The multivariate tests results show that there is no main effect for 'familiarity' ($F(4, 312) = .564$, $p = .689$; Wilks'$\Lambda = .993$), nor are there any two-way or three-way interaction effects between 'COO', 'familiarity' and 'access'. However, a main effect was discovered for 'COO' ($F(4, 312) = 3{,}324$, $p = .011$; Wilks $\Lambda = .959$), and 'nature of access' ($F(4, 312) = 3{,}396$, $p = .010$; Wilks $\Lambda = .958$). The results are presented in table 6. The complete SPPS-output of the tests performed can be found in appendix B.

Table 6. Multivariate test results for the main effects of 'COO', 'access', and 'familiarity'.

Variable	Wilks' Λ	F	Sig.
FAM	.993	,564	.689
COO	.959	3,324	.011*
ACC	.958	3,396	.010*
COO * FAM	.978	1,753	.138
COO * ACC	.989	,873	.480
FAM * ACC	.998	,129	.972
COO * FAM * ACC	.983	1,325	.260

* significant at significance level of 5%

4.1.1 Main effect COO

Two levels exist for the variable COO, being 'foreign' (American/US) and 'home country' (Dutch). A main effect of COO was found on ability trust (F = 8.079, p = .005). The mean scores of ability indicate that apps from the US (M = 3,6384) tend to generate higher trust, than Dutch apps (M = 3,4661). This was the only significant main effect that was found. Analysis further shows that the effects of COO on technical risk (F = 1.259, p = .263), privacy risk (F = 1.928, p = .166) and download intention (F = 1.112, p = .306) were not significant.

Looking into the interaction effect of COO with familiarity shows no significant effect on any of the dependent variables (F (4, 312) = 1.753, p = .138; Wilks Λ = .978). As for familiarity, no significant interaction effect was found between COO and nature of access on dependent variables (F (4, 312) = .873, p = .480; Wilks Λ = .989). These results reveal that familiarity and nature of access do not individually influence the relation between COO and the dependent variables of this study.

4.1.2 Main effect familiarity

The variable familiarity involves two levels, being unfamiliar and familiar. No significant main effects were found for familiarity on the dependent variables. The results show the following F- and p-values: technical risk (F = .199, p = .656), privacy risk (F = .055, p = .814), ability trust (F = 1.062, p = .303) and download intention (F = 1.053, p = .306).

As already mentioned in 4.1.1, no interaction was found between COO and familiarity on the dependent variables. The same can be concluded from the results for the interaction between familiarity and nature of access (F (4, 312) = .129, p = .972; Wilks Λ = .998).

4.1.3 Main effect nature of access

Nature of access has two levels, namely 'paid' and 'free'. A main effect was found for nature of access on privacy risk (F = 12.505, p = .000). The mean scores show that respondents perceive higher risk when downloading paid apps (M = 3,1366) than when downloading free apps (M = 2,8313). Other effects of nature of access on dependent variables were not significant: technical risk (F = .502, p = .479), ability trust (F = .010, p = .921) and download intention (F = .904, p = .342). As mentioned in the above paragraphs, no interaction effects between nature of access and the other independent variables were concluded from the results.

4.1.4 Three-way interaction effect

Next to the above described two-way interaction effects, it was investigated whether there was a three-way interaction effect between COO, familiarity and nature of access. According to the results, this is not the case (F (4, 312) = 1.325, p = .260; Wilks Λ = .983). This finding implies that the effect of COO on the dependent variables is not influenced by either familiarity or nature of access.

All results of the MANOVA analysis, displayed in table 7, mean that all hypotheses were rejected.

Table 7. Tests of between-subjects effects results

Independent	COO	FAM	ACC	COO * FAM	COO * ACC	FAM * ACC	COO * FAM * ACC
Technical risk	F = 1,259 p = .263	F = ,199 p = .656	F = ,502 p = .479	F = ,045 p = .833	F = ,720 p = .397	F = ,033 p = .855	F = ,042 p = .837
Privacy risk	F = 1,928 p = .166	F = ,055 p = .814	F = 12,505 p = .000	F = 1,296 p = .256	F = ,059 p = .809	F = ,225 p = .636	F = ,632 p = .427
Ability trust	F = 8.079 p = .005	F = 1,062 p = .303	F = 0,10 p = .921	F = 6,548 p = .011	F = 2,308 p = .130	F = ,017 p = .897	F = 1,578 p = .210
Download intention	F = 1,112 p = .293	F = 1,053 p = .306	F = 2,006 p = .158	F = ,904 p = .342	F = ,541 p = .463	F = ,125 p = .723	F = 4,694 p = .031

4.2 Regression analysis

Ideally, hypotheses 10, 11 and 12 should be tested using mediation analysis. However, due to the fact that the required conditions for performing mediation analysis were not met, mediation analysis was not possible. According to Baron and Kenny (1989), in order to perform mediation analysis, the independent construct should have a direct effect on the mediator and on the dependent construct. Plus, the mediator should directly influence the dependent variable. The MANOVA results revealed that this was not the case for this research, making it impossible to test hypothesis 10, 11 and 12. Therefore, they were dropped. Consequently, it was decided to solely look into the direct effects of trust and both types of risk perception on download intention, as well as the effect of trust on risk perception, using regression analysis. In the following sections, the results of the correlational analysis and the multiple regression analysis are presented.

4.2.1 Correlations

To find out how trust, technical risk and privacy risk correlate with depending variable download intention and with each other, a correlational analysis was performed. Correlational analysis can be considered as a useful matrix to identify possible relationships between variables (Dooley, 2001). The results of these correlational analysis is presented in table 8.

Table 8. Correlations between trust, risk and download intention

	Correlations			
Constructs	**Technical risk**	**Privacy risk**	**Trust**	**Download intention**
Technical risk	1			
Privacy risk	,237**	1		
Trust	-,077	-,178**	1	
Download intention	-,115*	-,197**	,269**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In the above table it can be concluded that privacy risk (r = -,197) and trust (r = ,269) correlate significantly with download intention at the ,01 level, while technical risk (r = -,115) does so on the ,005 level. Thus, the strongest correlation is established between trust and download intention. Furthermore, looking into the relation between trust and risk, a significant correlational effect has been found between trust and privacy risk (r = -,178) at the ,001 significance level.

4.2.2 Multicollinearity testing

Based on the correlation analysis and the Variance Inflation Factors (VIF-Scores) (O'Brien, 2007), a test on multicollinearity (Field, 2009) was conducted, in order to assess whether two or more predictors are strongly correlated. As VIF-scores are between 1.0 and 1.7, it can be ascertained that there is no problem with multicollinearity for this research (Field, 2009; O'Brien, 2007). The data is entered in table 9.

Table 9. Multicollinearity testing

Coefficients		
	Collinearity Statistics	
Model	Tolerance	VIF
Technical risk	,943	1,061
Privacy risk	,918	1,089
Trust	,967	1,034
a. Dependent Variable: Download intention		

4.2.3 Multiple regression analysis

The model that was tested resulted in an adjusted R Square of 0,09, meaning 9 per cent of the variance of download intention can be explained by trust, privacy risk and technical risk. The R Square descriptives can be found in table 10.

Table 10. R Square descriptives

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,315[a]	,099	,090	,50414
a. Predictors: (Constant), trust, technical risk, privacy risk				

The regression analysis turned out that there are two statistically significant influences on download intention, being trust and privacy risk. It was hypothesized that the higher the level of trust among consumers, the stronger their intention to download would be. Being significant at significance level 0,01, this hypothesis (H8) is supported. Furthermore, hypothesis 7 was partially supported, as privacy risk (H7a) turned out to have a significant negative influence on download intention at the significance level 0,05 (p = 0,013), whereas technical risk (H7b) has not (p = 0,25). The regression analysis data has been entered in table 11.

Table 11. Regression analysis data.

Coefficients						
Model		B	SE	β	t	Sig.
1	**(Constant)**	2,366	,253		9,362	,000
	Technical risk	-,051	,044	-,063	-1,158	,248
	Privacy risk	-,093	,037	-,139*	-2,507	,013
	Trust	,228	,052	,239**	4,427	,000
a. Dependent Variable: Download intention **. Significant at level p = 0.01 *. Significant at level p = 0,05						

In order to measure the effect of trust on both risk constructs, two regression analyses were performed. Firstly, the effect of trust on the level of privacy risk was tested. The data of this analysis is displayed in table 12. Being significant at the 0,01 level, there is a significant effect of trust on privacy risk, meaning that trust negatively influences the perception of privacy risk. Supporting H9a, statistics show that the higher the level of trust among consumers, the lower their perception of privacy risk.

Table 12. Regression analysis data of trust vs. privacy risk.

Coefficients						
Model		B	SE	β	t	Sig.
1	**(Constant)**	3,887	,282		13,793	,000
	Trust	-,254	,078	-,178**	-3,244	,001
a. Dependent Variable: Privacy risk **. Significant at level p = 0.01						

Secondly, the relation between trust and technical risk was investigated. The data of this relationship has been entered in table 13. Although the effect is not significant, the beta value of -,077 indicates a negative relationship, meaning that a higher level of trust results in a lower perception of technical risk, which was expected. Although H9b is rejected, a significant effect was found for privacy risk, meaning H9 is partially supported.

Table 13. Regression analysis data of trust vs. technical risk.

Coefficients						
Model		B	SE	β	t	Sig.
1	**(Constant)**	3,090	,236		13,104	,000
	Trust	-,090	,066	-,077	-1,375	,170
a. Dependent Variable: Technical risk						

5. DISCUSSION

The initial focus of this research aimed to answer the question "to what extent do country of origin, familiarity and nature of access (free vs paid) influence risk perception, trust and downloading intention?" Furthermore, the second analysis aimed to explore the relationship between trust, two types of risk perception and download intention. "To what extent do trust and risk mediate the effects of the manipulations and what is the influence of trust, privacy risk and technical risk on each other and on download intention? Initially, a total of twelve hypotheses was formulated, of which four could not be tested, as already discussed. The following section will discuss the results and indicate whether the hypotheses are supported or not.

The MANOVA results show that there is no main effect of familiarity on the dependent variables, whereas there is for COO and access. Neither are there any significant two-way or three-way interaction effects. It was hypothesized that high familiarity with the app would result in lower risk perception, higher trust in the app and a stronger intention to download the app. However, since there was no main effect for familiarity in this study, this cannot be claimed. The wide range of apps that is offered logically increases the choice of consumers. It could cause respondents to ignore those apps that are familiar to them. Furthermore, a familiar or popular app does not immediately imply that the app is more safe than others apps that are unfamiliar. Chia, Yamamoto and Asokan (2012) documented this in their study on risk signals in relation to app requests. They state that popular apps need to place more requests concerning privacy matters in order to offer more features, stay popular or to become more popular. Therefore, consumers have to decide what they value the most; an app that is more functional or an app that could have potential to violate their privacy.

As the MANOVA results reveal, there is a main effect of COO on ability trust. Ability trust, a conceptualization of competence-based trust (Butler & Cantrell, 1984), focuses on the ability of the app to perform or/and function in a way that the trustor expects it will. However hypothesis 1a stated that, for Dutch respondents, Dutch apps would generate higher trust, this was not the case. Apps that are developed in the US were perceived to be more trustworthy in terms of ability than Dutch apps. Thus, the opposite is true.

The absence of the expected effect of COO in this research can be explained by the fact that the population of this research was far from ethnocentric. However, as Balabanis and Diamantopoulos (2004) and Jaffe and Nebenzahl (2001) stated, consumer ethnocentrism differs per product category. The results show that for this category, mobile apps, this population does not have any problems with the fact that the app is not developed in their own country of origin. Furthermore, another explanation could relate to the age of respondents. The mean age in this research is young, namely twenty-four years old. Han (1988) found out that older people are more patriotic and conservative, resulting in higher ethnocentric feelings. This could explain the favor for American apps among this population.

Analysis also turned out that there was a main effect of nature of access on privacy risk. In hypothesis 3, it was hypothesized that a paid app would generate lower risk perception. Looking at the means learns us that the contrary is true. Higher means for paid apps imply that paid apps generate higher risk perception, as the items of the questionnaire express terms of fear.

In the introduction, the high frequency of apps that is being downloaded nowadays is put forward. The normality for individuals to accept requests from apps, paid or free, could cause consumers to get anxious when confronted with paid apps, as there is no real difference between paid and free apps when it becomes to privacy requests. Furthermore, paid apps are, in general, apps of which more is expected than free apps. However, in most studies and internet sources it is postulated that when consumers want to reduce the risk of having their privacy violated, they should go for a paid app instead of a free app.

A possible explanation for the above discrepancy was put forward by West et al., (2012). It could be that respondents tend to pay for apps of which they expect to have more functions than free apps. The paid and free apps used in this research, and, even most of the times in general, do not differ much in their features. This might have caused them to not value free apps as being more risky in terms of privacy. Furthermore, the price for the paid app in this study was only €0,99, which is not a large amount of money. It is assumed that the respondent perceives risk in both situations; either downloading a paid or a free app. Therefore, it is questionable that €0,99 is enough for the respondents to be convinced that their data is fully, or even better, protected than it is in the case of the free app. This could explain the results that were drawn.

Some explanations were put forward for the fact that American apps are more trustworthy and paid apps generate lower privacy risk. Although the lack of ethnocentric feelings, the young population and the lack of difference between the paid and free apps used in this research are possible clarifications for these results, more argumentation could be discussed. Considering reasons for the results from a wider perspective, the overall image of the US could contribute to what was concluded. According to a report of the Pew Research Center (2016), the US holds an overall positive image among Dutch citizens. The study was conducted among 999 Dutch individuals. Although this image might differ among age categories, the respondents of this study showed to be positive towards the US as well. Furthermore, a study by Statista (2016) on the most used running apps in the Netherlands, showed that Runkeeper was used the most, by thirty-nine per cent of the respondents respectively. Moreover, there were no Dutch apps among the thirteen most used apps. These statistics can be found in Appendix D.

Furthermore, as this research deals with a sports product, we take America's sports image into consideration. America has produced among the biggest sports brands in the world, such as Nike, Under Armour and EA Sports (Forbes, 2016). America hosts leading competitions in various sports, such as basketball (NBA), ice hockey (NHL) and American Football (NFL). It has organized the

Olympics the most times (8) and also won the most medals (2797) (Team USA, 2017). Additionally, it has brought forth numerous top athletes, for running disciplines as well. This is evidenced by the list of Runnersworld.com (2015). These numbers sketch the international image that the US have created globally.

In sum, the analysis turned out that all hypotheses are rejected. Thus, now we have performed the analysis and discussed the results, it can be concluded that the grand idea of this study did not show the effect that was expected. This study aimed to give insights into the relationship between COO, familiarity and nature of access on the dependent variables. However the hypotheses were based on existing literature, it turned out that the conclusions of these studies are not generalizable for the specific group of mobile running apps. This could also have been caused by the fact that technology and mobile apps have improved significantly over the years. Moreover, individuals show a greater acceptance towards technology, which makes them less prompted to engage in risk-reducing behavior.

The regression analysis had the aim of answering the formulated research question: “To what extent do trust and risk mediate the effects of the manipulations and what is the influence of trust, privacy risk and technical risk on each other and on download intention? As already mentioned, the mediation part could not be tested, so the direct effects were investigated. The findings have shown that download intention is indeed significantly influenced by trust and risk. The higher the level of trust, the more consumers are inclined to download the running app and the higher the level of risk, the lower the intention to download the app. This means hypotheses 8 and 7a are supported. Furthermore, a significant negative influence of trust on privacy risk was measured as well, supporting hypothesis 9a. This chapter will elaborate on these results.

The proven impact of trust on download intention of a running app is not a surprising outcome. Multiple other studies that conducted research into the relation between trust and behavioral outcomes, such as intention, have documented this effect (McKnight et al., 2002; Yoon, 2002; Kim, Ferrin & Rao, 2008; Liao, Liu & Chen, 2011). Moreover, trust is indispensable for establishing success in e-commerce, as Dayal, Landesberg and Zeisser (2001) have shown. As the present study focuses on a mobile app which requests for a substantial amount of personal details, trust is highly essential. The possibility of these personal details to be compromised, urges consumers to solely download apps which they sufficiently trust.

Previous studies have named several antecedents of trust. Some of these antecedents could explain the effect of trust that was found in this research as well. For instance reputation (Jarvenpaa & Tractinsky, 1999). As is mentioned before in this paper, running apps gain in popularity and are used extensively throughout the world. This might indicate a good reputation among consumers. Furthermore, two of the most popular running apps for both the Netherlands and the US are used for this research. Runkeeper and Looptijden.nl are alike in terms of color, design and features. Additionally, the

fictional apps that are used are based on Runkeeper and Looptijden.nl, which makes them quite identical. Those apps have proven to have proper navigation (Bart, Shankar, Sultan & Urban, 2005) and a good reputation. Moreover, according to Fung and Lee (1999), reputation has been most often identified as a predictor of trust towards online purchasing.

Related to the impact of trust on download intention, is the presence of risk. As Corritore, Kracher and Wiedenbeck (2003) stated in their study; when risk is there, trust is a requisite. The effect of risk on download intention of a running app can be translated to the higher the level of risk, the lower the intention to download the app, and the other way around.

Perceived risk as an influence factor of online purchase or download intention has been described in previous studies (Vijayasarathy & Jones, 2000; Lu, Hsu & Hsu, 2005; Liao et al., 2011). Other authors investigated the effect of confidence, which is the inverse of perceived risk (Howard & Sheth, 1969; Bennet & Harrel, 1975). It became clear that there was a positive relation between confidence and intention, which indicates that a lower perception of risk could cause a higher intention to download/purchase.

A distinction was made in the use of risk in this research, being privacy risk and technical risk. The hypothesis concerning privacy risk was supported, meaning that the higher the level of privacy risk, the lower the intention to download the app. While studies exist that show the opposite (e.g., Forsythe & Shi, 2003), studies have also acknowledged this relationship (e.g., Liao et al., 2011). Furthermore, analysis turned out that technical risk does not significantly influence download intention. This outcome is in line with that of Eggert (2006), who found that privacy risk perception has a greater influence on the intention to purchase online than product risk, or technical risk in this research.

Another reason for this could be that respondents are not fully aware of the technical risks that are attached to downloading a running app. It is assumable that they are more aware of the risks concerning their personal details that come when downloading an app. People are getting informed extensively on television, radio, or via other communication-platforms about being cautious with their personal data on the web, or during online transactions. Additionally, using a smartphone involves using and downloading apps, not functions, like in the days before smartphones were on the market. This implies that smartphone users most likely have downloaded apps before, which did not harm their smartphone either. Thus, there are more justifications for ignoring technical risk than privacy risk.

Aside from the relations between the independent constructs and download intention, an analysis of the effect of trust on the two types of risk was performed as well. The hypotheses test a negative relationship between trust and risk. Thus, the higher the level of trust, the lower the level of risk. This is in line with findings of multiple other studies (Gulati & Gargiulo, 1999; Pavlou, 2003; Koufaris and Hampton-Sosa, 2004; Park et al., 2005).

For the present research, a statistical significant negative influence of trust on privacy risk has been concluded from the regression analysis. This outcome might not be surprising since multiple studies have proven that trust alleviates the perception of risk (Caudill & Murphy, 2000; Culnan & Bies, 2003). However, these studies did not use running apps as their emphasis. Thus, consumers tend to perceive less privacy risk when they trust the app. However this sounds logical, it is not per se self-evident. The fact that apps request for personal information has become normal for the smartphone user, making the amount of trust less important. It can be asked whether consumers are taking these messages fully serious, as they in the end all want to use the app. Therefore, the fact that the effect of trust on privacy is still highly salient in this research, can be considered to be a crucial finding.

It is assumed that only a small group decides to not download the app because of the request to share information to optimally make use of the app. Especially the generation that has grown up with technology will place less importance on the risks attached to downloading a running app, as it has become normal for them to download apps.

Regarding the effect of trust on technical risk, it can be stated there was no significant effect. Although the effect of trust on technical risk was not significant, the negative beta-value indicates that trust has a negative influence on technical risk as well. Thus, a higher perception of trust reduces the amount of technical risk that is perceived by the consumer. As for the effect of trust on privacy risk, this result was expected. However the negative influence of trust has been appointed in previous sections of this study, a consideration has to be made in the case of apps. Being different from a physical product that is ordered online (e.g. clothing, apparel), it can be asked whether app-consumers are aware of technical risk. Smartphone companies improve their products constantly, just as app-developers improve the apps through updates. For this reason, less room for error is realized. However, improvements must be well-thought as, Bhatnagar et al., (2000) state that the level of product risk increases as the product becomes technically more complex. The duration of telephone-contracts might play a role as well. Most contracts do not last any longer than one or two years. After the contract, a new smartphone can be ordered. Smartphones are made to last much longer than that, which could imply that the risk of malfunctions becomes lower as well.

6. IMPLICATIONS

6.1 Theoretical implications

The main objective of this study was to explore the effects of COO, familiarity and nature of access on trust, risk perception and download intention. With the main focus on COO, it was interesting to see how the effect of COO was influenced by the other manipulations. The study did not turn out to have the expected effects. This study indicates that for the case of running apps, the COO does not play the role that is expected. Although running apps involve a substantial amount of risk with regard to personal details to be comprised, American apps were indicated to be more trustworthy. Thus, it can be concluded that the image of American products, at least American apps, is still favorable in comparison to Dutch apps.

However, the regression analysis that looked into the effect of trust and risk perception on download intention showed interesting results. This gave insights into the predictors of intention to download a running app. Running apps, as indicated before, are popular in nowadays society. Gaining understanding into the factors that stimulate or hinder the intention to download such apps is a valuable contribution. Literature has acknowledged the relations between trust, risk perception and intention extensively, however never were running apps the focus of research.

6.2 Practical implications

However most hypotheses were not supported, tendencies can be detected, as well as proper assumptions can be made, due to the large number of participants that was used for this study.

Furthermore, app developers could take the result of nature of access on privacy risk into consideration. In this study, paid apps generate higher perception of privacy risk, which is a quite unusual result at first sight. This could raise thoughts among app-development companies, since paying for an app the discussion of considering whether to develop a free or a paid app.

Another result that can be consulted by app-designers is that respondents were more inclined to the American app. At least, the US app was trusted more than the Dutch app. So, developing a running app for the Dutch market in the style of an American app could be a consideration. This also indicates that it is hard to compete with American apps, in the field of running or sport apps. As the overall image of the US could have played a significant role, involving famous Dutch athletes or features that indicate prestige might be an action to consider.

The results of this study are especially interesting for app-developers and other companies that have products requesting, or dealing with personal data. Thinking of dating sites, social media and web-shops, the sharing of personal details has become less of an issue. Facebook founder Mark Zuckerberg (2010) even stated that privacy is no longer a ‘social norm’. According to Zuckerberg, people have not only gotten more comfortable with sharing information, they are also willing to share it more openly

and with more people. Although this might be true, this research clearly indicates that privacy risk still reduces the intention to download an app. Thus, people are still considering their privacy when they want to download a running app. Additionally, although there are overlaps, running apps are placed in a different category than social apps such as Facebook, so these statements cannot be bluntly generalized. However, the effect of privacy risk cannot be ignored and should therefore be taken serious.

The relations that have been tested and found statistically significant can be used by any company to improve their trustworthiness, as simple cues were proven in this research. In the field of running or sport apps, American products have indicated to be favored by Dutch individuals. This should be taken into account when developing such an app. Trust reducing privacy risk, less privacy risk and higher trust increasing download intention are clear, yet important conclusions that are not self-evident in every company/organization.

Furthermore, this study proves that trust in the product reduces the level of privacy risk. Since privacy risk is such an important factor when it becomes to products that deal with personal data, this research once again emphasizes the importance of trust. Concurrently, a recommendation for a future research is raised here. The importance of trust should be investigated more in-depth, as this research does not provide tools or solutions on how to improve the trustworthiness of an app.

7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Although the topic that was addressed by this research was highly interesting and important as a scientific contribution, a major error was made. As the manipulations were not checked sufficiently, which means only in the pre-test, a solid, evidence-based conclusion cannot be made, which is a serious limitation. It cannot be certified that the manipulations work as they should do.

The target group was clustered on 18 to 35 years old. It might be difficult to generalize the results to older consumers, such as individuals of 50 and older. Although the target group represents the majority of users of apps, health apps are important to all age groups. According to a study by Nielsen (2014), the majority of a specific fitness app was older than 35 years old. Thus, it is recommended to include other age groups in the research, such as older than 35 years old or between 35 and 65.

Furthermore, when it becomes to generalization, it is assumable that snowball sampling has established a participant base which consists of people from the same geographical area (the eastern part of the Netherlands). Therefore, a recommendation is to collect data from other parts of the country to see whether there is a difference. It might be true that in more populated areas or bigger cities the results differ, for example due to more exposure to advertising. This also means a demographic question concerning the place of living should be included in the questionnaire.

Another limitation is that the construct of trust was only measured by 4 items. The factor analysis turned out that integrity-based trust and benevolence-based trust only had one or no items left. However four items is not bad for measuring a construct, measuring trust with more items would give the argumentation more body and support, especially because of the complex character of trust. .

In this study it was tested whether the nature of accessing the app caused a difference for downloading the app or not. A paid app represented a price of 0,99€, which is not a significant difference with nothing. Especially, as these apps only function on a smartphone, it is assumable that the owners can afford an app of 0,99€. Therefore, a future research recommendation would be to raise the price of the paid condition in order to realize a difference that matters to the consumer, such as 5,99€. In this way, possible considerations with regard to privacy risk and trust could become more salient as well.

As the results indicated that the respondents of this research were very much inclined to the American app, the status of the USA could possible play a role here. Especially when it becomes to sports and sports brands, the USA has a popular reputation among Dutch citizens. Jarvenpaa, Tractinsky and Saarinen (1999) also proved in their research that reputation is among the factors that trigger trust. Therefore, it would be interesting for a coming research to focus on an app that is developed somewhere else. Additionally, addressing features, athletes and/or performances that might strengthen the image of the Netherlands when it becomes to sports could also be interesting to investigate.

The two real apps that were used in this research differed a lot in terms of popularity. The US familiar app (Runkeeper) is the most popular running app in the world, whereas the Dutch familiar app (Looptijden.nl) is not very popular, although it is the most popular Dutch running app. A recommendation would therefore be to use two apps that are more alike in terms of popularity, to clear out this bias.

In a future study, a bigger focus on demographic information of the participants could be included. It would be interesting to see whether educational level is of influence on the results. Higher educated people could have more knowledge of privacy issues, or be more interested in it. This could make them more cautious.

Another recommendation for a future research in this field of study is to increase the role of trust. As the research has proven that trust is crucial for an app to be downloaded, future researches could focus on cues or tools that improve the trustworthiness of an app. However one of those cues this research has proven is that American apps are more popular than Dutch apps, it would still be interesting to see whether other constructs have an impact on the role of trust, such as design, ease of use or other.

8. CONCLUSION

This paper aimed to identify the effect of familiarity, COO and nature of access on trust, risk perception and intention to download a running app. These effects were expected to become salient after manipulating the independent constructs. However, the manipulations were not properly tested, which makes it difficult to claim solid conclusions from the results. What can be claimed is that no strong preference for products from the respondents' COO was indicated. Furthermore, nature of access turned out to significantly influence privacy risk. Although it was hypothesized that paid apps alleviate the perception of risk, this was the other way around. Thus, it can be concluded that this research did not have the expected outcome. Although data exchange gains in importance, people still favor the American app, although it was indicated in the questionnaire that personal data is less protected there. In the end, all hypotheses concerning the manipulations were rejected.

Perhaps most salient result from the regression analysis that was performed, is the pivotal character of trust with regard to behavior. The effect of trust on risk perception and download intention has been confirmed for the case of mobile apps, which makes it a valuable asset. As already noted, trust is an inevitable construct to focus on for any employee of an, in this case, app-development company. Furthermore significant effects were found between privacy risk and intention, which is in line with existing literature. This implies that, although trust is domain or product specific, it in the end always plays an important role, perhaps even more for a running app, considering the amount of personal details that are at stake.

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APPENDIX A. PRE-TEST RESULTS

Feedback pre-test

Condition: Runfast – paid version
Tester: Lianne schwarte
Sex: Female
Age: 28
Comments:

- Het is 'wilt' in plaats van wil;
- '…na het vragen naar…' → kromme zin, moet anders geformuleerd worden;
- Het woord 'immer' is misschien geen woord voor de doelgroep die je aanspreekt;
- Het woord 'te' mist bij de derde antwoordmogelijkheid op vraag 3;
- Ik zou het woord 'voelen' vervangen door 'gevolgen heeft' bij de vierde antwoordmogelijkheid op vraag 3;
- U 'komt' de volgende app tegen in plaats van u 'kwam'

Condition: Runfast – free version
Tester: Jikke Duteweert
Sex: Female
Age: 20
Comments: -

Condition: Looptrainer – paid version
Tester: Ricky Olthof
Sex: Male
Age: 29
Comments: De enquête werkt goed.

Condition: Looptrainer – free version
Tester: Reinout Saaltink
Sex: Male
Age: 24
Comments: Kromme zinnen bij de antwoordmogelijkheden op de vraag omtrent consumenten etnocentrisme.

Condition: Looptijden – paid version
Tester: Lotte Duteweert
Sex: Female
Age: 23
Comments: -

Condition: Looptijden – free version
Tester: Karlijn Duteweert
Sex: Female
Age: 27
Comments:

Condition: Runkeeper – paid version
Tester: Jochem Duteweert
Sex: Male
Age: 18
Comments:

Condition: Runkeeper – free version
Tester: Jasper Habermehl
Sex: Male
Age: 26
Comments:

- Kromme zin bij de vraag over consumenten etnocentrisme.
- Inleidende tekst over de afbeelding bevat een contaminatie: verschillen en onderscheiden.
- De antwoordmogelijkheid “Ik ben niet bekend met deze app” ontbreekt.
- Er staat: u kwam de in NL ontwikkelde gratis app tegen: dit moet VS zijn.

APPENDIX B. DUTCH QUESTIONNAIRE

Beste deelnemer,

Hartelijk bedankt dat u wilt deelnemen aan dit onderzoek dat wordt uitgevoerd in het kader van mijn masterthese, onderdeel van de master Communicatiewetenschappen aan de Universiteit Twente. Met deze vragenlijst wordt onderzoek gedaan naar het gebruik van zogeheten 'gezondheids-apps'.

Na een aantal demografische gegevens zal er een scenario worden geschetst waarin u een hardloop-app wilt gaan downloaden. Vervolgens is er een informatieve tekst geschreven welke u zal helpen bij het beantwoorden van de vragen. Lees deze tekst gelieve goed door, daar het zeer belangrijke informatie bevat voor het onderzoek. Hierna worden er, aan de hand van screenshots van de verschillende hardloop-apps, vragen aan u gesteld. U heeft altijd de mogelijkheid om terug te gaan naar de afbeeldingen terwijl u de vragen aan het beantwoorden bent.

De gegevens van deelnemers aan dit onderzoek zullen strikt vertrouwelijk en met respect worden behandeld, uitsluitend ten behoeve van dit onderzoek.

P.S.: Het is niet mogelijk om aan dit onderzoek mee te doen indien u niet de Nederlandse nationaliteit bezit en buiten de leeftijdscategorie van 18 tot 35 jaar oud valt.

Met vriendelijke groet,

Toby Schwarte

Gaat u akkoord om deel te nemen aan dit onderzoek?

- Ik ga akkoord
- Ik ga niet akkoord

Q2 Wat is uw geslacht?

- Man
- Vrouw

Q3 Welke nationaliteit heeft u?

- Nederlandse
- Anders, namelijk _____

Q4 Wat is uw leeftijd?

▼ 18 (1) ... 35 (18)

Q5 De volgende stellingen gaan over de waarde die u hecht aan producten die in uw eigen land zijn gemaakt. In hoeverre bent u het eens met deze stellingen?

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
Het is niet juist om buitenlandse producten te kopen, omdat dit Nederlanders minder werk oplevert.	○	○	○	○	○
Een echte Nederlander koopt alleen Nederlandse producten.	○	○	○	○	○
We moeten producten kopen die in Nederland gemaakt zijn, in plaats van andere landen rijk te laten worden van ons geld.	○	○	○	○	○
Nederlanders moeten geen buitenlandse producten kopen omdat dit gevolgen heeft voor de economie en werkloosheid veroorzaakt.	○	○	○	○	○

Q6 Nu volgt een informatieve tekst welke helpt bij het beantwoorden van de volgende vragen.

De focus van dit onderzoek ligt zogezegd op hardloop-apps. Dit soort apps is gekozen gezien de steeds groter wordende nadruk op een gezonde levensstijl en de groeiende populariteit van hardloop apps. De hardloop-apps die worden aangeboden in Appstore of Google Playstore hebben uiteraard onderscheidende kenmerken en functies. Echter hebben ze ook een aantal dingen gemeen, zoals de mogelijkheid, of soms zelfs de vereiste, om de app toegang te geven tot uw locatie, adresgegevens, schema's, agenda en/of andere persoonlijke gegevens. Hiermee is meteen een belangrijk punt van dit onderzoek aangesneden.

Het onderzoek behandelt een aantal verschillende apps uit, aan de ene kant de Verenigde Staten van Amerika, en aan de andere kant apps uit Nederland. In deze landen wordt er verschillend omgegaan met privacy en persoonsgegevens. Het is namelijk zo dat er in de Europese Unie een strengere privacy wetgeving geldt dan in de VS. Dit geldt dus ook voor het verzamelen en delen van persoonlijke data. Waar het in de VS luidt: 'het mag, mits..', luidt het in de EU: 'het mag niet, tenzij..'.

Q7 Na het zien van de volgende afbeeldingen zullen er een aantal vragen worden gesteld.

Stel u voor; u denkt er over na om een hardloop-app te downloaden, en u komt de volgende in Nederland ontwikkelde, gratis app tegen:

Afbeelding van een door de randomizer uitgekozen app zal nu worden getoond.

Q8 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
De app verkort de levensduur van mijn batterij.	○	○	○	○	○
De app zou mijn mobiele telefoon kunnen beschadigen.	○	○	○	○	○
De app vertraagt mijn mobiele telefoon of zorgt ervoor dat hij vastloopt.	○	○	○	○	○
De app gebruikt veel opslagruimte.	○	○	○	○	○

Q9 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
Ik ben bang dat deze app mijn persoonlijke gegevens voor andere doelen gebruikt, zonder mij hiervan op de hoogte te stellen.	○	○	○	○	○
Ik ben bang dat deze app mijn persoonlijke gegevens met andere eenheden deelt zonder mijn toestemming daarvoor te hebben.	○	○	○	○	○
Ik heb het gevoel dat mijn gegevens goed zijn beschermd bij deze app.	○	○	○	○	○

Q10 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
Dit is een capabele app.	○	○	○	○	○
Deze app werkt zeer goed.	○	○	○	○	○
Dit is een professionele app.	○	○	○	○	○

Q11 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
Deze app functioneert dusdanig om mij zo goed mogelijk van dienst te zijn.	○	○	○	○	○
Als ik hulp nodig heb, steekt de app er voldoende moeite in om mij te helpen.	○	○	○	○	○
Deze app is geïnteresseerd in mijn vooruitgang.	○	○	○	○	○

Q12 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
Dit is een eerlijke app.	○	○	○	○	○
Zoals deze app in haar privacy beleid aangeeft, worden mijn persoonlijke gegevens goed beschermd.	○	○	○	○	○
Deze app houdt zich aan haar gestelde verplichtingen en toezeggingen.	○	○	○	○	○

Q13 Geef aan wat u denkt over de volgende stellingen met betrekking tot de getoonde app.

	Volledig mee oneens	Oneens	Noch oneens, noch eens	Eens	Volledig mee eens
De waarschijnlijkheid dat ik deze app zal gaan downloaden is hoog.	○	○	○	○	○
Ik zal niet twijfelen om deze app te downloaden.	○	○	○	○	○
Ik sta op het punt om deze app te downloaden.	○	○	○	○	○
Ik zal deze app niet downloaden.	○	○	○	○	○

APPENDIX C. SPSS-OUTPUT MANOVA

Multivariate Tests[a]						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,991	8490,809[b]	4,000	312,000	,000
	Wilks' Lambda	,009	8490,809[b]	4,000	312,000	,000
	Hotelling's Trace	108,857	8490,809[b]	4,000	312,000	,000
	Roy's Largest Root	108,857	8490,809[b]	4,000	312,000	,000
COO	Pillai's Trace	,041	3,324[b]	4,000	312,000	,011
	Wilks' Lambda	,959	3,324[b]	4,000	312,000	,011
	Hotelling's Trace	,043	3,324[b]	4,000	312,000	,011
	Roy's Largest Root	,043	3,324[b]	4,000	312,000	,011
FAM	Pillai's Trace	,007	,564[b]	4,000	312,000	,689
	Wilks' Lambda	,993	,564[b]	4,000	312,000	,689
	Hotelling's Trace	,007	,564[b]	4,000	312,000	,689
	Roy's Largest Root	,007	,564[b]	4,000	312,000	,689
ACC	Pillai's Trace	,042	3,396[b]	4,000	312,000	,010
	Wilks' Lambda	,958	3,396[b]	4,000	312,000	,010
	Hotelling's Trace	,044	3,396[b]	4,000	312,000	,010
	Roy's Largest Root	,044	3,396[b]	4,000	312,000	,010
COO * FAM	Pillai's Trace	,022	1,753[b]	4,000	312,000	,138
	Wilks' Lambda	,978	1,753[b]	4,000	312,000	,138
	Hotelling's Trace	,022	1,753[b]	4,000	312,000	,138
	Roy's Largest Root	,022	1,753[b]	4,000	312,000	,138
COO * ACC	Pillai's Trace	,011	,873[b]	4,000	312,000	,480
	Wilks' Lambda	,989	,873[b]	4,000	312,000	,480
	Hotelling's Trace	,011	,873[b]	4,000	312,000	,480
	Roy's Largest Root	,011	,873[b]	4,000	312,000	,480
FAM * ACC	Pillai's Trace	,002	,129[b]	4,000	312,000	,972
	Wilks' Lambda	,998	,129[b]	4,000	312,000	,972
	Hotelling's Trace	,002	,129[b]	4,000	312,000	,972
	Roy's Largest Root	,002	,129[b]	4,000	312,000	,972
COO * FAM * ACC	Pillai's Trace	,017	1,325[b]	4,000	312,000	,260
	Wilks' Lambda	,983	1,325[b]	4,000	312,000	,260
	Hotelling's Trace	,017	1,325[b]	4,000	312,000	,260
	Roy's Largest Root	,017	1,325[b]	4,000	312,000	,260
a. Design: Intercept + COO + FAM + ACC + COO * FAM + COO * ACC + FAM * ACC + COO * FAM * ACC						
b. Exact statistic						

Tests of Between-Subjects Effects						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	TECHNICALRISK_mean	1,187[a]	7	,170	,393	,906
	PRIVACYRISK_mean	10,172[b]	7	1,453	2,398	,021
	ABILITY_TRUST	5,768[c]	7	,824	2,788	,008
	DOWNLOADINTENTION_mean	2,820[d]	7	,403	1,456	,182
Intercept	TECHNICALRISK_mean	2453,669	1	2453,669	5688,147	,000
	PRIVACYRISK_mean	2841,735	1	2841,735	4690,290	,000
	ABILITY_TRUST	4047,373	1	4047,373	13693,591	,000
	DOWNLOADINTENTION_mean	2441,578	1	2441,578	8823,938	,000
COO	TECHNICALRISK_mean	,543	1	,543	1,259	,263
	PRIVACYRISK_mean	1,168	1	1,168	1,928	,166
	ABILITY_TRUST	2,388	1	2,388	8,079	,005
	DOWNLOADINTENTION_mean	,308	1	,308	1,112	,293
FAM	TECHNICALRISK_mean	,086	1	,086	,199	,656
	PRIVACYRISK_mean	,034	1	,034	,055	,814
	ABILITY_TRUST	,314	1	,314	1,062	,303
	DOWNLOADINTENTION_mean	,291	1	,291	1,053	,306
ACC	TECHNICALRISK_mean	,217	1	,217	,502	,479
	PRIVACYRISK_mean	7,577	1	7,577	12,505	,000
	ABILITY_TRUST	,003	1	,003	,010	,921
	DOWNLOADINTENTION_mean	,555	1	,555	2,006	,158
COO * FAM	TECHNICALRISK_mean	,019	1	,019	,045	,833
	PRIVACYRISK_mean	,785	1	,785	1,296	,256
	ABILITY_TRUST	1,935	1	1,935	6,548	,011
	DOWNLOADINTENTION_mean	,250	1	,250	,904	,342
COO * ACC	TECHNICALRISK_mean	,310	1	,310	,720	,397
	PRIVACYRISK_mean	,036	1	,036	,059	,809
	ABILITY_TRUST	,682	1	,682	2,308	,130
	DOWNLOADINTENTION_mean	,150	1	,150	,541	,463
FAM * ACC	TECHNICALRISK_mean	,014	1	,014	,033	,855
	PRIVACYRISK_mean	,136	1	,136	,225	,636
	ABILITY_TRUST	,005	1	,005	,017	,897

	DOWNLOADINTENTION_mean	,035	1	,035	,125	,723
COO * FAM * ACC	TECHNICALRISK_mean	,018	1	,018	,042	,837
	PRIVACYRISK_mean	,383	1	,383	,632	,427
	ABILITY_TRUST	,466	1	,466	1,578	,210
	DOWNLOADINTENTION_mean	1,299	1	1,299	4,694	,031
Error	TECHNICALRISK_mean	135,880	315	,431		
	PRIVACYRISK_mean	190,851	315	,606		
	ABILITY_TRUST	93,104	315	,296		
	DOWNLOADINTENTION_mean	87,160	315	,277		
Total	TECHNICALRISK_mean	2614,250	323			
	PRIVACYRISK_mean	3076,111	323			
	ABILITY_TRUST	4182,625	323			
	DOWNLOADINTENTION_mean	2546,438	323			
Corrected Total	TECHNICALRISK_mean	137,067	322			
	PRIVACYRISK_mean	201,023	322			
	ABILITY_TRUST	98,872	322			
	DOWNLOADINTENTION_mean	89,981	322			
a. R Squared = ,009 (Adjusted R Squared = -,013)						
b. R Squared = ,051 (Adjusted R Squared = ,030)						
c. R Squared = ,058 (Adjusted R Squared = ,037)						
d. R Squared = ,031 (Adjusted R Squared = ,010)						

APPENDIX D. MEANS AND STANDARD DEVIATION VALUES

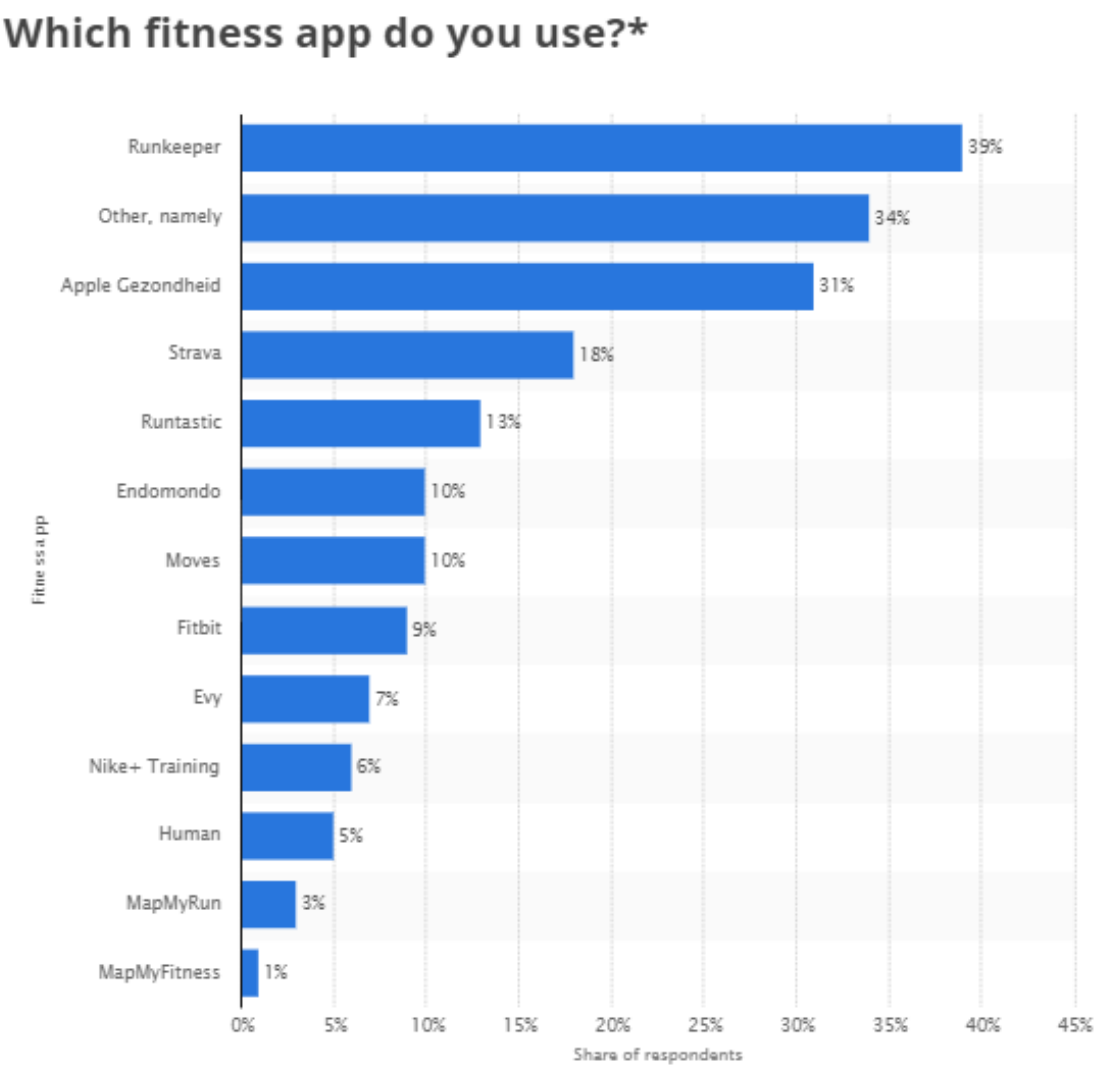
Descriptive Statistics						
	COO	FAM	ACC	Mean	Std. Deviation	N
TECHNICALRISK_mean	NL	Familiar	Free	2,7083	,71123	42
			Paid	2,7941	,60136	34
			Total	2,7467	,66143	76
		Unfamiliar	Free	2,6316	,59768	38
			Paid	2,7744	,63444	41
			Total	2,7057	,61727	79
		Total	Free	2,6719	,65675	80
			Paid	2,7833	,61558	75
			Total	2,7258	,63755	155
	US	Familiar	Free	2,8224	,70449	38
			Paid	2,8138	,63517	47
			Total	2,8176	,66300	85
		Unfamiliar	Free	2,8068	,64218	44
			Paid	2,7949	,71145	39
			Total	2,8012	,67146	83
		Total	Free	2,8140	,66760	82
			Paid	2,8052	,66686	86
			Total	2,8095	,66524	168
	Total	Familiar	Free	2,7625	,70587	80
			Paid	2,8056	,61745	81
			Total	2,7842	,66114	161
		Unfamiliar	Free	2,7256	,62436	82
			Paid	2,7844	,66886	80
			Total	2,7546	,64538	162
		Total	Free	2,7438	,66404	162
			Paid	2,7950	,64159	161
			Total	2,7693	,65244	323
PRIVACYRISK_mean	NL	Familiar	Free	2,8492	,74062	42
			Paid	3,1078	,83574	34
			Total	2,9649	,78990	76
		Unfamiliar	Free	2,7018	,65204	38
			Paid	3,0163	,80606	41
			Total	2,8650	,74825	79
		Total	Free	2,7792	,69949	80
			Paid	3,0578	,81534	75
			Total	2,9140	,76809	155
	US	Familiar	Free	2,7807	,78758	38
			Paid	3,2199	,84349	47

			Total	3,0235	,84326	85
		Unfamiliar	Free	2,9697	,67368	44
			Paid	3,1880	,86449	39
			Total	3,0723	,77223	83
		Total	Free	2,8821	,73024	82
			Paid	3,2054	,84817	86
			Total	3,0476	,80689	168
	Total	Familiar	Free	2,8167	,75919	80
			Paid	3,1728	,83684	81
			Total	2,9959	,81649	161
		Unfamiliar	Free	2,8455	,67321	82
			Paid	3,1000	,83422	80
			Total	2,9712	,76536	162
		Total	Free	2,8313	,71487	162
			Paid	3,1366	,83373	161
			Total	2,9835	,79012	323
ABILITY_TRUST	NL	Familiar	Free	3,3452	,54926	42
			Paid	3,5000	,57075	34
			Total	3,4145	,56058	76
		Unfamiliar	Free	3,5066	,58265	38
			Paid	3,5244	,47370	41
			Total	3,5158	,52554	79
		Total	Free	3,4219	,56758	80
			Paid	3,5133	,51644	75
			Total	3,4661	,54362	155
	US	Familiar	Free	3,8421	,52768	38
			Paid	3,6596	,51717	47
			Total	3,7412	,52674	85
		Unfamiliar	Free	3,5398	,61697	44
			Paid	3,5256	,49932	39
			Total	3,5331	,56143	83
		Total	Free	3,6799	,59353	82
			Paid	3,5988	,51059	86
			Total	3,6384	,55246	168
	Total	Familiar	Free	3,5813	,59104	80
			Paid	3,5926	,54263	81
			Total	3,5870	,56545	161
		Unfamiliar	Free	3,5244	,59785	82
			Paid	3,5250	,48326	80
			Total	3,5247	,54260	162
		Total	Free	3,5525	,59333	162
			Paid	3,5590	,51350	161

			Total	3,5557	,55413	323
DOWNLOADINTENTION_mean	NL	Familiar	Free	2,6786	,57986	42
			Paid	2,7868	,41802	34
			Total	2,7270	,51345	76
		Unfamiliar	Free	2,8224	,58676	38
			Paid	2,6341	,55084	41
			Total	2,7247	,57261	79
		Total	Free	2,7469	,58393	80
			Paid	2,7033	,49779	75
			Total	2,7258	,54264	155
	US	Familiar	Free	2,9671	,61833	38
			Paid	2,7340	,51448	47
			Total	2,8382	,57179	85
		Unfamiliar	Free	2,7443	,44620	44
			Paid	2,7244	,45449	39
			Total	2,7349	,44747	83
		Total	Free	2,8476	,54114	82
			Paid	2,7297	,48540	86
			Total	2,7872	,51522	168
	Total	Familiar	Free	2,8156	,61204	80
			Paid	2,7562	,47430	81
			Total	2,7857	,54619	161
		Unfamiliar	Free	2,7805	,51429	82
			Paid	2,6781	,50503	80
			Total	2,7299	,51074	162
		Total	Free	2,7978	,56319	162
			Paid	2,7174	,48984	161
			Total	2,7577	,52862	323

APPENDIX E. STATISTICS MOST USED RUNNING APPS IN THE NETHERLANDS

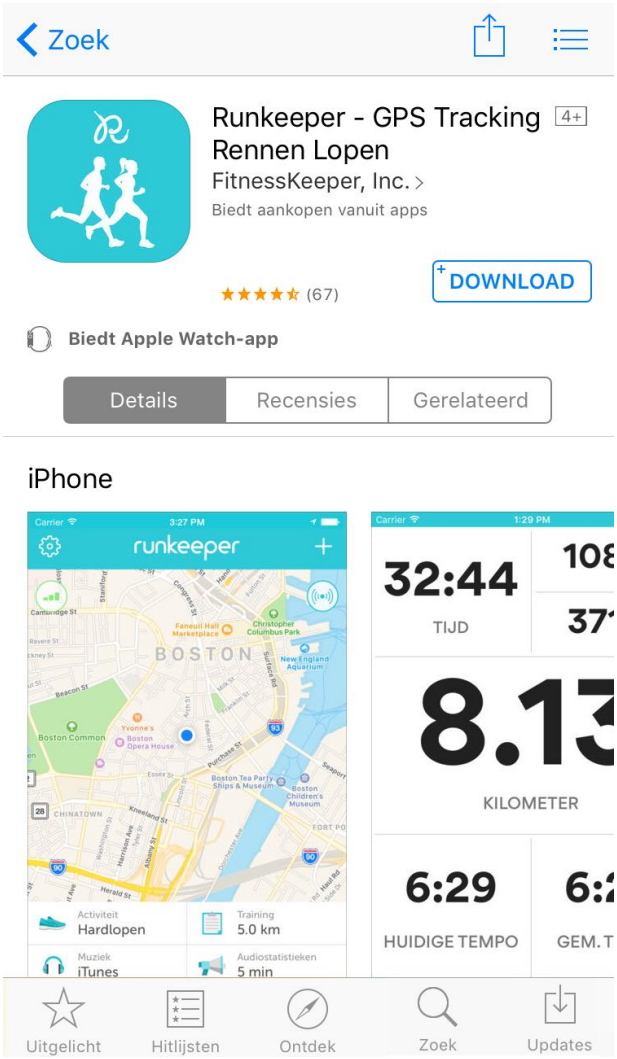
Internet › Mobile Internet & Apps › Most used fitness apps in the Netherlands 2016



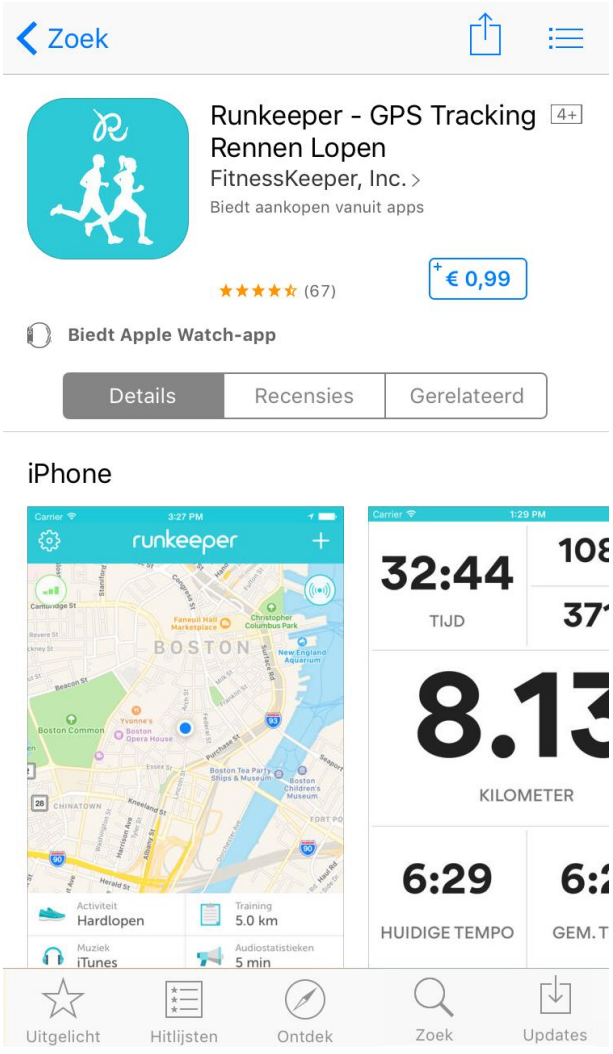
APPENDIX F. MANIPULATIONS

The following images show the familiar app from the USA. Both a free and a paid version are included.

US familiar free running app

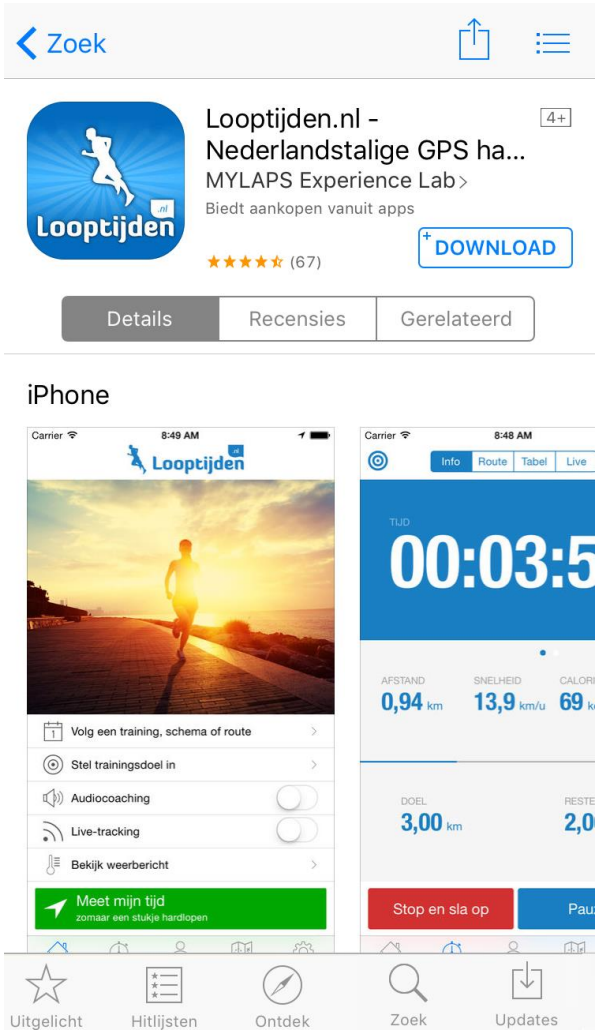


US Familiar paid running app.

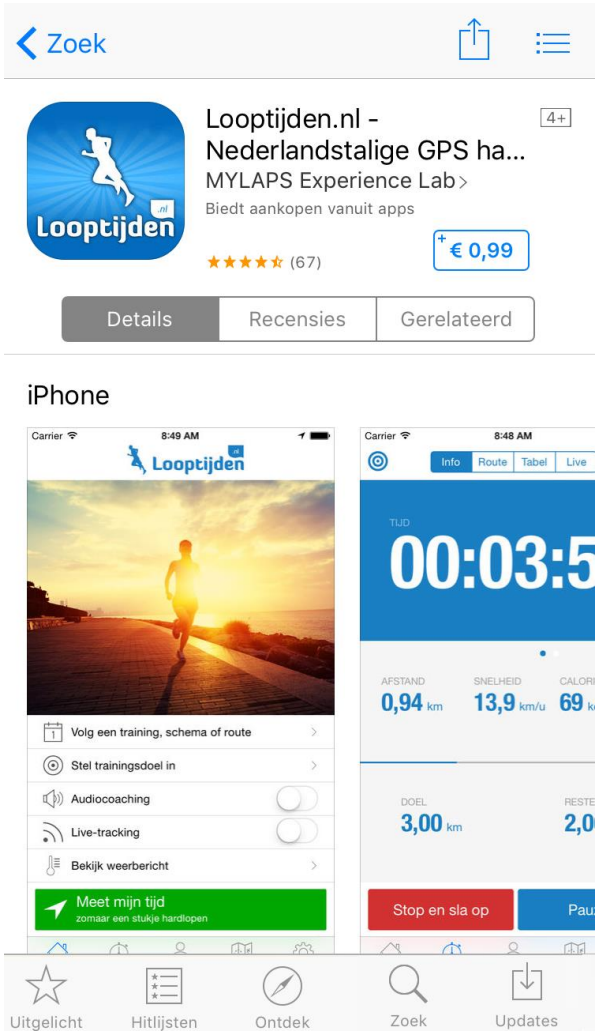


The following images show the familiar app from the Netherlands. Both a free and a paid version are included.

Dutch familiar free running app.

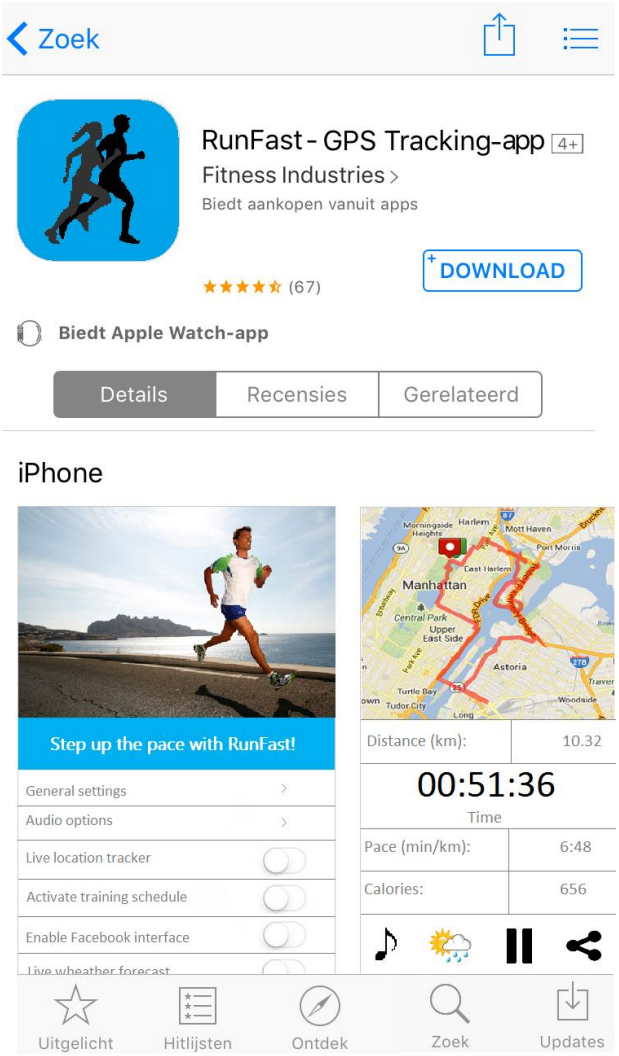


Dutch familiar paid running app.

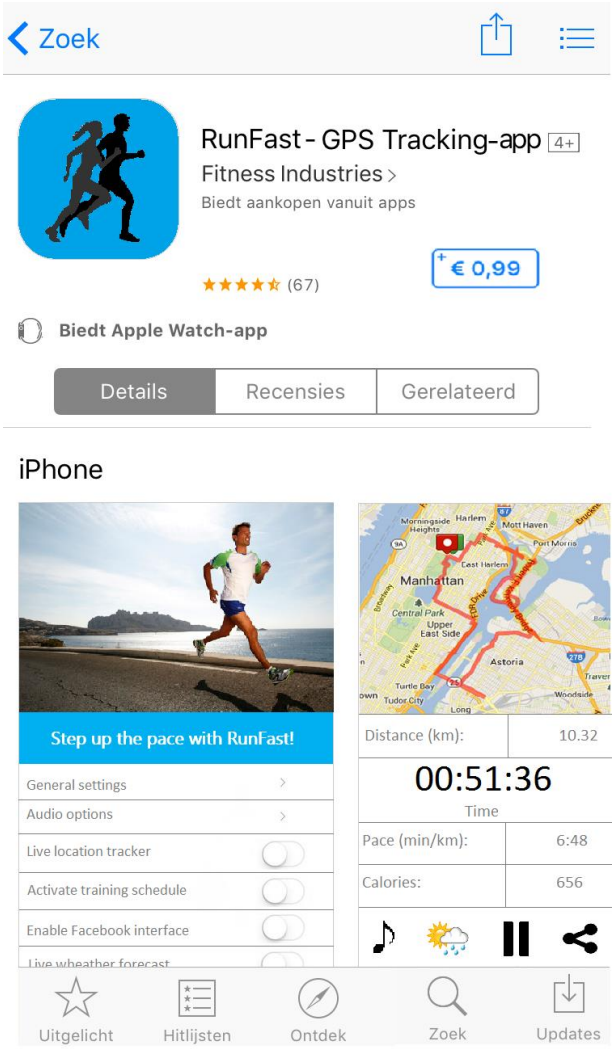


The following images show the unfamiliar app from the USA. Both a free and a paid version are included.

Unfamiliar free US app

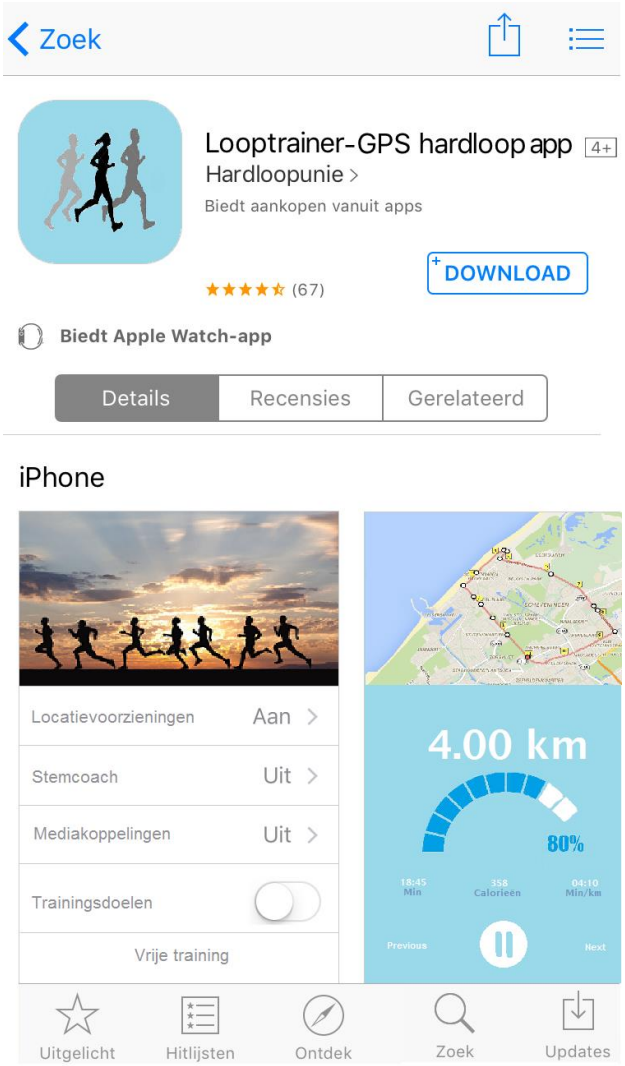


Unfamiliar paid US app



The following images show the unfamiliar app from the Netherlands. Both a free and a paid version are included.

Unfamiliar free Dutch app



Unfamiliar paid Dutch app