App icon preferences:

The influence of app icon design and involvement on quality and intention to download

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Apeldoorn, 19 March 2015

Abstract

Research objective

Nowadays, a life without communication through mobile devices is something that is hard to imagine for many people. Consumers intensively download and use apps on their smartphones and tablets. Consumers can choose among the more than one million apps to find the hidden gems they did not know about. The number of apps is growing every day and are therefore getting more and more competition, so they have to be distinctive to cut through the clutter. However, to date, no research has been carried out investigating the influence of branding in app icons or the influence of app icon design on the perceived app quality and the intention to download. This study has the goal to provide insight in the (possible) consumer preferences for specific app icon characteristics. Furthermore, the influence of brand presence, app icon design, and involvement with the app category on perceived app quality and intention to download the app for both entertainment and informative apps was investigated.

Study

In an online survey 279 participants evaluated their involvement with several app subcategories which were categorized into entertainment and informative apps. Then, the participants were asked to choose the app they preferred out of ten app icon variants. This procedure was repeated for each of the twelve different cases (six entertainment and six informative app cases). The app icons were manipulated on three aspects; design style (flat design versus skeuomorphic design), logo style (logo versus brand name), and brand presence (well-known brand versus non-existent brand versus no brand). Subsequently, questions were asked regarding the perceived app quality and download intention of the selected app icon per case. Afterwards, the brand awareness of the well-known brands and attitude toward the well-known brands were measured. Based on the selected app icons, preferences for specific app icon characteristics were found. The measures on brand awareness, attitude toward the brand, and involvement with the app category were used to investigate their influence on the perceived app quality and intention to download the apps.

Results and conclusions

The study demonstrated that consumers do have a strong preference for specific app icon characteristics. Design style is found to be an important factor in the app icon preference. Most differences in app icon preference between entertainment and informative apps are based on

the factor design style. Respondents have a strong preference for skeuomorphic app icons when it comes to entertainment apps. However, when informative apps are involved, respondents have a strong preference for app icons that contain a flat design.

Another important finding is that the brand appears to be an anchor in the choice of apps. Respondents have a strong preference for apps that contain a well-known brand over apps that do not contain a brand, or contain an unknown (i.e. non-existent) brand. Besides, respondents strongly prefer app icons that contain a brand logo over app icons with a brand name.

App designers should take into account that the presence of a well-known brand in the app icon is found to have a positive effect on the perceived app quality of entertainment apps, while the preference for no brand within the app icon had a negative influence. Furthermore, as a brand, it is very important to create positive attitudes among the target group(s) of the brand because attitude toward the brand is found to have a positive influence on the perceived app quality and intention to download for both entertainment and informative apps. Furthermore, for both entertainment apps and informative apps, involvement with the app category is found to have a positive effect on the intention to download an app within this category.

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1. Introduction

Nowadays, a life without communication through mobile devices is something that is hard to imagine for many people. Many people own a smartphone, which could be defined as a multifunctional mobile phone whose functions go beyond voice communication and text-messaging capabilities, and feature wireless connectivity, multimedia presentation and capture a built-in Web browser (e.g. iPhone) (Oulasvirta, Wahlström, & Ericsson, 2010). Furthermore, tablet computers are getting more and more popular. Tablet computers can be identified as wireless, portable computers with a touch screen interface. The iPad and Samsung Galaxy Tab are examples of such devices.

Both smartphones and tablet computers use installed applications ("apps") which provide desired information, services, and communication functions. People are frequently using the devices and apps wherever they are. The focus of this study will be on the apps used on smartphones and tablet computers. A wide range of applications is available, Apple's App Store has over 950.000 interactive applications ranging from tools for text messaging, to maps, books, games, and online shopping programs (Jones, 2013; Bellman, Potter, Treleaven-Hassard, Robinson, & Varan, 2011). Android's Google Play has over one million apps and has therefore the greatest application store on the market (Jones, 2013).

The number of applications is growing every day. Apple, for instance, receives over 10.000 application submissions each week of which most become available in the App Store within two weeks (Wortham, 2009). The market shares of the operating systems Android (e.g. Samsung, HTC, and LG devices) with 78.4 percent and iOS (i.e. Apple devices) with 15.6 percent market share together account for 90 percent of the total market (Gartner, 2014). The apps experience more competition and have to be distinctive to cut through the clutter. Consumers have to search among the more than one million apps to find the hidden gems they did not know about.

The intensive use of smartphones and tablet computers leads to mobile communication being a continuously growing field of research within media and communication studies. Some studies have investigated the effectiveness of branded mobile applications (e.g. Bellman et al., 2011). Branded apps are "apps that prominently display a brand identity, often by the name of the app

and the appearance of a brand logo or icon" (Bellman et al., 2011, p. 191). Bellman and colleagues concluded that branded apps are welcomed as "useful" in contrast to other forms of advertising and that branded apps could be one of the most powerful forms of advertising nowadays.

However, to date, no research has been carried out investigating the influence of branding in app icons. When looking at application stores, various visual elements such as app icons and screenshots are visible to persuade consumers to download the app. The app icon is often the first visual element users see in the application store when evaluating an app (Woolridge & Schneider, 2011; Choi & Lee, 2012). However, no research has investigated the influence of app icon design on the perceived app quality and the intention to download. Therefore, it is interesting to gain insight in the influence of branding in app icons on the perceived app quality and the intention to download. Do consumers have a preference for a specific type of app icon? What influence does the app icon have on the perceived app quality? Why will consumers download a particular application based on the app icon, instead of downloading others?

It is also interesting to investigate how consumers make decisions in application stores. There are so many apps to choose from. When selecting an app without thinking thoroughly, which visual cues, such as a brand name or logo, influence consumers to download an app? Does involvement have an influence on the download intention of an app?

This study will contribute to the knowledge of app icon preferences and the influence of app icon design on the perceived quality of the app and the intention to download. These insights are interesting for application designers, developers and marketers. Application designers, developers and marketers could use this information to merchandize their apps in the way that consumers would prefer to download these apps instead of the apps of their competitors. To gain insight in this matter, the following main research question is created for this study:

"App icon preference in app browsing:
What is the influence of brand presence, app icon design, and involvement with the app category on perceived app quality and the intention to download?"

In order to answer the main research question, the following sub research questions are formulated and a basic research model is developed.

RQ1: Which app icon characteristics (i.e. app icon design and brand presence) are preferred by consumers?

RQ2: Which factors influence the perceived app quality?

RQ3: Which factors influence the intention to download the app?

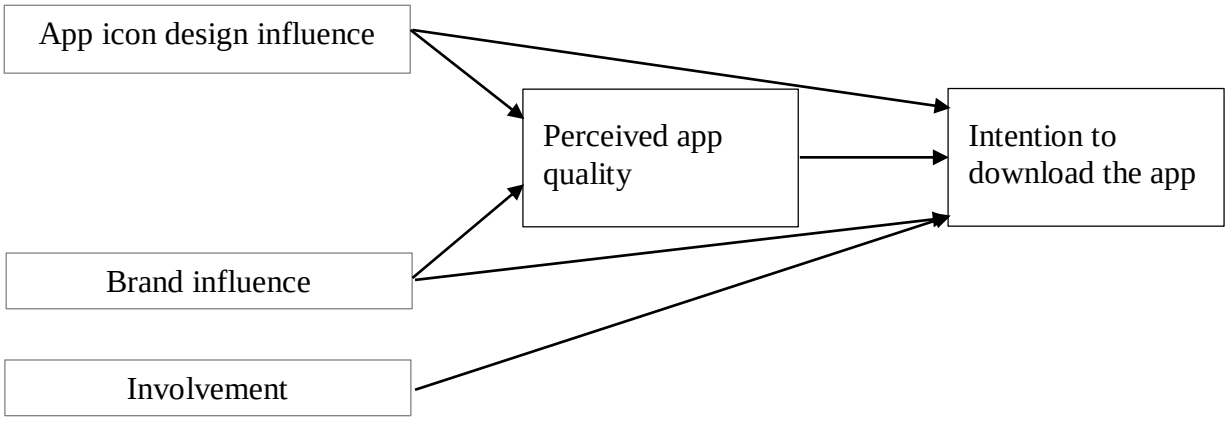


Figure 1 **Overview of relations that will be investigated in this study**

2. Theoretical framework

2.1. Consumer decision making process

When consumers are searching for an app and download one, they are going through a process of decision making. In general, the consumer decision making process consists of five stages; problem recognition (or need for a product), information search, evaluation of alternatives, product choice, and the outcomes of the choice. Based on the importance of the decisions, the amount of effort put into each stage differs (Solomon et al., 2013).

More expensive products, infrequently bought products, high consumer involvement, and/ or unfamiliar product classes and brands will lead to more extensive thought, search, and time will be given to the purchase decision (Solomon et al., 2013). From this perspective, a continuum is distinguished which is anchored at one end by habitual decision-making and at the other end by extended problem solving. Solomon and colleagues argue that many decisions are somewhere in the middle of this continuum, these processes can be identified as limited problem solving.

Extended problem-solving decisions involve high risk and involvement, extensive information search by which the information is processed actively and whereby multiple sources would be consulted prior to store visits (Solomon et al., 2013). According to Solomon and colleagues, limited problem-solving decisions involve low risk and involvement, little information search, whereby in-store decision making is likely. With habitual decision making, no or little conscious effort is used to make the decision, because these purchases are so routinized, that the decisions are made without conscious control (Solomon et al., 2013). Therefore, habitual decision making does not require passing through all the stages of the abovementioned decision making process.

Based on these characteristics, the app selection process before downloading could be characterized as limited problem-solving. The in-store decision making will be operationalized in the study by asking the participants to choose an app icon within a time limit of three seconds.

2.2. Elaboration Likelihood Model

The consumer decision making process can be related to The Elaboration Likelihood Model (Petty & Cacioppo, 1986) in which two routes to attitude change (e.g. persuasion to download an app) are modeled. According to Petty and Cacioppo (1986), the two most influencing factors of the route a consumer will take in a persuasive situation are motivation (i.e. the desire to process the message) and ability (i.e. the capability to evaluate the message critically).

The central route of attitude change is characterized by a person's consideration of information that one feels is central to the issue involved, whereby the pros and cons of the issue are considered (Petty & Cacioppo, 1986). The peripheral route is characterized by attitude change association with the issue that have positive or negative cues, or because the person makes a simple inference about the merits of the advocated position based on various simple cues in the persuasion context (Petty & Cacioppo, 1986).

The central route demands motivation and ability of consumers to process information. High involvement with a particular subject would lead consumers to process the information via the central route. Whether the attitude will change depends on the argument quality and the processing quality of the information.

Contradictory, the peripheral route is taken when consumers are not motivated and/or able to process the information in the persuasive situation. In this situation, consumers are low involved and rely on mental shortcuts which lead to acceptance (or rejection) of a message based on external cues, rather than thought. Whether the attitude will change depends on of the presence of persuasive cues.

2.3. App categories

There are various categories in which the apps in the application stores are placed. The most popular apps are those that provide information (e.g. news, weather and sports apps), apps that are used to communicate (e.g. Facebook, WhatsApp, and Skype), and apps that are used for entertainment and relaxation (e.g. Candy Crush and Angry Birds) (Google, 2012).

Both Android's Google Play and Apple's App Store have arranged their apps into categories. Android's Google Play has first classified the apps into three categories: Apps, Music, and

Books. When choosing for the category Apps, another classification into 26 categories has been made. The apps in the App Store are divided over 22 categories. As can be seen in Appendix A, almost all categories of the two application stores are corresponding with each other. This categorization of apps will be further mentioned as app subcategories.

In their study, Kim, Lee, and Son (2011) have classified apps into four categories: *Productivitiy* (i.e. business utility apps), *Entertainment* (e.g. games, sports, music, and photography), *Information* (e.g. finance, news, travel, medical, weather), and *Networking* (e.g. Twitter, Facebook). The categories entertainment and information can be related to two kinds of interactive experiences consumers may experience (Calder, Malthouse, & Schaedel, 2009). Utilitarian/ information gathering experiences and intrinsic enjoyment/ entertainment experiences are two of the eight different kinds of interactive experiences that matches respectively information and entertainment apps (Calder, Malthouse, & Schaedel, 2009). These two experiences are also used in the study of Bellman et al. (2011) regarding the effectiveness of branded mobile phone apps. Informational content in the apps such as banking and weather apps supports a utilitarian/ goal-directed desired outcome, whereas apps with experiential content such as games meet a desired intrinsic-enjoyment outcome (Bellman et al., 2011).

The two contrasting categories *Entertainment* and *Information* will be used in this study to investigate whether there are differences in preferences based on these app categories. Furthermore, it will be investigated whether there are differences in the influence on perceived app quality and intention to download due to the app categories.

2.4. Involvement with app categories

In the literature, there are fairly compatible definitions of involvement. One definition is: involvement reflects the extent of personal relevance of the decision to the individual in terms of basic values, goals, and self- concept (Engel and Blackwell, 1982; also adopted by Celsi and Olson, 1988; and Mittal and Lee; 1989). Complimentary, Greenwald and Leavitt (1984) concluded their literature review on involvement with the general agreement that high involvement (approximately) means the consumer's personal relevance or importance.

Despite differences in nuances, there are resemblances in the way that involvement is the perceived value of a "goal- object" that manifests as interest in that goal-object (Mittal & Lee,

1989). Mittal and Lee make a distinction between the goal-object being a product itself (as in product involvement) or a purchase decision (as in purchase involvement). Accordingly, product involvement relates to how interesting a consumer finds in a product class, while within purchase involvement, the interest is taken in making a brand selection. When making a distinction between high and low purchase involvement, high purchase involvement implies a very deliberative decision process, while low purchase involvement does not.

A purchase decision is comparable with deciding to download an (paid or free) app. Based on the aforementioned definitions and concepts, involvement in this study will be conceptualized as *the perceived relevance or importance a consumer acknowledges in the process of downloading an app.* Adapted from the Elaboration Likelihood Model, highly involved consumers will take more time to choose app and download an app, due to processing of information. Therefore, involvement in this study will be measured by the time a consumer takes to choose and download an app.

2.5. App searching versus app browsing

In the app selection process of consumers, a distinction can be made between app searching and app browsing. When consumers already have a specific app in mind, they will actively search to find that particular app. This manner of app selection can be categorized as app searching. By app browsing, consumers are simply scrolling through an app category or lists of apps not knowing what app they are looking for or only having a subject or category in mind.

With app searching, consumers are likely to be motivated to read information concerning various apps and therefore are taking the central route of the Elaboration Likelihood Model. When app browsing, consumers are more likely to be persuaded by the visual appeal of the apps (e.g. app icons) when scrolling through a list of apps, and take the peripheral route.

An example of the apps that consumers could see when browsing apps within the category Weather for the application stores Google Play and App Store are enclosed in Appendix B.

This study will concentrate on app browsing, because the study will focus on the influence of app icons on consumer perceptions and intentions when consumers are not already having a specific app in mind.

2.6. App icons

The app icon is often the first visual element users see in the application store when evaluating an app (Woolridge & Schneider, 2011; Choi & Lee, 2012). A bad first impression can cost sales and invite negative reviews (Woolridge & Schneider, 2011). Therefore, fine-tuning the design of the app's icon is important for its success.

When people see a listing with apps, their interest is captured for only less than a few seconds to convince them to explore a specific app. Lindgaard, Fernandes, Dudek, and Brown (2006) argued that a user can assess the visual appeal of websites within 50 milliseconds. Furthermore the judgments of users were found to be relatively stable in the three time conditions (i.e. 50 milliseconds, 500 milliseconds and unlimited time condition). Tractinsky, Cokhavi, Kirschenbaum, and Sharfi (2006) have replicated Lindgaard et al.'s study and confirmed those findings in the 500 milliseconds condition while using a different research method. Since the app icon is less comprehensive in size, these results can be generalized to app icons. Therefore, it is important that the app icon will convince the consumer to have a closer look on the app within this short time. For that reason, this study will show several app icons for a few seconds, and let the respondent make a quick decision regarding which app icon they want to have a closer look on. Also, in this manner, extensive thought about the app icons will be excluded.

2.7. Trend in app icon design: skeuomorphic versus flat design

Academic literature concerning app icon design mainly describes two types of app icon design; skeuomorphic and flat design (e.g. Morson, 2014; Hou & Ho, 2013; Wooldridge & Schneider, 2011).

Skeuomorphic design is a realistic app icon design style in which the icons have embossed effects, 3D artificial textures, drop shadows, reflective shimmers, and a glossy look (Morson, 2014; Creative Blog, 2014). Flat design represents a simple and clear icon with clear lines and a lighter, bolder and more colorful color palette than the skeuomorphic design (Morson, 2014; Hou & Ho, 2013). Morson (2014) formulated flat design also as being more sophisticated and versatile than the realistic skeuomorphic design. An image containing a skeuomorphic and a flat design is enclosed in Appendix C.

The study of Hou and Ho (2013) concluded four aesthetic trends in app icons, namely:

1) concrete and detailed app icons, 2) abstract app icons with detailed decorations, 3) sample text logo and abstract app icon design, and 4) concrete and terse app icons. The skeuomorphic design style can be characterized as concrete, while on the other hand the flat design can be characterized as more abstract app icon design.

Both skeuomorphic and flat designs are being used to design app icons. However, little scientific research has investigated the influence of these designs on consumer evaluations (Hou & Ho, 2013). Hou and Ho (2013) argued that users prefer miniaturized designs of real goods. However, Hou and Ho's findings still provide doubt that the success of the skeuomorphic style will continue in the future, their study also indicated that the new generation of users preferred the abstract design style. In order to gain insight in the influence of the two design styles, design style is included as a factor in this study with the following hypothesis:

H1: Consumers have a preference for apps with either a flat or skeuomorphic design.

2.8. Branding

Bellman et al. (2011) concluded their research that apps which prominently display a brand identity could be one of the most powerful forms of advertising nowadays. According to the American Marketing Association (AMA), a brand is a name, term, sign, symbol, or design, or a combination of these elements, intended to identify the goods and services of one seller or a group of sellers and to differentiate them from its competitors. The components that identify and differentiate a brand can be identified as brand elements. Brand elements are elements such as name, logo, colors, shapes, and graphics that signify a specific brand and perceptions of the brand as shaped by experience (Rondeau, 2005). These perceptions are created by the marketers behind the brand and the people that experience the brand. The perceptions regarding a brand are remembered and reinforced each time consumers encounter things that represent the specific brand (Rondeau, 2005).

By making a connection between a brand and another entity, consumers may form a mental association between the brand and this other entity. As a result, any or all associations, judgments, and feelings will be linked with that entity (Keller, Apéria, & Georgson, 2012). The associations people have with a brand are most likely to affect product evaluations of that brand when consumers lack either the motivation or ability to judge product-related concerns (Keller et al., 2012).

As aforementioned, branded apps "prominently display a brand identity often by the name of the app and the appearance of a brand logo or icon" (Bellman et al., 2011, p. 191). Considering branded apps being possibly one of the most powerful forms of advertising nowadays, it is interesting to include the brand elements brand name and logo as a factor in this study. Based on these insights, the following hypothesis is formulated:

H2: Consumers have a preference for apps with a brand logo.

2.9. Brand awareness

In order to be persuasive, consumers have to be aware of the brand. Brand awareness is the ability for a consumer to recognize or recall that a brand is a member of a certain product category (Aaker, 1991). Thus, brand awareness is measured by brand recognition and brand recall performance. Brand recognition relates to the consumer's ability to confirm exposure to the brand when given the brand as a cue (Keller et al., 2012). Brand recall related to the consumer's ability to retrieve a brand from memory when given the product category.

Brand recognition is important when consumer decisions are made at the point of purchase, where the brand name, logo, and so on will be visible, while brand recall will be more important when consumer decisions are made in settings away from the point of purchase (Keller et al, 2012). In this study, brand recognition will be more important because the participants will see various app icons with a brand name or logo and the participants are asked to make an in-store decision, while facing the app icons.

When making limited problem-solving decisions, were consumers may lack the motivation or the ability to judge between brands (Petty & Cacioppo, 1986), consumers often rely on heuristics which are mental rules-of-thumb that lead to a speedy decision (Solomon et al., 2013). Brand awareness is an example of such a heuristic. Brand awareness increases the likelihood that the brand will be included in the consideration set and it can determine choice from the consideration set (Macdonald & Sharp, 2003; Rajh, 2002). Based on these insights, the following hypothesis can be proposed:

H3: Consumers have a preference for apps with a well-known brand.

2.10. Attitude toward the brand

Mitchell and Olson (1981, p. 318) define attitude toward the brand as an "individual internal evaluation of the brand". This definition incorporates two aspects that have remained fairly constant across 20th- century definitions (Giner-Sorolla, 1999). First, attitude is organized around responses to an object, in this case a brand. Second, an attitude is evaluative, which incorporate a general feeling of favorableness or unfavorableness toward the attitudinal object (Giner-Sorolla, 1999; Fishbein & Ajzen, 1975). The third component of Mitchell and Olson's definition is the internal evaluation, which suggests that an attitude is an internal state (Spears & Singh, 2012). However, Eagly and Chaiken (1993) defined that an attitude is an enduring state, it endures at least for a short period of time and is likely to affect and directs behavior. Therefore, Spears and Singh (2012) have conceptualized attitude toward the brand as a "relatively enduring, unidimensional summary evaluation of the brand that presumably energizes behavior" (p.55). This definition of attitude toward the brand will be used in this study.

Familiarity with the brand affects the attitude toward the brand (Laroche, Kim, & Zhou, 1996). The well-grounded *mere exposure effect* shows that affect toward a given object or brand arises as the result of repeated stimulus exposure (Zajonc, Markus, & Wilson, 1974). The more exposure of the stimulus, the more opportunities consumers have to form a more positive attitude toward the object or brand (Solomon et al., 2013). This implies that people tend to develop a preference for things merely because they are familiar with them. Therefore, this study will investigate whether attitude toward the brand also has an influence on the perceived app quality and intention to download the app.

2.11. Perceived app quality

Quality can be defined broadly as excellence or superiority (Zeithaml, 1988). By extension, the perceived quality can be defined by the consumer's judgment about a product's overall excellence or superiority of a product or service relative to another and with respect to its intended purpose (Keller et al., 2012; Zeithaml, 1988). It is an overall assessment of the consumer based on the perceptions of what constitutes quality and how well the brand is performing on those dimensions (Keller et al., 2012). It is the quality of apps as perceived by consumers that we are interested in, so we do not force a definition of quality on the consumers.

Consumers use intrinsic and extrinsic cues to infer the quality of products and services (Solomon et al., 2013). Intrinsic cues refer to concrete, physical properties of the product that cannot be changed without altering the nature of the product itself, like color or texture. Consumers are confronted with intrinsic cues when consuming the product (Aaker & Biel, 2009). Extrinsic cues are product related, but not part of the physical product. A number of extrinsic cues are the brand name, logo, country of origin, price, and even consumers' estimates of how much money has been put into a new product's advertising campaign (Solomon et al., 2013).

When consumers rate the visual quality of a logo as high, they assume that the products of this brand are of high quality as well (Bosch, de Jong & Elving, 2005). Strong logos can reinforce people's positive evaluations of the apps in case, while logos of poor quality can damage the reputation of the app. Besides, the cue utilization literature has repeatedly found that brand name is one of the most important cues of product quality (Dawar & Parker, 1994).

The perceived quality is also influenced by brand awareness. Hoyer and Brown (1990) have investigated this influence and found that over 70% of the consumers selected the known brand of peanut butter, even though another brand was "objectively" of better quality (i.e. determined by a blind taste test), and even though they were able to taste all the brands and they had neither bought or used the brand before (Hoyer & Brown, 1990). In other words, the fact of being a well-known brand dramatically affected the evaluation of the brand.

Furthermore, Stokes (1985) investigated the effects of price, package design and brand familiarity on perceived quality. Results showed that for a low involvement product (i.e. rice) familiarity had a greater effect on the quality perception of a brand than price or packaging. A declaration of this phenomenon might be that consumers may rationalize that if they have heard of a brand, the organization behind that brand must be spending a large amount of money on advertising. "If it is spending a lot on advertising, the organization must be reasonable profitable which means that other consumers must be purchasing the product and they must be satisfied enough with its performance, therefore the product must be of reasonable quality" (Macdonald & Sharp, 2003, p.2).

Based on these insights, the following hypotheses are proposed:

H4: Design style has an influence on the perceived app quality.

H5: Logo style has an influence on the perceived app quality.

H6: Brand presence has an influence on the perceived app quality.

H7: Brand awareness has a positive effect on the perceived app quality.

H8: Attitude toward the brand has a positive effect on the perceived app quality.

However, it could be possible that the relation between brand presence and perceived app quality is explained by brand awareness and/or attitude toward the brand. Therefore, it could be possible that brand awareness and/or attitude toward the brand are mediators between the presence of a brand within the app icon and the perceived app quality. To investigate these relationships, the following hypotheses are formulated.

H9: Brand awareness is a mediator between brand presence and perceived app quality.

H10: Attitude toward the brand is a mediator between brand presence and perceived app quality.

2.12. Intention to download an app

Intention can be defined as "the person's motivation in the sense of his/ her conscious plan to exert effort to carry out a behavior" (Eagly and Chaiken 1993, p. 168). Taking this in consideration, purchase intention can be defined as "an individual's conscious plan to make an effort to purchase a brand" (Spears & Singh, 2012, p. 56).

Not all apps in the application stores have to be bought, because a large number of apps are for free. Therefore, the term purchase intention is not always applicable within this area. However, purchase intention can be compared to intention to download, which is more suitable in the context of apps. In our conceptualization, *the intention to download an app is the person's motivation in the sense of his/ her conscious plan to make an effort to download an app*.

Studies that investigated the influence of attitude toward the brand on purchase intention are consistent. Many studies have found a significant positive relationship between attitude toward the brand and the intention to buy the same brand (e.g. Laroche et al., 1996; Phelps & Hoy, 1996; Homer, 1990).

Another positive relationship is identified between brand awareness and purchase intention (e.g. Laroche et al., 1996; Stokes, 1985). Research of Stokes (1985) found a significant effect of brand familiarity on purchase intention, while price and package design did not have a significant effect. Besides, Laroche et al. (1996) found a significant positive effect of brand familiarity on the consumer's confidence with the brand, which in turn has a significant positive effect on the purchase intentions. Besides, as aforementioned, Macdonald & Sharp (2003) and Rajh (2002) found that brand awareness increases the likelihood that the brand will be included in the consideration set and it can determine choice from the consideration set.

Furthermore, involvement is identified to have a positive effect on purchase intentions (Jiang, Chan, Tan, & Chua, 2010; O'Cass, 200l). As aforementioned, high purchase involvement implies a very deliberative decision process, while low purchase involvement does not. When consumers have a more deliberative decision process, they will search for more information and have an extensive thought about the purchase decision, which leads to a higher purchase intention (Jiang et al., 2010).

However, there is, to our knowledge, no literature that investigates the influence of a brand name or logo within an app icon on intention to download. Furthermore, it is also interesting to investigate whether the design style (i.e flat or skeuomorphic design) and presence of a well-known brand have an influence on the intention to download. Therefore, it is interesting to investigate these relationships too.

Based on these insights, the following hypotheses are proposed:

H11: Design style has an influence on the intention to download.
H12: Logo style has an influence on the intention to download.
H13: Brand presence has an influence on the intention to download.
H14: Brand awareness has a positive effect on the intention to download.
H15: Attitude toward the brand has a positive effect on the intention to download.
H16: Involvement with the app category has a positive effect on the intention to download.

2.13. Influence of perceived quality on intention to download

It has been suggested that perceived quality has a positive influence on customer purchase intentions (e.g. Boulding, Karla, Staelin & Zeithaml, 1993; Zeithaml, Berry & Parasuraman, 1996). This influence is justified by viewing perceived quality as an attitude (e.g. Carman, 1990). However, the empirical evidence available is, in many cases, inconclusive.

Zeithaml, Berry, and Parasuraman (1996) stated that the effects of perceived quality on behavioral response has been the subject of only a few marketing studies. Boulding et al. (1993) considered service quality as an antecedent of purchase intentions and found a significant direct effect in their research. However, all of these studies concentrated on service quality instead of product quality.

When looking at the customer-based brand equity model of Aaker, perceived product quality is, together with the facets perceived value for the cost, uniqueness, and willingness to pay a price premium, a factor that predicts the brand purchase intention and behavior (Netemeyer et al., 2004).

The influence of perceived app quality on the intention to download the app is assumed to be comparable with the influence of perceived quality on purchase intention. Therefore, the following hypothesis can be formulated:

H17: Perceived app quality has a positive effect on the intention to download.

2.14. Research model

Based on the theoretical framework, a research model for this study is composed. The model in Figure 2 gives an overview of the concepts and relations that will be investigated in this study. Table 1 gives an overview of the hypotheses of this study.

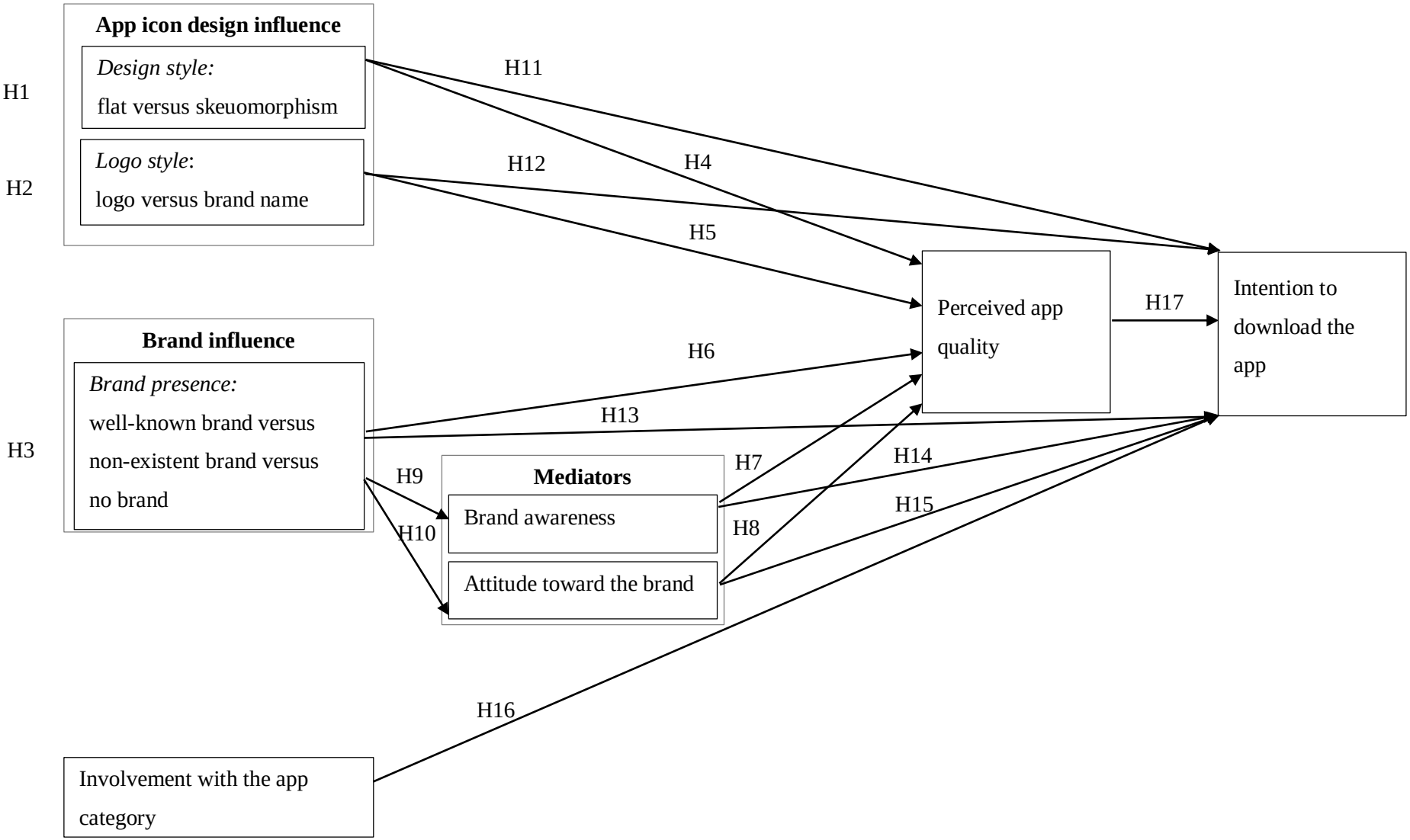


Figure 2 **Overview of relations that will be investigated in this study.**

Table 1
Summary of this study's hypotheses.

#	Hypotheses
	App icon preferences
H1	Consumers have a preference for apps with either a flat or skeuomorphic design.
H2	Consumers have a preference for apps with a logo.
H3	Consumers have a preference for apps with a well-known brand.
	Influences on perceived app quality
H4	Design style has an influence on the perceived app quality.
H5	Logo style has an influence on the perceived app quality.
H6	Brand presence has an influence on the perceived app quality.
H7	Brand awareness has a positive effect on the perceived app quality.
H8	Attitude toward the brand has a positive effect on the perceived app quality.
H9	Brand awareness is a mediator between brand presence and perceived app quality.
H10	Attitude toward the brand is a mediator between brand presence and perceived app quality
	Influences on intention to download
H11	Design style has an influence on the intention to download.
H12	Logo style has an influence on the intention to download.
H13	Brand presence has an influence on the intention to download.
H14	Brand awareness has a positive effect on the intention to download.
H15	Attitude toward the brand has a positive effect on the intention to download.
H16	Involvement with the app category has a positive effect on the intention to download.
H17	Perceived app quality has a positive effect on the intention to download.

3. Method

The data is gathered using an online survey with a 3 (brand; well-known brand versus non-existent brand versus no brand) by 2 (logo style; logo versus brand name) by 2 (design style; flat design versus skeuomorphic design) within subjects design. A pretest including ten participants is conducted to explore the amount of time spend by each participant and to make sure that the questionnaire makes sense to the participants.

3.1. Participants

Students who use Android devices or Apple devices were recruited to participate in the study. This is a very high percentage of the people who have a smartphone and/ or tablet computer, because these two operating systems together, as mentioned earlier, account for 90% of the total market. It was necessary to have participants who use one of these operating systems, because images of the application stores of Android (i.e. Google Play) or Apple (i.e. App Store) are shown in the survey.

The participants-pool SONA was used to recruit participants for this study. SONA is a system in which bachelor students of the faculty Behavioral Science of University of Twente could sign-up. The students received credits for participating in this study. Furthermore, the author placed a message on her *Facebook* profile with a link to the questionnaire to recruit participants.

In total 279 participants have participated in this study, of which the majority was between the 19 and 23 years old (M = 21.23, SD = 3.01). There were 78 male (28%) and 201 female respondents (72%). The sample consisted of higher educated participants (81.7% were bachelor students; 9% were students of a higher professional education; 7.5% were master students, and 1.8% were students of an intermediate vocational education). The majority of respondents (67.7%) only had a smartphone. Furthermore, almost one third of the respondents had both a smartphone and a tablet (31.5%), while 0.7 percent only had a tablet. The most frequently used operating system is Android with 60 percent of the respondents. 29 percent of respondents had the operating systems iOS. Besides, 11 percent had both Android and iOS, because of the fact that they had both a smartphone and a tablet which runs on different operating systems.

Ninety-two percent of the respondents (N = 257) completed the questionnaire. Three percent of the respondents (N = 8) almost completed the questionnaire, by quitting in the last section of the questionnaire (i.e. brand attitude questions), while 5 percent of the respondents (N = 14) quitted the questionnaire after app case 12 (i.e. choosing app icons).

Not all respondents managed to choose an app icon in all cases within the time limit of three seconds. On average, the respondents had chosen 4.69 out of 6 entertainment apps and 4.86 out of 6 informative apps.

3.2. Manipulations

The ten app icons that were visible per case are manipulated in three ways: design style (i.e. skeuomorphic design vs. flat design), logo style (i.e. logo vs. brand name), and brand presence (i.e. well-known brand vs. non-existent brand vs. no brand). The study included twelve cases in total; six entertainment app cases and six informative app cases.

The apps with a skeuomorphic design have a glossy look, 3D artificial textures, drop shadows, and/or reflective shimmers. The app icons with a flat design are simple and clear icons, with clear lines, and no effects as mentioned at the skeuomorphic design. It is self-evident that the app icons within the manipulation variant logo contain the logo of the brand, and the app icons with the manipulation variant brand name contain the brand name. The overview of app icon variants is shown in Table 2, and an example of the app icon variants is shown in Figure 3.

The app icons are displayed within the Google Play or App Store environment, such as which is visible in Appendix D.

The app icons are designed in a way that several brand elements are visible/ recognizable for the participants. Therefore, some of the existing corporate design elements of the brand are used to create the various app icons.

Table 2
Overview of the app icons variants

Icon variant	Brand presence	Design style	Logo style
Icon variant 1	Well-known brand	Brand logo	Flat design
Icon variant 2	Well-known brand	Brand logo	Skeuomorphic design
Icon variant 3	Well-known brand	Brand name	Flat design
Icon variant 4	Well-known brand	Brand name	Skeuomorphic design
Icon variant 5	Non-existent brand	Brand logo	Flat design
Icon variant 6	Non-existent brand	Brand logo	Skeuomorphic design
Icon variant 7	Non-existent brand	Brand name	Flat design
Icon variant 8	Non-existent brand	Brand name	Skeuomorphic design
Icon variant 9	No brand	/	Flat design
Icon variant 10	No brand	/	Skeuomorphic design

Well-known brand
Logo
Skeuomorphic design

Well-known brand
Logo
Flat design

Well-known brand
Brand name
Skeuomorphic design

Well-known brand
Brand name
Flat design

No brand
/
Skeuomorphic design

Non-existent brand
Logo
Skeuomorphic design

Non-existent brand
Logo
Flat design

Non-existent brand
Brand name
Skeuomorphic design

Non-existent brand
Brand name
Skeuomorphic design

No brand
/
Flat design

Figure 3 **Overview of the ten app icon variants for case 1.**

3.3. Selection of app categories

A selection of twelve app subcategories is made for this study, based on the literature review and the overview of app subcategories in Appendix A. All of the cases within these app subcategories can be classified into either the Entertainment or the Information category of

Kim, Lee, and Son (2011). Only entertainment and information apps would be used in the cases of this study because of the criterion that a well-known brand without an app is available within the category (see also section 3.4). Since social networking is very popular on smartphones and tablets, there is, to our knowledge, no well-known brand within this category that does not have a widely used app. Therefore, it is not feasible to use the category networking within our study. The category productivity is not applicable in our study, because there are no branded productivity apps.

The selected subcategories for the six entertainment cases are; Game, Health & Fitness, Lifestyle, Music, Photo & Video, Sports, and for the six informative cases; Book & Reference, Business, Catalog, Education, Travel & Local, and Weather. Each category is the theme of a case in order to have a good representation of the different sort of apps within the entertainment and informative app categories.

3.4. Selection of brands

Together with the creation of non-existent brands, well-known brands are selected for each of the twelve cases. A criterion for the selection of well-known brands is that the brand does not have an app or does have an unknown app (e.g. Japanese app). When the brand has an app and this app is known to the participant, this could influence the evaluation of the various app icons by the participant. To eliminate the influence of prior experiences with the app, only brands that do not have an (Dutch or English) app are selected.

Furthermore, the selected brands should be perceived by the participants to match with the app category and the case in which the brand is placed in the questionnaire (see also Table 3) and should not have a logo that is a word mark. Word mark logos only consist of the brand name in a uniquely styled type font, by which the icon variations logo and brand name would not differ from each other. Therefore, brands with iconic/ symbolic logos (i.e. logos that contain images that are emblematic of a particular brand) and combination marks (i.e. logos that contain text and a symbol/ icon) are selected for this study.

In each case, app icons of a well-known brand, a non-existent brand, and app icons that does not contain a brand are displayed in order to investigate participants' preference, and the influence of brand awareness on perceived app quality and intention to download. Table 3 gives

an overview of the well-known brands and non-existent brands for each of the twelve app subcategories and corresponding cases.

Table 3
Overview of the app subcategories and corresponding cases, well-known brands and non-existent brands

App category	App subcategory	Case		Well-known brand	Non-existent brand
Enter-	Game	1	Ice cream game	Ben & Jerry's	Icy Ice Cream
tainment	Health & Fitness	2	Running app	Asics	Speedy
apps	Lifestyle	3	Design your own sneakers	Converse	Silver Grey
	Music	4	Listen to your favorite songs	Beats by Dr. Dre	Sing Fling
	Photo & Video	5	Watching movies	Warner Brothers	Movie Starts
	Sports	6	Rankings WC 2014 Brazil	KNVB	WC Soccer
Infor-	Book & Reference	7	Baking a cake	Dr. Oetker	Crusty Cake
mation	Business	8	Currency converter	De Nederlandsche Bank	E Xchange
apps	Catalog	9	Flowers and plants catalog	Intratuin	Flower Rain
	Education	10	Reading scientific articles	Utrecht University	Science4U
	Travel & Local	11	Gas station locator	Shell	Toxy
	Weather	12	Weather forecast	KNMI	Shiny Sun

3.5. Measurement instruments

The involvement with the app category, brand awareness, attitude toward the brand, perceived quality and intention to download the app were measured with the questionnaire. Demographical questions and questions regarding the participants' use of mobile devices were also included in the questionnaire.

3.5.1. Involvement with the app category

The involvement with the app category is measured using a seven-point Likert scale. For each of the twelve app subcategories, the respondents had to indicate the time they take to choose and download an app that falls within the specific app category (1 = very little time, 7 = very much time). Furthermore, the participants are asked to make an estimation of the number of apps that the participant has on his/ her mobile device within each category.

3.5.2. Brand awareness

Five items are used to measure the brand awareness of the all the brands used within this study, using a seven-point Likert scale derived from Yoo & Donthu (2001a). Examples are "I can

recognize X among other competing brands"; "I am aware of X", and "I can quickly recall the symbol or logo of X" (1 = strongly disagree, 7 = strongly agree). The reliability of the scale was appropriate. The Cronbach's Alpha of the brand awareness scale in the twelve cases ranged between α = .783 and α = .973.

3.5.3. Attitude toward the brand

The attitude toward the brand is measured by five items, using the seven-point semantic differential scale of Spears & Singh (2012) (unappealing/ appealing; bad/ good; unpleasant/ pleasant; unfavorable/ favorable; unlikable/ likable). Participants are asked to indicate their overall feelings about the brand in question. The reliability of the scale was high (Cronbach's α between .862 and .960).

3.5.4. Perceived app quality

The perceived quality of the app is measured by four items, using the seven-point Likert scale of Yoo & Donthu (2001a). The questions "The likely quality of this app is extremely high." and "The likelihood that this app would be functional is very high." (1 = strongly disagree, 7 = strongly agree) are examples of items within the perceived app quality scale. The reliability of the scale was high (Cronbach's α between .856 and .924).

3.5.5. Intention to download

The intention to download is measured by three items using a seven-point Likert scale derived from Grewal et al. (1998). The measure includes the following items: "I would download this app", "I would consider downloading this app", and "The probability that I would download this app is low (*r*) (1 = strongly disagree, 7 = strongly agree). The reliability of the scale was high (Cronbach's α between .928 and .973).

The means and standard deviations in Table 4 give a summary of the reliability of the scales. All instruments were internally consistent and therefore reliable. The Cronbach's Alpha for the scales per case is also executed and can be found in Appendix E.

Table 4:
Summary of the reliability analysis

Scale	Number of items	Mean Cronbach's Alpha	Std. Deviation
Brand awareness	5	.902	.061
Attitude toward the brand	5	.926	.029
Perceived app quality	4	.894	.021
Intention to download	3	.951	.014

3.6. Procedure

This survey was distributed through *SONA* and the online social network *Facebook*. After reading the research goal and instructions, participants started the questionnaire. First, the participants answered demographical questions and questions regarding their use of mobile devices. Then, the participants answered questions regarding their involvement with twelve app categories. Subsequently, the participants got a case, for example: "*Imagine: you are looking for a game app that includes ice creams. While browsing through the application store, the following apps are presented to you*". They were also instructed to click on the app they preferred. Besides, the participants were instructed that when they click on the button for the following page, the image with the ten apps will only be shown for three seconds before the next case will be displayed.

This procedure was repeated for each of the twelve cases, by which the entertainment and informative app cases were displayed alternately. After this, the participants were instructed to assess the perceived app quality and intention to download for each of the app icons of choice. Subsequently, questions regarding the brand awareness and attitude toward the brand of the twelve well-known brands used in the survey were asked. Last, the participants were thanked for their participation. An overview of the structure of the questionnaire is shown in Figure 4, the complete questionnaire is enclosed in Appendix F.

Questionnaire structure:

- Demographical questions and questions regarding the use of mobile devices.
- Questions regarding the involvement with the twelve app categories.
- Participant selects one app icon out of ten variants for each of the twelve cases.
- Participant assesses the perceived app quality and download intention for the icon of choice for each of the twelve cases.
- Questions regarding the brand awareness and attitude toward the twelve well-known brands used within the cases.
- Participant is thanked for his/ her participation.

Figure 4
Structure of the questionnaire

3.7. Data analysis

SPSS Statistics 20.0 is used to analyze the results. For all variables the distinction is made between entertainment and information apps. The scores for each scale were computed. Subsequently, the correlations, stepwise regressions and ANOVAs were conducted.

3.7.1. Preparation of the data

The app icon variants where divided several times into two or three columns, based on the manipulations (flat and skeuomorphic design; brand logo and brand name; well-known brand, non-existent brand, and no brand). Subsequently, the columns for the entertainment apps were added together as well as the columns for the informative apps. In this matter, data was organized in a way that statements regarding the preference for specific app icon variants could be made.

In order to be able to execute a stepwise regression analysis, dummy variables were made for the factors design style, logo style, and brand presence. It was decided to nominate a preference for a manipulation variant, when the respondent had chosen a manipulation variant at least two times more than the associated manipulation variant. For example, when a respondent had chosen four skeuomorphic app icon designs and two flat app icon designs, the respondent had a preference for skeuomorphic design. By creating the dummy variables, it was possible to investigate the influence of preference for one of the app variants on perceived app quality and intention to download.

3.7.2. Calculation of the scores

The scores of brand awareness, attitude toward the brand, perceived app quality, and intention to download the app were calculated for each participant by taking the average scores on the values that belong to each scale. For example a participant's score on perceived app quality was computed by adding his scores on the items *"This app is of high quality", "The expected quality of this app is extremely high", "The app must be of very good quality",* and *"The app appears to be of very poor quality"* (reverse coded) and dividing this total then by the number of items that belong to this scale. Then the average of the scores of cases 1 till 6 and 7 till 12 are computed to get the mean scores of perceived app quality for respectively entertainment apps and informative apps. The scores on the other aforementioned variables are also computed in this way.

3.7.3. Analyses

All analyses are conducted for entertainment apps and information apps separately.

Wilcoxon signed-rank tests were conducted to compare the means values of each of the manipulation variants within the factors design style and logo style in order to investigate whether respondents had a strong preference for one of the variants within the manipulations. The means of variables within the manipulation brand presence were compared via the Friedman test. Post hoc analysis with Bonferroni adjustment were performed to test the significance of the differences between the means.

Only the respondents that had selected an icon at least four times out of the six cases per category (i.e. cases 1 until 6, or cases 7 until 12) were selected. These respondents are most reliable to test any preference for a type of app icon. For the Entertainment category (cases 1 until 6), 236 participants (84.6%) have chosen an app icon in at least four examples. For the Information category (cases 7 until 12), 253 participants (90.7%) have selected at least four app icons out of the six cases.

Brand awareness and attitude toward the brand were considered as possible mediators. Mediation analyses, using the mediation roadmap of Baron and Kenny (1986), revealed that brand awareness and attitude toward the brand are no mediators (see Appendix G). Therefore, several correlation and stepwise regression analyses were conducted to investigate which of the independent variables (design style, logo style, brand presence, brand awareness, and attitude toward the brand) has an influence on the dependent variables (perceived app quality and intention to download the app). The stepwise regression analyses for the intention to download the app has one more independent variable, namely involvement with the app category. Furthermore, the relations between perceived app quality and intention to download the app was investigated by correlation and single regression analysis.

Analyses of gender and education effects revealed no significant relations on these measures and are therefore not discussed further.

4. Results

4.1. App icon preference

This section will explore which app icons variants are preferred by the respondents. The differences in design style (flat design versus skeuomorphic design), logo style (logo vs. brand name), or brand presence (well-known brand vs. non-existent brand vs. no brand) will be elaborated for both entertainment and informative apps. Table 5 gives an overview of the frequencies of chosen app icon variants based on the three abovementioned manipulations for both entertainment and informative apps.

Table 5
Overview of number of times an app icon variant is chosen per case and in total for entertainment and informative apps

		Design style (*N*)		**Logo style (*N*)**		**Brand presence (*N*)**		
Case		*Flat*	*Skeuo-morphic*	*Logo*	*Brand name*	*Well-known brand*	*Non-existent brand*	*No brand*
Entertainment apps								
Case 1	*N* = 406	53	91	86	32	72	46	26
Case 2	*N* = 522	124	112	42	8	37	13	186
Case 3	*N* = 587	123	94	125	28	135	18	64
Case 4	*N* = 642	107	124	122	58	123	57	51
Case 5	*N* = 656	115	140	140	6	129	17	109
Case 6	*N* = 725	82	176	177	32	122	87	49
Total	***N* = 3538**	**604**	**737**	**692**	**164**	**618**	**238**	**485**
Informative apps								
Case 7	*N* = 536	110	92	115	17	115	17	70
Case 8	*N* = 533	104	87	106	45	67	84	40
Case 9	*N* = 628	121	117	130	22	123	29	86
Case 10	*N* = 640	102	120	130	66	97	99	26
Case 11	*N* = 653	186	81	104	15	109	10	148
Case 12	*N* = 608	151	103	72	28	80	20	154
Total	***N* = 3598**	**774**	**600**	**657**	**193**	**591**	**259**	**524**

4.1.1. Design style

Table 6 summarizes the number of times a flat design and a skeuomorphism design is chosen for entertainment apps and informative apps separately. In total, for entertainment apps, 737 apps with a skeuomorphic design were chosen compared to 604 apps with a flat design. For informative apps, these totals are 774 apps with a flat design compared to 600 apps with a skeuomorphic design.

Table 6
Number of chosen app icons variants based on the design style for entertainment and informative apps

Design style:	Flat design	Skeuomorphic design
Entertainment apps	*N* = 604	*N* = 737
Informative apps	*N* = 774	*N* = 600

For the entertainment app category, respondents show a significant preference for app icons with a skeuomorphic design (Z = -3,687, p < .001). Out of the six entertainment cases, participants (N = 236) chose on average 2.89 apps with a skeuomorphic design (SD = 1.22) compared to 2.33 apps with a flat design (SD = 1.21). Also a significant preference is found for the informative app category. However, for the informative app category, respondents (N = 253) show a significant preference for app icons with a flat design (M = 2.91, SD = 1.29) over app icons with a skeuomorphic design (M = 2.29, SD = 1.32, Z = -3.723, p < .001).

4.1.2. Logo style

Table 7 summarizes the number of times an app is chosen that contain a logo or a brand name for entertainment apps and informative apps separately. In total, for entertainment apps, 692 apps with a brand logo were chosen compared to 164 apps with a brand name. For informative apps, these totals are respectively 657 and 193.

Table 7
Number of chosen app icons variants based on the logo style for entertainment and informative apps

Logo style:	Logo	Brand name
Entertainment apps	*N* = 692	*N* = 164
Informative apps	*N* = 657	*N* = 193

For entertainment apps, app icons that contain a brand logo are preferred over icons that app icons with a brand name (Z = -11.671, p < .001). Out of the six entertainment cases, participants (N = 236) chose on average 2.71 apps that contain a logo (SD = 1.31) compared to 0.64 apps that contain a brand name (SD = .81). The same significant difference in preference is found for informative apps (Z = -11.345, p < .001), with an average of 2.49 apps with a logo (SD = .88) and 0.74 apps with a brand name (SD = 1.36, N = 253).

4.1.3. Brand presence

Table 8 gives an overview of the number of times an app that contain a well-known brand, non-existent brand, or no brand name is chosen for entertainment apps and informative apps separately. In total, for entertainment apps, 618 apps that contain a well-known brand were

chosen compared to 485 apps without a brand, and 238 apps that contain a non-existent brand. For informative apps, these totals are 591 apps with a well-known brand, 524 apps without a brand, and 259 apps with a non-existent brand.

Table 8
Number of chosen app icons variants based on the logo style for entertainment and informative apps

Brand presence:	**Well-known brand**	**Non-existent brand**	**No brand**
Entertainment apps	$N = 618$	$N = 238$	$N = 485$
Informative apps	$N = 591$	$N = 259$	$N = 524$

Within entertainment apps, there is a significant difference in preference for app icons between icons that contains well-known brands, non-existent brands, and no brands (χ^2 (2) = 96.757, p < .001). Post hoc analysis with a Bonferroni adjustment applied, resulted in a significance level set at p <.017. Out of the six entertainment cases, participants (N = 236) chose on average 2.44 apps that contain a well-known brand (SD = 1.38), 1.87 apps that does not contain a brand (SD = 1.19), and 0.92 apps that contain a non-existent brand (SD = .96). There are significant differences in preference of app icons. Respondents strongly prefer well-known brand app icons over non-existent brand app icons (Z = -9.439, p < .001). Also well-known brand app icons are preferred over app icons that do not contain a brand (Z = -3.724, p < .001). Furthermore, respondents prefer an app icon with no brand over an app icon with a non-existent brand (Z = -7.740, p < .001).

Within informative apps, there is also a significant difference in preference for app icons between icons that contain a well-known brand, non-existent brand, and no brand (χ^2 (2) = 65.996, p < .001). Out of the six informative cases, participants (N = 253) chose on average 2.22 apps that contain a well-known brand (SD = 1.55), 1.98 apps that does not contain a brand (SD = 1.34), and 1.01 apps that contain a non-existent brand (SD = 1.06). Respondents show a significant preference for app icons that consists of a well-known brand over app icons that consists of a non-existent brand (Z = -7.704, p < .001). Furthermore, respondents prefer app icons that do not contain a brand over app icons that contain a non-existent brand (Z = -7.559, p < .001). However, no significant difference in preference is found between a well-known brand app icons and app icons that do not contain a brand (Z = -1.171, p = .242, *ns*).

4.1.4. Detail analyses of app icon preferences

Based on the abovementioned significant preferences, the preferences for app icon variants will be elaborated on a more specific level. First, the preference for design style within well-known brand app icons will be examined, then the preference for logo style within well-known brand app icons will be explored. Subsequently, the preference for design style within well-known brand app icons that contain a logo will be elaborated. Last, the preference for design style within app icons that does not contain a brand will be examined.

Well-known brand app icons: skeuomorphic design versus flat design

Table 9 summarizes the number of times a well-known brand app is chosen that contain a skeuomorphic design or a flat design. For entertainment apps, 349 apps with a well-known brand contain a skeuomorphic design were chosen compared to 269 well-known brand apps with a flat design. For informative apps, these totals are respectively 358 and 664.

Table 9
Number of chosen well-known brand apps: skeuomorphic design versus flat design

Well-known brand and design style	Skeuomorphic	Flat
Entertainment apps	*N* = 349	*N* = 269
Informative apps	*N* = 358	*N* = 664

For well-known brand apps in the entertainment category, a significant difference in preference is visible for skeuomorphic design over flat design (Z = -3.310, p = .001). Out of the six entertainment cases, participants (N = 236) chose on average 1.39 well-known brand apps that contain a skeuomorphic design (SD = 1.03) compared to 1.05 well-known brand apps with a flat design (SD = .97). However, the opposite is visible within the informative app category. Within this category well-known brand apps with a flat design are strongly preferred over app icons with a skeuomorphic design (Z = -4.290, p < .001). On average, participants (N = 253) chose 1.33 well-known brand apps with a flat design (out of six cases) (SD = 1.29) compared to 0.89 apps with a skeuomorphic design (SD = .93).

Well-known brand app icons: brand logo versus brand name

Table 10 summarizes the number of times a well-known brand app is chosen that contain a logo or a brand name. For entertainment apps, 505 apps with a well-known brand that contain a logo were chosen compared to 113 well-known brand apps that contain a brand name. For informative apps, these totals are respectively 454 and 137.

Table 10
Number of chosen well-known brand apps: logo versus brand name

Well-known brand and logo style:	Logo	Brand name
Entertainment apps	*N* = 505	*N* = 113
Informative apps	*N* = 454	*N* = 137

For entertainment apps, there is a significant difference in preference for app icons that have the brand logo of a well-known brand over app icons that have the brand name of a well-known brand (Z = -11.489, p < .001). Out of the six entertainment cases, participants (N = 236) chose on average 2 well-known brand apps with a logo (SD = 1.28) compared to 0.44 well-known brand apps with a brand name (SD = .67).

Also within the informative app category, there is a significant preference for app icons that contain the brand logo of a well-known brand over icons that contain the brand name of a well-known brand (Z = -10.632, p < .001). On average, participants (N = 253) chose 1.69 well-known brand apps with a logo (out of six cases) (SD = 1.30) compared to 0.53 well-known brand apps with a brand name (SD = .76).

Well-known brand apps with logo: skeuomorphic design versus flat design

Table 11 summarizes the number of times apps with a well-known brand logo and a skeuomorphic design is chosen compared to the app icon variant with a flat design. For entertainment apps, 282 well-known brand logo apps with a skeuomorphic design are chosen compared to 223 apps with a flat design. For informative apps, these totals are respectively 169 and 286.

Table 11
Number of chosen well-known brand apps with logo: skeuomorphic design versus flat design

Well-known brand and logo style:	Skeuomorphic	Flat
Entertainment apps	*N* = 282	*N* = 223
Informative apps	*N* = 169	*N* = 286

For entertainment apps, there is a significant difference in preference for apps with a well-known brand logo and a skeuomorphic design over apps with a well-known brand logo and a flat design (Z = -2.652, p = .008). Out of the six entertainment cases, participants (N = 236)

chose on average 1.12 apps that contain a well-known brand logo and a skeuomorphic design (*SD* = .96) compared to 0.88 apps with a well-known brand logo and a flat design (*SD* = .89).

For informative apps, the significant difference in preference points in the opposite direction with a strong preference for apps with a well-known brand logo and flat design over apps with a well-known brand logo and a skeuomorphic design (Z = -5.002, $p < .001$). On average, participants (N = 253) chose 1.06 apps with a well-known brand logo and flat design (*SD* = 1.08) compared to 0.64 apps with a well-known brand logo and a skeuomorphic design (*SD* = .74).

App icons that contain no brand: skeuomorphic design versus flat design

Table 12 summarizes the number of times the skeuomorphic app icons that does not contain a brand are chosen compared to the flat design app icon variant. For entertainment apps, 253 flat app icons without a brand are chosen compared to 232 skeuomorphic app icons that do not contain a brand. For informative apps, these totals are 293 for the app icon variant with a flat design and 231 for the skeuomorphic design variant.

Table 12
Number of chosen apps that contain no brand: skeuomorphic design versus flat design

No brand and design style:	**Skeuomorphic**	**Flat**
Entertainment apps	N = 232	N = 253
Informative apps	N = 231	N = 293

For entertainment apps, there is no significant difference in preference for app icons that contain no brand and have a flat design and icons that contain no brand and have a skeuomorphic design (Z = -0.958, p= .338, *ns*). On average, participants (N = 236) chose 0.96 entertainment apps without a brand that contain a flat design (*SD* = .94) compared to 0.91 apps of the skeuomorphic design variant (*SD* = .81).

However, for informative apps, respondents (N = 253) strongly prefer app icons that do not contain a brand and a flat design (M = 1.10, *SD* = .98) over icons that do not contain a brand and have a skeuomorphic design (M = .88, *SD* = .94, Z = -2.792, p = .005).

4.1.5. Summary of the app icon preference results

Table 13 gives a summary of the significant preferences for entertainment apps and informative apps.

Table 13
Summary of the app icon preferences for entertainment and informative apps

	Entertainment apps	**Informative apps**
Design style *(skeuomorphic / flat)*	Skeuomorphic design	Flat design
Logo style *(brand logo / brand name)*	Brand logo	Brand logo
Brand presence *(well-known brand / non-existent brand / no brand)*	Well-known brand over non-existent brand	Well-known brand over non-existent brand
	No brand over non-existent brand	No brand over non-existent brand
	Well-known brand over no brand	
Well-known brand and design style	Well-known brand app icon with skeuomorphic design	Well-known brand app icon with flat design
Well-known brand and logo style	Well-known brand app icon with logo	Well-known brand app icon with logo
Well-known brand with logo and design style	Well-known brand app icon with logo and skeuomorphic design	Well-known brand app icon with logo and flat design
No brand with design style		No brand with flat design

4.2. Involvement with entertainment apps and informative apps

In this section, it will be explored whether there are differences in the involvement with the app category between the entertainment and information app category. Involvement is operationalized by the perceived time to choose and download an app, and the number of apps with the category. On average, participants had significantly more entertainment apps (M = 11.95, SD = 8.61, SE = .52), than informative apps on their mobile devices (M = 6.46, SD = 4.86, SE = .29, t (278) = 12.81, p < .001). However, the participants reported to take significantly more time to choose and download informative apps (M = 3.47, SD = .89) than to choose and download entertainment apps (M = 3.32, SD = 1.08, t (278) = -2.29, p = .02). These results suggest that participants were significantly more involved with informative apps compared to entertainment apps.

4.3. Brand awareness

In this section, it will be explored whether there are differences in brand awareness for the brands used in the entertainment cases and informative cases. First, the name awareness will be analyzed. Second, the possible differences in brand awareness will be investigated.

The chosen "well-known" brands did indeed score high on knowing the name of the brand. Some brands (e.g. Ben & Jerry's, Converse All Star, Dr. Oetker, and Shell) were known by almost all participants. Other brands were known by at least 75% to 90% of the participants (e.g. Warner Bros, Utrecht University, Beats by Dr. Dre, Asics). A few brands were somewhat less well-known, but still known by at least half of the participants (e.g. KNVB, Intratuin, KNMI, De Nederlandsche Bank). The percentages of respondents knowing the chosen brands are shown in Table 14.

Table 14
Name awareness of the well-known brands

Brand	Percentage	App category
Shell	98.8%	Information
Dr. Oetker	98.5%	Entertainment
Ben & Jerry's	97.7%	Entertainment
Converse All Star	97.7%	Entertainment
Warner Bros	91.5%	Entertainment
Utrecht University	85.3%	Information
Beats by Dr. Dre	81.1%	Entertainment
Asics	78.8%	Entertainment
KNVB	64.9%	Information
Intratuin	56.8%	Information
KNMI	52.1%	Information
De Nederlandsche Bank	51.7%	Information

Table 15 shows the average ratings and standard deviations of the brand awareness of the well-known brands. Eye-catching are the high standard deviations of some brands (e.g. KNVB, Intratuin, KNMI), which suggests that the brand awareness of these brands clearly differed within the group of respondents.

Table 15
Means and standard deviations of brand awareness (1 to 7 scale)

Brand	*M*	*SD*	App category
Converse All Star	6.14	0.982	Entertainment
Shell	6.08	0.972	Information
Dr. Oetker	5.88	0.952	Entertainment
Warner Bros	5.79	1.442	Entertainment
Ben & Jerry's	5.70	1.157	Entertainment
Beats by Dr. Dre	4.94	1.881	Entertainment
Asics	4.46	1.855	Entertainment
KNVB	4.04	2.221	Information
Utrecht University	3.85	1.685	Information
Intratuin	3.83	2.260	Information
KNMI	3.52	2.158	Information
De Nederlandsche Bank	2.85	1.540	Information

On average, participants had a significantly higher brand awareness for the brands used for the entertainment apps (M = 5.18, SD = .90) than the brand awareness for the brands used for the informative apps (M = 4.33, SD = 1.08, t (257) = 13.09, p < .001). This could be due to the fact that the respondents were generally more familiar with the brands used for the entertainment app cases compared to the brands used for the information app cases.

4.4. Attitude toward the brand

In this section, if will be investigated whether the attitude toward the brand differs for the brands used within the entertainment app cases compared to the informative app cases.

The means and standard deviations of the respondents' attitude toward the well-known brands are shown in Table 16. It is striking that the attitude toward Shell is relative low, in spite of its high brand awareness. Eye-catching is the high standard deviation of Beats by Dr. Dre and Asics, which means that the attitude toward the brand varied within the group of respondents.

Table 16:
Average ratings and standard deviations of attitude toward the brand (1 to 7 scale)

Brand	App category	Mean	Std. Deviation
Ben & Jerry's	Entertainment	5.71	1.019
Warner Brothers	Entertainment	5.68	1.126
Converse All Star	Entertainment	5.62	1.188
Dr. Oetker	Entertainment	5.57	0.948
Intratuin	Information	4.83	1.067
Utrecht University	Information	4.71	0.941
KNMI	Information	4.71	1.063
Beats by Dr. Dre	Entertainment	4.71	1.422
KNVB	Information	4.62	1.158
Asics	Entertainment	4.46	1.855
Shell	Information	4.37	1.275
De Nederlandsche Bank	Information	4.18	0.753

On average, participants had a significantly more positive attitude toward the brands used for the entertainment apps (M = 5.22, SE =.05) than the brands used for the informative apps (M = 4.72, SE = .04, t (256) = 12.85, p <.001).

4.5. Perceived app quality

In this section, it will be explored whether there are differences in the perceived app quality, based on differences in design style (preference for flat design, preference for skeuomorphic design), logo style (preference for brand, preference for brand name), brand presence (preference for well-known brand, preference for non-existent brand, preference for no brand), brand awareness, and attitude toward the brand. These will be elaborated for both entertainment apps and informative apps.

Entertainment apps: perceived app quality

Stepwise regression shows that attitude toward the brand (t (243) = 9.03, p < .001), preference for a well-known brand within the app icon (t (243) = 4.24, p = .016), and preference for no brand within the app icon (t (243) = -1.99, p = .048), are significant predictors of perceived app quality for entertainment apps. A weak correlation is visible between the independent variables; attitude toward the brand, preference for a well-known brand and preference for no brand, and

the perceived app quality (R = .379). 14.3% of the variance in perceived app quality can be explained by these independent variables (R^2 = .143). ANOVA of the regression shows the model is significant in predicting the perceived app quality by the independent variables (F (3,243) =13.56, p < .001). Significant positive relations are visible between the attitude toward the brand and perceived app quality and between the preference for a well-known brand in the app icon and the perceived app quality. A negative relation is visible between the preference for no brand and the perceived app quality. The attitude toward the brand had the greatest influence on perceived app quality, 10% of the variance in perceived app quality can be explained by the attitude toward the brand. The preference for a well-known brand and preference for no brand within the app icon had less influence, respectively 3% and 1% of variance in perceived app quality can be explained by these preferences.

Table 17 gives an overview of the significant results of the stepwise regression on perceived app quality for entertainment apps. The other variables are non-significant, and therefore excluded from the regression model.

Table 17
Stepwise regression on perceived app quality for entertainment apps

	B	*SE B*	*β*
Step 1			
Constant	3.03	0.37	
Attitude toward the brand	0.36	0.07	.32 *
Step 2			
Constant	3.22	0.37	
Attitude toward the brand	0.31	0.07	.27 *
Preference well-known brand	0.33	0.11	.18 *
Step 3			
Constant	3.32	0.37	
Attitude toward the brand	0.30	0.07	.26 *
Preference well-known brand	0.33	0.11	.15 *
Preference no brand	-0.29	0.14	-.12 *

Note. R^2= .10 for Step 1; ΔR^2 = .03 for Step 2; ΔR^2 = .01 for Step 3, * p <.001

Informative apps: perceived app quality

For informative apps, stepwise regression shows that attitude toward the brand (t (245) = 5.54, p < .001) is the only significant predictor of perceived app quality, as shown in Table 18. A weak correlation is visible between attitude toward the brand and perceived app quality (R =

.334). 11.1% of the variance in perceived app quality of informative apps can be explained by the attitude toward the brand (R^2 = .111). ANOVA of the regression shows the model is significant in predicting the perceived app quality by attitude toward the brand (F (1,245) = 30.74, p < .001). A significant positive relation is visible between these variables. All other independent variables are non-significant, and therefore excluded from the regression model.

Table 18
Stepwise regression on perceived app quality for informative apps

	B	*SE B*	*β*
Step 1			
Constant	2.74	0.39	
Attitude toward the brand	0.50	0.08	.33 *

Note. R^2= .11, * p <.001

4.6. Intention to download the app

In this section, it will be explored whether there are differences in the intention to download an app, based on differences in design style (preference for flat design, preference for skeuomorphic design), logo style (preference for logo, preference for brand name), brand presence (preference for well-known brand, preference for non-existent brand, preference for no brand), brand awareness, attitude toward the brand and involvement with the app category.

Entertainment apps: intention to download

Stepwise regression shows that involvement with the app category (t (244) = 3.93, p < .001) and attitude toward the brand (t (244) = 3.81, p < .001) are significant predictors of the intention to download entertainment apps. A weak correlation is visible between the independent variables involvement with the app category and attitude toward the brand and the dependent variable the intention to download an entertainment app (R = .402). 16.1% of the variance in intention to download can be explained by the involvement with the app category and attitude toward the brand (R^2 = .161). ANOVA of the regression shows the model is significant in predicting the intention to download by these two independent variables (F (2,244) = 23.470, p<.001). As shown in Table 19, significant positive relations are visible between involvement with entertainment apps and the intention to download entertainment apps (t = 3.93, p < .001) and between the attitude toward the brand and intention to download entertainment apps (t = 3.946, p < .001). Involvement with entertainment apps had the greatest influence on the intention to download entertainment apps, 11% of the variance in perceived app quality can be

explained by involvement with the app category. The attitude toward the brand had less influence, 5% of variance in the intention to download can be explained by the attitude toward the brand. All other independent variables are non-significant, and therefore excluded from the regression model.

Table 19
Stepwise regression on intention to download for entertainment apps

	B	*SE B*	*β*
Step 1			
Constant	2.82		
Involvement with app category	0.40	0.07	.33 *
Step 2			
Constant	1.28	0.47	
Involvement with app category	0.30	0.08	.25 *
Attitude toward the brand	0.36	0.10	.24 *

Note. R^2= .11 for Step 1; ΔR^2 = .05 for Step 2, * p <.001

Informative apps: intention to download

Stepwise regression shows that attitude toward the brand (t (243) = 5.58, p < .001), involvement with the app category (t (243) = 3.71, p < .001) and brand awareness (t (243) = -3.14, p = .002) are significant predictors of the intention to download informative apps. A weak correlation is visible between the aforementioned independent variables (i.e. attitude toward the brand, involvement with the app category, and brand awareness) and the intention to download informative apps (R = .413). 17% of the variance in intention to download can be explained by these independent variables (R^2 = .170). ANOVA of the regression shows the model is significant in predicting the intention to download by these independent variables (F (3,243) = 16.62, p < .001). As shown in Table 20 significant positive relations are visible between attitude toward the brand and intention to download (t = 5.58, p < .001), and between involvement with informative apps and intention to download (t = 3.71, p < .001). Furthermore, a significant negative relation is visible between brand awareness the intention to download informative apps (t = -3.137, p = .002). Attitude toward the brand had most influence on intention to download, 10% of variance in intention to download can be explained by attitude toward the brand. Involvement with the app category and brand awareness are less influential, explaining respectively 4% and 3% of the variance in intention to download. All other independent variables are non-significant, and therefore excluded from the regression model.

Table 20
Stepwise regression on intention to download for informative apps

	B	*SE B*	*β*
Step 1			
Constant	1.31	0.54	
Attitude toward the brand	0.59	0.11	.32 *
Step 2			
Constant	0.96	0.54	
Attitude toward the brand	0.52	0.11	.28 *
Involvement with app category	0.20	0.06	.20 *
Step 3			
Constant	0.72	0.54	
Attitude toward the brand	0.79	0.14	.41 *
Involvement with app category	0.23	0.06	.22 *
Brand awareness	-0.26	0.08	-.24 *

Note. R^2= .10 for Step 1; ΔR^2 = .04 for Step 2; ΔR^2 = .03 for Step 3, * p <.001

4.7. Relation between perceived app quality and intention to download

In this section, the relation between perceived app quality and intention to download will be investigated for both entertainment and informative apps.

For entertainment apps, there is a weak correlation between the perceived app quality and intention to download the app (R = .462). 21.4% of the variance in download intention of entertainment apps can be explained by the perceived app quality (R^2 = .214). The ANOVA of the regression shows the model is significant in predicting the intention to download by the perceived quality of entertainment apps (F (*1*,263) = 71.518, p < .001). As shown in Table 21, a significant positive relationship is found between the perceived app quality and intention to download (t = 8.457, p < .001).

Table 21
Regression on intention to download for entertainment apps

	B	*SE B*	*β*
Constant	1.27	0.34	
Perceived app quality	0.59	0.07	.46 *

Note. R^2= .21, * p <.001

For informative apps, there is a weak correlation between the perceived app quality and intention to download (R = .494). Within this category, 24.5% of the variance in intention to download can be explained by the perceived app quality (R^2 = .245). The ANOVA of the

regression shows the model is significant in predicting the intention to download by the perceived quality of entertainment apps (F (1,263) = 84.152, p < .001). As shown in Table 22, a significant positive relationship is visible between the perceived app quality and intention to download informative apps (t = 9.173, p < .001).

Table 22
Regression on intention to download for informative apps

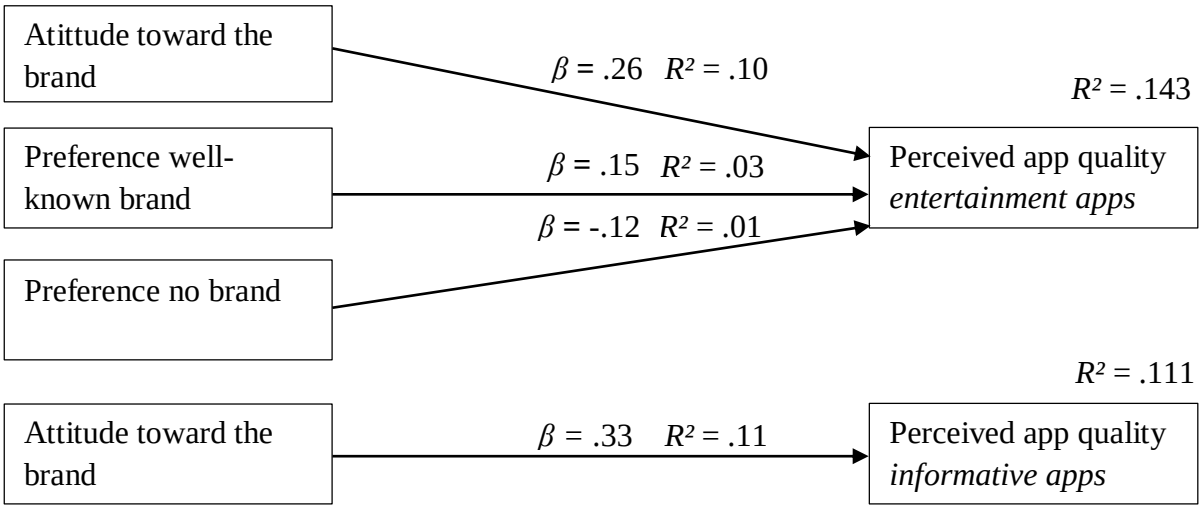
	B	*SE B*	*β*
Constant	0.74	0.37	
Perceived app quality	0.70	0.08	.49 *

Note. R^2= .25, * p <.001

4.8. Summary of results on perceived app quality and intention to download

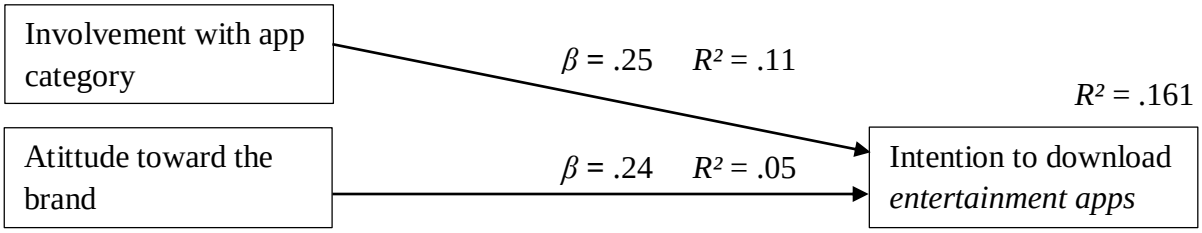
Figure 5 gives an overview of the significant influences on perceived app quality for both entertainment apps and informative apps, while Figure 6 gives an overview of the significant influences on the intention to download. Subsequently, Figure 7 gives an overview of the relation between perceived app quality and intention to download.

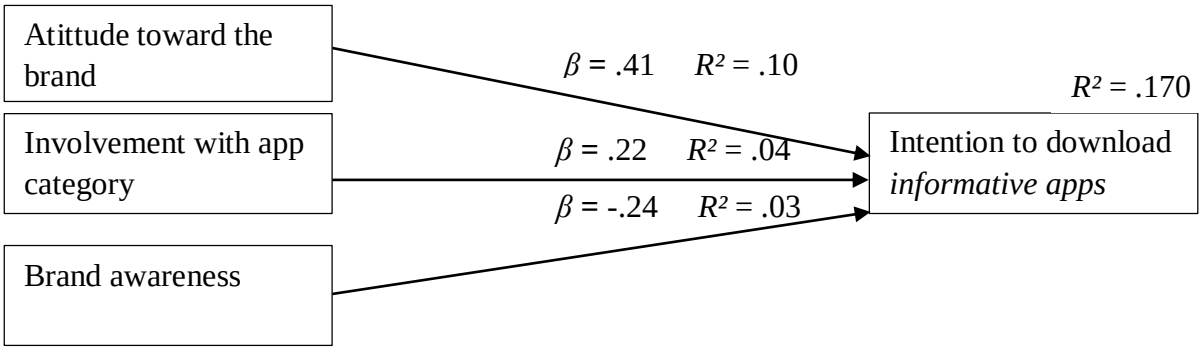
Figure 5
Overview of significant relations on perceived app quality



Note. All paths in this figure are statistically significant (p < .001).

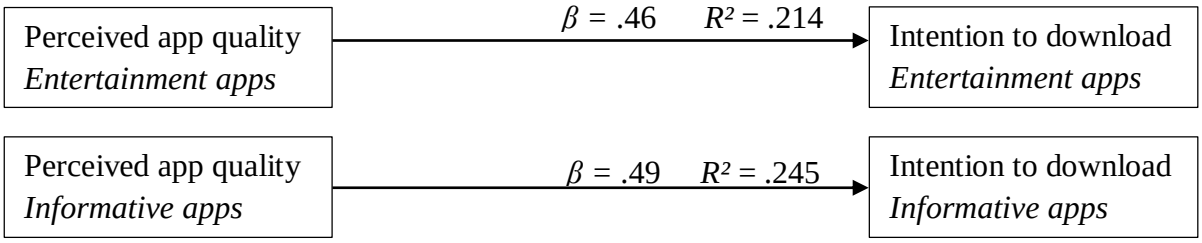
Figure 6
Overview of significant relations on intention to download





Note. All paths in this figure are statistically significant ($p < .001$).

Figure 7
Overview of significant relations of perceived app quality on intention to download



Note. All paths in this figure are statistically significant ($p < .001$).

5. General discussion

This study investigated app icon preferences for selecting apps in app browsing, and the influence of app icon design, brand awareness, attitude toward the brand and involvement on perceived quality and the intention to download the app. This chapter discusses how the study contributes to the existing framework and to an effective strategy for app icon design within the entertainment and informative app categories. In addition implications of the study are provided for the academic theory and professionals in the mobile applications field.

5.1. Conclusion

This study had the goal to provide insight in app icon preferences for selecting apps while browsing apps and to gain knowledge in the influence of brand presence, app icon design, and involvement with the app category on perceived app quality and intention to download the app for both entertainment and informative apps. This research goal resulted in the following main research question:

App icon preference in app browsing:
What is the influence of brand presence, app icon design, and involvement with the app category on perceived app quality and the intention to download?

A literature review and an online survey were conducted to answer this research question. The following subsections will be used to answer the research question. First, insight in the app icon preferences will be given. Then, the influences on perceived app quality will be discussed, followed by the influences on the intention to download.

5.1.1. App icon preference

The study showed that consumers do have a strong preference for specific app icon designs, and this preference is determined by the app category. Table 23 summarizes the significant app icon preferences for both entertainment apps and informative apps. The preferences in bold type differ between entertainment and informative apps.

Table 23
App icon preferences for entertainment and informative apps

	Entertainment apps	**Informative apps**
Design style *(skeuomorphic / flat)*	**Skeuomorphic design**	**Flat design**
Logo style *(brand logo / brand name)*	Brand logo	Brand logo
Brand presence *(well-known brand / non-existent brand / no brand)*	Well-known brand over non-existent brand	Well-known brand over non-existent brand
	No brand over non-existent brand	No brand over non-existent brand
	Well-known brand over no brand	
Well-known brand and design style	**Well-known brand app icon with skeuomorphic design**	**Well-known brand app icon with flat design**
Well-known brand and logo style	Well-known brand app icon with logo	Well-known brand app icon with logo
Well-known brand with logo and design style	**Well-known brand app icon with logo and skeuomorphic design**	**Well-known brand app icon with logo and flat design**
No brand with design style		**No brand with flat design**

As Table 23 shows, this study revealed the very interesting finding that design style is an important factor in app icon preferences. Most differences in app icon preference between entertainment and informative apps are due to the factor design style. Respondents namely have a strong preference for skeuomorphic app icons when it comes to entertainment apps. However, when informative apps are involved, respondents strongly prefer app icons with a flat design.

Another important finding that the brand appears to be an anchor in the choice of apps. Respondents have a strong preference for apps that contain a well-known brand over apps that do not contain a brand, or contain an unknown (i.e. non-existent) brand. Besides, respondents strongly prefer app icons that contain a brand logo over app icons with a brand name.

5.1.2. Perceived app quality

For both entertainment and informative apps, attitude toward the brand turned out to have a large positive effect on perceived app quality. This implies that the perceived app quality is positively influenced by the attitude toward the brand. The perceived app quality will therefore be higher when one has a more positive the attitude toward the brand.

Furthermore, the study revealed that the perceived app quality of entertainment apps is positively influenced by the preference for a well-known brand within the app icon and negatively influenced by the preference of no brand within the app icon. This suggests that when one has a preference for app icons that contain a well-known brand, the perceived app quality of the app with a well-known brand will be higher than when one has no preference for these apps. Besides, when one has a preference for no brand within the app icon, the perceived app quality will be lower than one has no preference for these apps.

However, design style, logo style, and brand awareness did not seem to have an influence on the perceived app quality.

5.1.3. Intention to download the app

For both entertainment and informative apps, involvement with the app category and attitude toward the brand have a significant positive effect on the intention to download the app. For entertainment apps, the involvement with entertainment apps is most important, followed by the attitude toward the brand. However, for informative apps, the magnitude of influence is reverse. The results indicate that the intention to download the app will be higher when one is more involved with the app category. Furthermore, the results also imply that the intention to download the app will be higher when someone has a more positive attitude toward the brand.

Besides, for informative apps, brand awareness had a significant negative influence on the intention to download. This implies that the intention to download an informative app will be lower as ones brand awareness increases. However, this variable does not have a big influence on the intention to download.

Furthermore, the preference for a specific app icon variant did not seem to have an influence on the intention to download.

5.1.4. Relation perceived app quality and intention to download

For both entertainment and informative apps, a positive relation is found between the perceived app quality and the intention to download. This implies that the intention to download the app will be relatively high as the app quality is perceived as high. The magnitude of the influence

of perceived app quality on intention to download is for both entertainment and informative apps relatively high.

5.1.5. Hypotheses

In Table 24 this study's hypotheses are summarized as supported (V) or unsupported (X).

Table 24
Summary of supported (V) or unsupported (X) hypotheses of this study for Entertainment apps (E) and Informative apps (I).

H#	Hypothesis	E	I
	App icon preferences		
H1	Consumers have a preference for apps with either a flat or skeuomorphic design.	V	V
H2	Consumers have a preference for apps with a brand logo.	V	V
H3	Consumers have a preference for apps with a well-known brand.	V	V
	Influences on perceived app quality		
H4	Design style has an influence on the perceived app quality.	X	X
H5	Logo style has an influence on the perceived app quality.	X	X
H6	Brand presence has an influence on the perceived app quality.	V	X
H7	Brand awareness has a positive effect on the perceived app quality.	X	X
H8	Attitude toward the brand has a positive effect on the perceived app quality.	V	V
H9	Brand awareness is a mediator between brand presence and perceived app quality.	X	X
H10	Attitude toward the brand is a mediator between brand presence and perceived app quality.	X	X
	Influences on intention to download		
H11	Design style has an influence on the intention to download.	X	X
H12	Logo style has an influence on the intention to download.	X	X
H13	Brand presence has an influence on the intention to download.	X	X
H14	Brand awareness has a positive effect on the intention to download.	X	X
H15	Attitude toward the brand has a positive effect on the intention to download.	V	V
H16	Involvement with the app category has a positive effect on the intention to download.	V	V
H17	Perceived app quality has a positive effect on the intention to download.	V	V

5.2. Discussion

The results of this study are an important addition to the current knowledge in the field of app icon design and factors predicting preferences. The findings of this study are the first to demonstrate preferences for specific app icons. Specifically for practical purposes of how to get consumers selecting the app of a specific brand or organization, this study formulates a clear vision of how to design an app icon when introducing an entertainment or informative app.

App icon preference

The difference in preference for design style could be due to the difference in the desired outcome of the apps. Informative apps supports a utilitarian/ goal- directed desired outcome, while entertainment apps meet a desired intrinsic-enjoyment outcome (Bellman et al., 2011). It is imaginable that consumers are willing a simple and clear app (icon) that supports their utilitarian goal. While, the skeuomorphic design will match the intrinsic- enjoyment desired outcome of entertainment apps, because it can be evaluated as playful and entertaining with its embossed effects, 3D artificial textures, drop shadows, and glossy look. However, to date, no scientific research is executed on this specific subject, so this line of thought could not be confirmed empirically. With these results, Hou and Ho's doubts whether the success of skeuomorphic style will continue in the future should be revised whereas a distinction should be made between entertainment and informative apps.

The preference for a brand logo within the app icon over a brand name can be explained by the *picture superiority effect*, which is the finding that pictures are more easily recognized and recalled than words (Gass & Seiter, 2014).

Furthermore, the preference for a well-known brand within the app icon for both entertainment and informative apps can be explained by the *mere- exposure effect*, which implies that people tend to develop a preference for things (e.g. a brand) merely because they are familiar with them (Solomon et al., 2013). The results are also consistent with studies that suggest brand awareness increases the likelihood that the brand will be included in the consideration set, in this case the app icon that is being selected to have a closer look on (Macdonald and Sharp, 2003; Rajh, 2002).

Influences on perceived app quality

Results revealed that attitude toward the brand is an important factor, by having a large positive effect on the perceived app quality for both entertainment and informative apps. This can be related to the fact that the respondents could not judge the product-related concerns of the apps within this study. In this situation, the associations people have with a brand affect the product evaluations of that brand (Keller et al., 2012). So the respondents infer the quality of the app by the associations they have of a brand. With the associations respondents have, they form an attitude toward the brand. This explains the findings that the more positive attitude respondents had toward the brand, the higher the perceived app quality was evaluated.

The positive influence of a well-known brand within the app icon on perceived app quality can also be explained in this manner. The well-known brand could be associated with a good quality, which could also imply a good quality of the app (Solomon et al., 2013). The results are in line with the study of Hoyer and Brown (1990) in which they found that a well-known brand dramatically affects the evaluation of products of that brand in a positive manner. Another declaration for the positive influence of a well-known brand on the perceived app quality is the line of thought that consumers may rationalize that if they have heard of a brand, the organization behind that brand must be spending a large amount of money on advertising. "If it is spending a lot on advertising, the organization must be reasonable profitable which means that other consumers must be purchasing the product and they must be satisfied enough with its performance, therefore the product must be of reasonable quality" (Macdonald & Sharp, 2003, p.2).

Furthermore, results showed that the perceived app quality is negatively influenced by a preference for no brand within the app icon. This could be due to the relative simple pictures that were used in those apps, which could be used as extrinsic cues to infer the quality of the app.

Influences on intention to download

Attitude toward the brand does not only have a positive influence on perceived app quality, it is also an important positive influence on the intention to download the app for both entertainment and informative apps. Therefore, it can be concluded that attitude toward the brand is the most important factor of influence. These results are consistent with existing

literature on the influence of attitude toward the brand on purchase intentions (e.g. Laroch et al., 1996; Phelps & Hoy, 1996; Homer, 1990).

Besides, involvement with the app category demonstrated a positive influence on the intention to download for both entertainment and informative apps. A logical explanation for this relation is that when consumers are highly involved with an app category, they perceive apps within that category personally as more relevant or important. Therefore, consumers will take more time to choose app, where after the intention to download the app increases.

However, the magnitude of the effect of attitude toward the brand and involvement with the app category differs between entertainment and informative apps. For entertainment apps, the involvement with the app category had a much bigger influence on the intention to download, while for informative apps, the attitude toward the brand had a much bigger influence. This could be explained by the two app categories. These results suggest that consumers find the presence of a brand, and consequently their attitude toward that brand, more important when informative apps are involved. When entertainment apps are involved, the involvement with the app category entertainment is a better predictor for the intention to download the app. When consumers find these apps more personally relevant or important, they will have a higher intention to download these apps, which sounds very logical.

A remarkable finding in this study is the negative influence of brand awareness on the intention to download an informative app. This implies that the higher the brand awareness, the lower the intention to download an informative app. This is inconsistent with existing literature on the relationship between brand awareness and purchase intention (e.g. Laroche et al., 1996; Stokes, 1985). However, the respondents did have a significant lower brand awareness for the brands used for the informative app cases than the brands used for the entertainment app cases. It could be possible that the respondents had a lower intention to download the app, because they were less familiar with the brands used within the informative app icons, and subsequently have less associations with the brands.

Influences of perceived app quality on intention to download

This study revealed a relatively strong positive relation between perceived app quality and intention to download. These results are consistent with existing literature investigating this

type of relation between perceived quality and purchase intentions (e.g. Netemeyer et al., 2004; Boulding, Karla, Staelin & Zeithaml, 1993; Zeithaml, Berry & Parasuraman, 1996).

Proportion explained variance

Considering this is one of the very first researches in the field of app icon design and its influence on consumer perceptions and intentions, the proportion explained variances in this study were moderately high. Especially for the factor attitude toward the brand. 10% of the variance in the perceived app quality of entertainment apps can be explained by attitude toward the brand, for informative apps, it is 11.1%. This implies that, of all possible reasons, the factor attitude toward the brand influences the variance in perceived app quality with 10% to 11.1% (respectively entertainment and informative apps). Besides, for entertainment apps, the preference for a well-known brand and the preference for no brand within the app icon also have an influence on perceived app quality. However, with respectively 3% and 1%, these variables have much less impact.

Furthermore, 14% to 16% of the variance in the intention to download can be explained by the involvement with the app category and attitude toward the brand (resp. informative and entertainment apps). These percentages are also moderately high, when imagining that, of all possible reasons, the involvement with the app category and attitude toward the brand together are influencing the variance in the intention to download with 14% to 16%.

The highest proportion explained variances are found in the relation between perceived app quality and intention to download. 24.5% of the variance in intention to download informative apps can be explained by the perceived app quality of informative apps. For entertainment apps, this percentage was 21.4%. This implies that almost a quarter of the variance in the intention to download the app is influenced by the perceived app quality, which is a reasonable high percentage. However, these high percentages are not surprising since this relationship is well-grounded in academic literature.

These results are interesting starting points for app designers to have insight in what factors are contributing to the perceived app quality and intention to download the app.

Theoretical relevance

With so many apps to choose from, it is very important that "your" app stands out from the crowd. This study contributes to the knowledge of in the in-store decision making of consumers in application stores. The study revealed interesting results indicating that consumers do have a strong preference for specific app icon designs, and this preference is determined by the app category. Visual cues such as the presence of a well-known brand, a brand logo, skeuomorphic or flat design and an image related to the subject of the app were found to influence the preference for apps within the entertainment and information app category. Besides, the presence of a well-known brand within the app icon appears to be an anchor in the choice of apps.

Furthermore, this study resulted in valuable insights in the influences on perceived app quality and intention to download an app. The attitude toward the brand and involvement with the app category were found most important, positively influencing the perceived app quality and intention to download for both entertainment and informative apps.

Generalization

The majority of the respondents in this study was highly educated and between 19 and 23 years old. There is no concrete indication from this study that other age or educational groups show different results. However, this is one of the very first studies on this topic. The participants in this study were all regularly users of smartphones and tablets. The results might be different for people that do not use smartphones or tablets regularly and do not download apps regularly.

5.3. Limitations and suggestion for future research

This study resulted in valuable insights in consumers' app icon preferences and the influences on perceived app quality and intention to download. However, there are also some limitations in the research design of the study to take in account.

First, the length of the questionnaire could have been exhaustive for the respondents. The respondents had to fill in sets of the identical questions, because they had to answer questions for each of the twelve cases and for each of the twelve well-known brands. This could have led to uncompleted questionnaires or not seriously answered questions. However, there were only 22 uncompleted questionnaires, which is 7.9% of all respondents. This low percentage could

be due to the fact that the majority of the respondents were rewarded with credits for participating in this study. Besides, the questions that were last in the questionnaire also showed high Cronbach's alphas and significant results. This would not have been the case when the questionnaire was answered in a rush because of the reversed coded questions and the alternate sequence of the entertainment and informative case questions.

Second, the time limit set for selecting an app icon was three seconds in order to exclude extensive thought about the app icons. However, this time limit made that not all respondents had selected an app icon within all twelve cases. On average, the respondents had chosen 4.69 out of 6 entertainment apps and 4.86 out of 6 informative apps. This limitation of missing answers is overcome by selecting the respondents that had chosen four or more app icons within an app category for the further analyses.

Third, almost all results regarding the influence of app icon preference on perceived app quality and intention to download the app were insignificant. This could be due to the lack of scientific fundaments on this topic, since this is the first study that investigated these relations. However, almost all results on the preference for specific app icon variants were significant. Since this study is one of the first in the field of app icon design and its influence on consumer behavior there has to be a starting point somewhere. It is necessary to conduct more research to explore whether there are significant relations between various designed app icons and perceived app quality and intention to download. Moreover, it would also be interesting to consider other factors influencing perceived app quality and intention to download.

This study revealed that design style is an important factor in the preference of consumers for apps. However, to date no research has investigated in this matter and in the reasons why consumers actually prefer these apps. Therefore, it would be useful to know why consumers prefer specific app icon characteristics. For example, why do consumers prefer skeuomorphic designed entertainment apps and flat designed informative apps?

Besides, the majority of the respondents in this study was between 19 and 23 years old. However, almost everybody uses smartphones and tablets in this modern age. Therefore, it would be interesting to test the preferences for app icons and the influence on perceived app quality and intention to download the app among different age groups to explore whether there

are differences among different age groups. By gathering data on specific age groups, developers may consider different design practices based on their target consumer audience.

Furthermore, in this study the distinction is made between entertainment and informative apps. However, it could be interesting to conduct research on the specific sub categories in order to investigate whether there are differences between the app subcategories. Future research on this topic will find a more detailed effect and relation between app icon design and consumer perceptions, intentions, and behavior.

5.4. Practical implications

Although, this study does not provide significant results in the influence of preferences for app icon design on perceived app quality and intention to download, it is advisable to take the preference for a specific app icon into account. This study revealed that some app icon variants were selected significantly more to have a closer look on. When consumers have a closer look on an app, a brand or organization has an opportunity to persuade them to download the app. Based on the results in this study, the following app icon variants are preferable for entertainment and informative apps.

When wanting to introduce an entertainment app, a skeuomorphic design is strongly preferred over a flat design. Furthermore, it is preferable to put the brand logo in the app icon. Especially when introducing an entertainment app for a well-known brand, because this study revealed that the presence of the well-known brand in the app icon will have a positive effect on the perceived app quality. Furthermore, apps with a well-known brand in its app icon are strongly preferred over an app icon without a brand. Besides, the app quality of entertainment apps that contain no brand within the app icon are perceived as lower.

When introducing an informative app, a flat design is preferable over a skeuomorphic design. Besides, the brand logo within the app icon is strongly preferred over the brand name. Especially when having a well-known brand, it is preferable to put the brand logo in the app icon.

Furthermore, this study revealed the relevance of a positive attitude toward the brand once more. The study revealed a positive influence of the attitude toward the brand on the perceived

app quality and intention to download for both entertainment and informative apps. This implies that when consumers have a more positive attitude toward the brand, they will perceive the quality of the app as higher, and have a higher intention to download the app of that brand. Therefore, as a brand, it is very important to create positive attitudes among the target group(s) of the brand.

Besides, the positive influence of involvement with the app category on the intention to download for both entertainment and informative apps is important for app designers and developers. Having insight in the personal importance and relevance consumers have regarding the app category or an app will help designing the app icon and creating the other persuasive elements in the application store, such as screenshots and the description of the app. Knowing that highly involved consumers will take more time to choose app, where after the intention to download the app increases. Designing an app for high involved consumers should therefore have more information about the app which could be placed in the description of the app. However, one should take into account that the involvement could differ among the target group of the app.

Moreover, after launching the apps, it is very important to know what consumers think of the quality of the app, because 21% to 25% of the variance in intention to download can be explained by the perceived app quality. Therefore, it is important for app developers and brands or organizations to gain knowledge in the perceived app quality when the app is launched through the reviews of customers. This insight will contribute to for example download prognoses of apps and could persuade other consumers to download the app.

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Appendices

Appendix A: App categories of Google Play and App Store

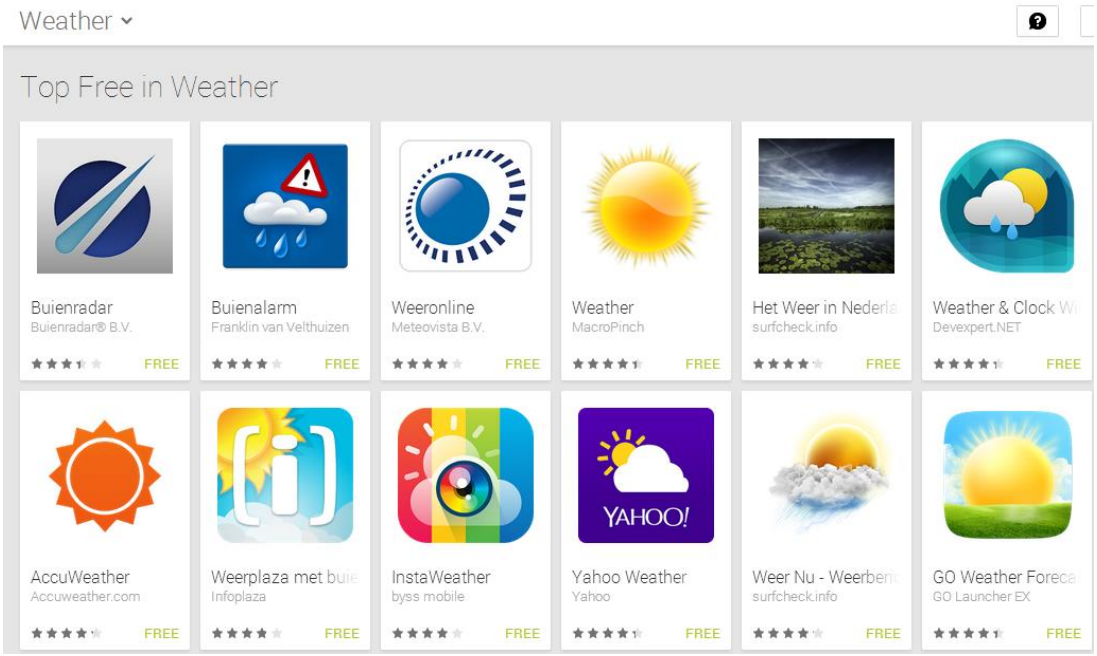
Google Play	App Store
Books & Reference	Books / Reference
Business	Business
Comics	
Communication	(*Social Networking)
Education	Education
Entertainment	Entertainment
Finance	Finance
Games	Games
Health & Fitness	Health & Fitness
Libraries & Demo	
Lifestyle	Lifestyle
Live Wallpaper	
Media & Video	(*Photo & Video)
Medical	Medical
Music & Audio	Music
News & Magazines	News
Personalization	
Photography	Photo & Video
Productivity	Productivity
Shopping	Catalog
Social	Social Networking
Sports	Sports
Tools	Utilities
Transportation	Navigation
Travel & Local	Travel
Weather	Weather
Widgets	
	Food & Drink

(* = comparable with category)

Appendix B: Images of application stores Google Play and App Store

Android - Google Play:

Top of the free apps in the category Weather:



Apple - App Store:

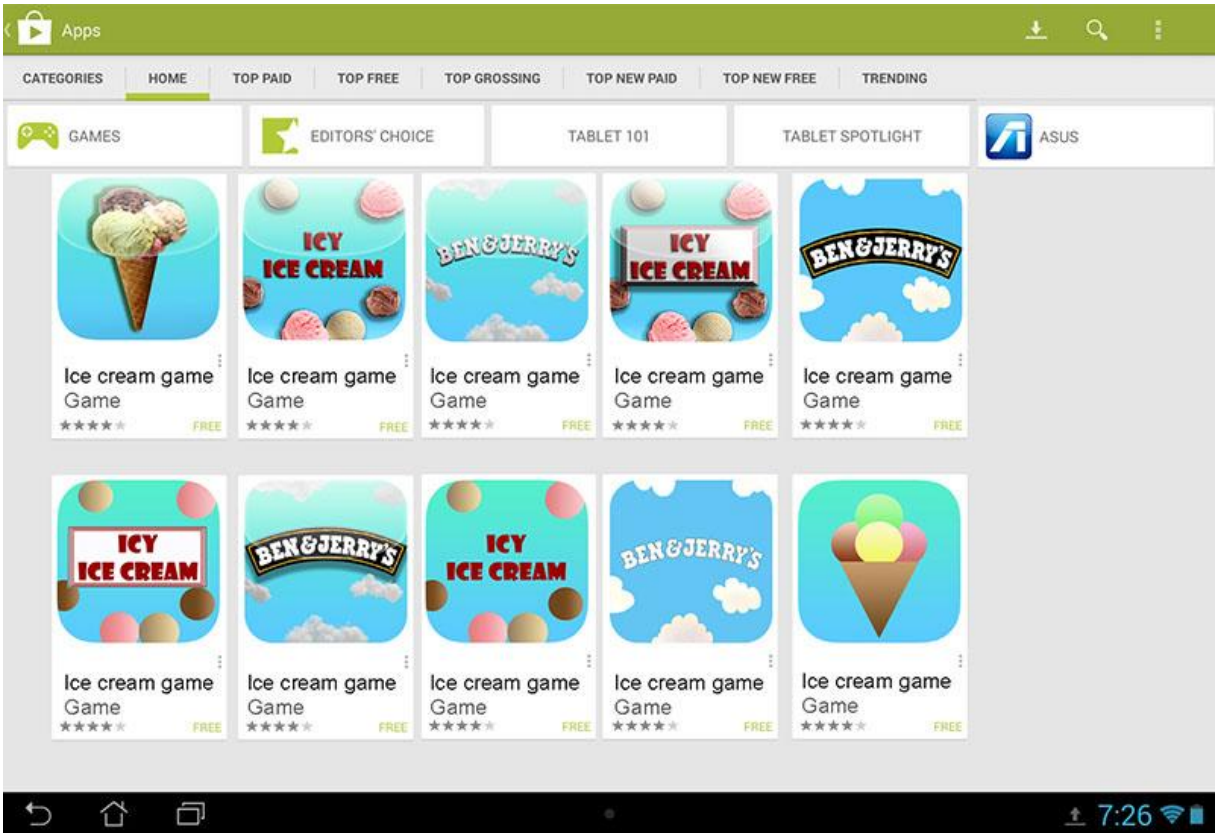
Top of the free apps in the category Weather:

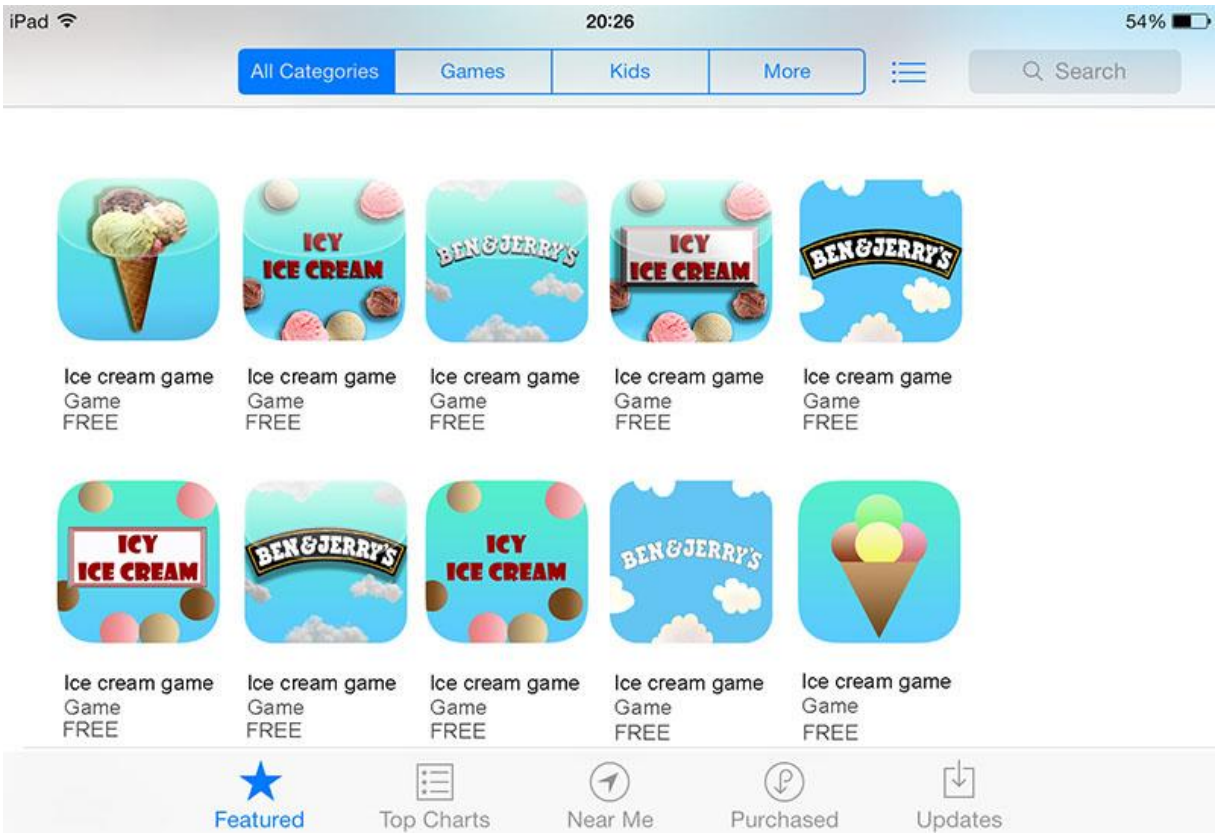
Appendix C: Skeuomorphic versus flat design

Skeuomorphic design

Flat design

Appendix D: App icons for case 1, visible within Google Play and App Store





Appendix E: Reliability measures for each case

	Cronbach's alpha			
Cases	***Brand awareness***	***Attitude toward the brand***	***Perceived app quality***	***Intention to download the app***
Case 1	.838	.862	.890	.928
Case 2	.783	.900	.856	.936
Case 3	.929	.948	.884	.945
Case 4	.889	.890	.905	.943
Case 5	.839	.919	.899	.957
Case 6	.971	.960	.916	.973
Case 7	.941	.936	.869	.948
Case 8	.905	.930	.924	.942
Case 9	.934	.949	.882	.954
Case 10	.858	.924	.909	.963
Case 11	.973	.953	.880	.971
Case 12	.966	.946	.916	.957
Mean	.902	.926	.894	.951
SD	.061	.029	.021	.014

Appendix F: Questionnaire

Note: this questionnaire includes images of the application store Google Play for Android devices. A questionnaire with images of the App Store were used for respondents with an iPhone/ iPad. An example of such an image can be found in Appendix D.

App icons survey: Win a gift voucher of your choice worth € 15!

For my master Marketing Communication at the University of Twente, I write my thesis about mobile app icons. For this study, I need your help!

You are asked to complete this questionnaire. Completing this questionnaire takes approximately 20 minutes. The results will be processed completely anonymous and used solely for my master thesis. I am interested in your opinion, and for that reason there are no wrong answers.

Among all respondents, I will raffle a gift voucher of your choice worth €15. If you want to make use of this opportunity, please fill in your e-mail address at the end of the questionnaire. The winner of the voucher will be contacted by mail.

Participating in this study is voluntary; it is possible to end the participation, without giving any reason, at any moment in this questionnaire.

It is necessary to complete the survey on a laptop or computer due to the amount of pictures in this survey. By starting with the questionnaire you acknowledge that you have read the information above and agree to participate in this study.

If you have any questions regarding this survey, please contact me.

Thank you for your participation!
Melissa Pol
m.pol-1@student.utwente.nl

Gender:
Male / Female

Age:
Open question

Highest level of education:
- *Lower vocational education (VMBO)*
- *School of higher general secondary education (HAVO)*
- *Pre-university education (VWO)*
- *Intermediate vocational education/ technical school (MBO)*
- *Higher vocational education (HBO)*
- *Bachelor's degree*
- *Master's degree*

Educational specialization (only visible for HBO / Bachelor's degree / Master's degree):
- *Education and breeding*
- *Language and communication*
- *Arts and culture*
- *Law and government*
- *Economics and business*
- *Behaviour and society*
- *Health*

- *Earth and environment*
- *Exact sciences and information technology*
- *Engineering*

Which mobile device are you using:
- *Smartphone*
- *Tablet*
- *Both*
- *None of the above (respondent was send to the end of the questionnaire)*

Which apps can you download with your device?
- *Android apps (e.g. Samsung, HTC, LG, Sony, Google devices)*
- *Apple apps (e.g. iPhone, iPad)*
- *Both, because I have two different devices*
- *None of the above (respondent was send to the end of the questionnaire)*

Indicate the time you take to choose and download an app that falls within the following categories:

	Very little time						Very much time
Game	0	0	0	0	0	0	0
Health & Fitness	0	0	0	0	0	0	0
Lifestyle	0	0	0	0	0	0	0
Music	0	0	0	0	0	0	0
Photo & Video	0	0	0	0	0	0	0
Sports	0	0	0	0	0	0	0
Book & Reference	0	0	0	0	0	0	0
Business	0	0	0	0	0	0	0
Catalog / Shopping	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0
Travel & Local	0	0	0	0	0	0	0
Weather	0	0	0	0	0	0	0

Give an estimation of the number of apps within each category that you have downloaded and are on your mobile device right now (do NOT include pre-installed apps):

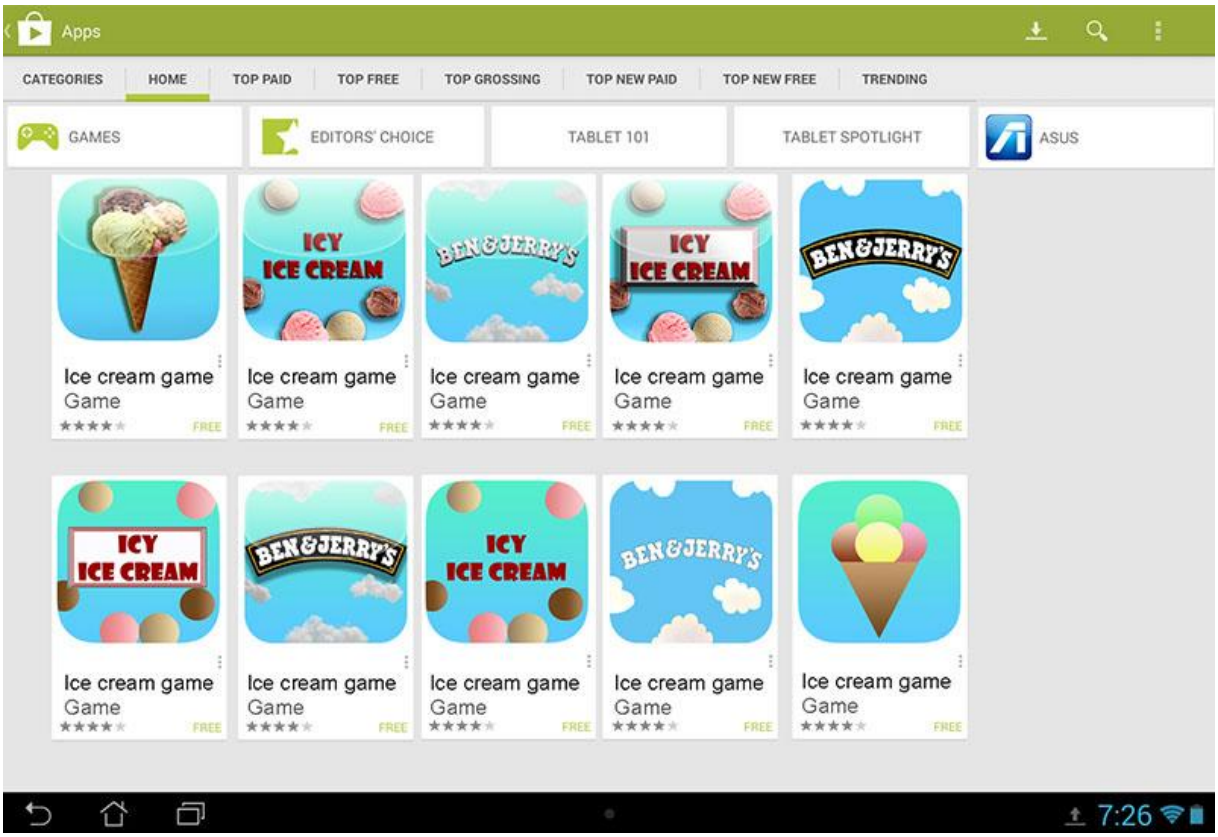
Game	... *apps*
Health & Fitness	... *apps*
Lifestyle	... *apps*
Music	... *apps*
Photo & Video	... *apps*
Sports	... *apps*
Book & Reference	... *apps*
Business	... *apps*
Catalog / Shopping	... *apps*
Education	... *apps*
Travel & Local	... *apps*
Weather	... *apps*

On the following pages, you will get cases followed by ten app icons. You have to choose one app icon which you want to have a closer look on. This can be done by clicking on the app icon of your choice.

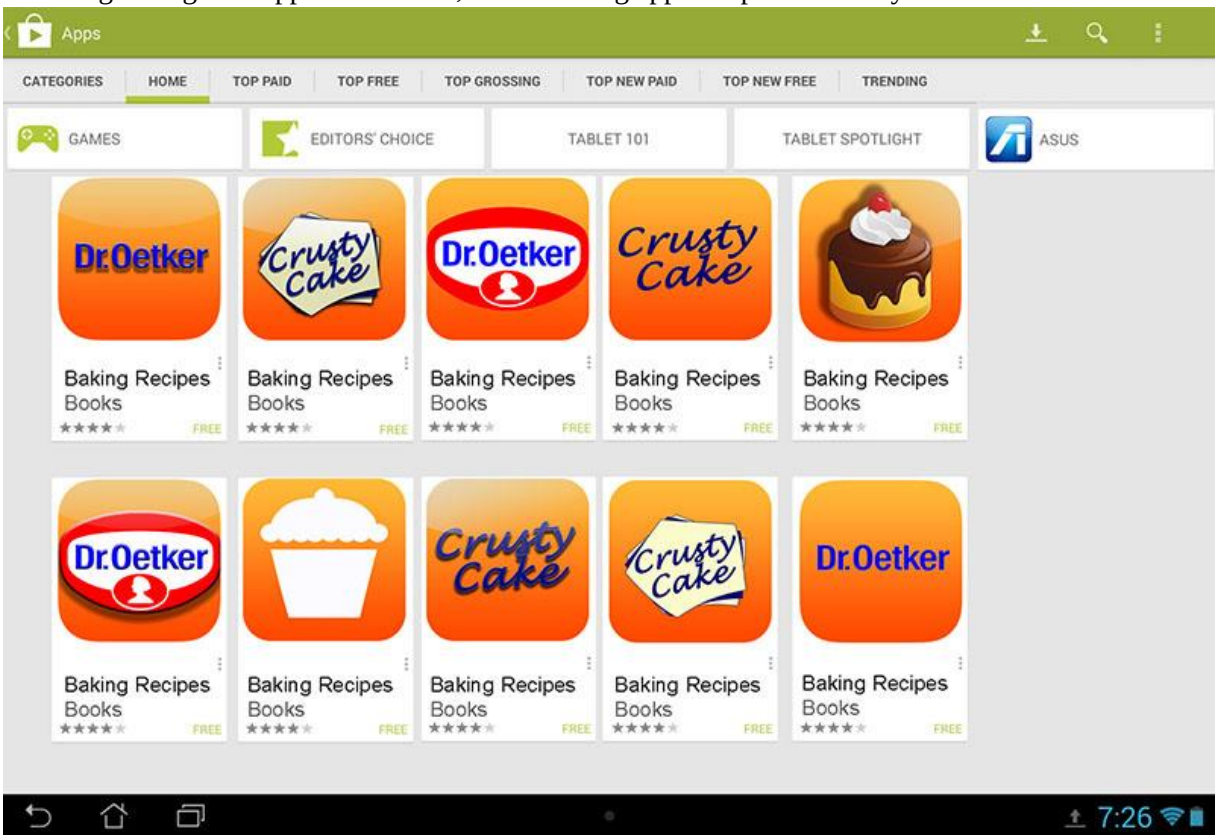
Case # (Note: cases are visible on the following pages)

Note: when you click on Next, you have only three seconds to click on the app icon you prefer. After three seconds, the following page will be displayed automatically.

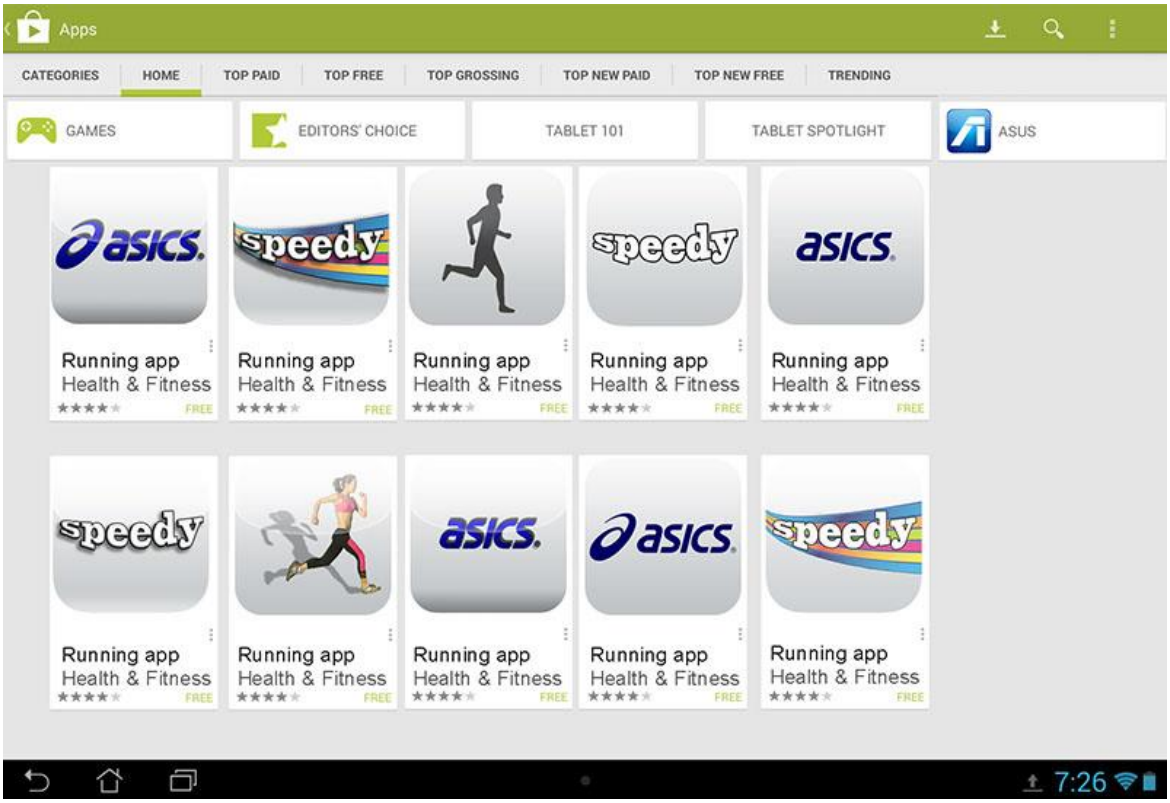
Case 1:
Imagine: you are looking for a game app that includes ice creams.
While browsing through the application store, the following apps are presented to you.



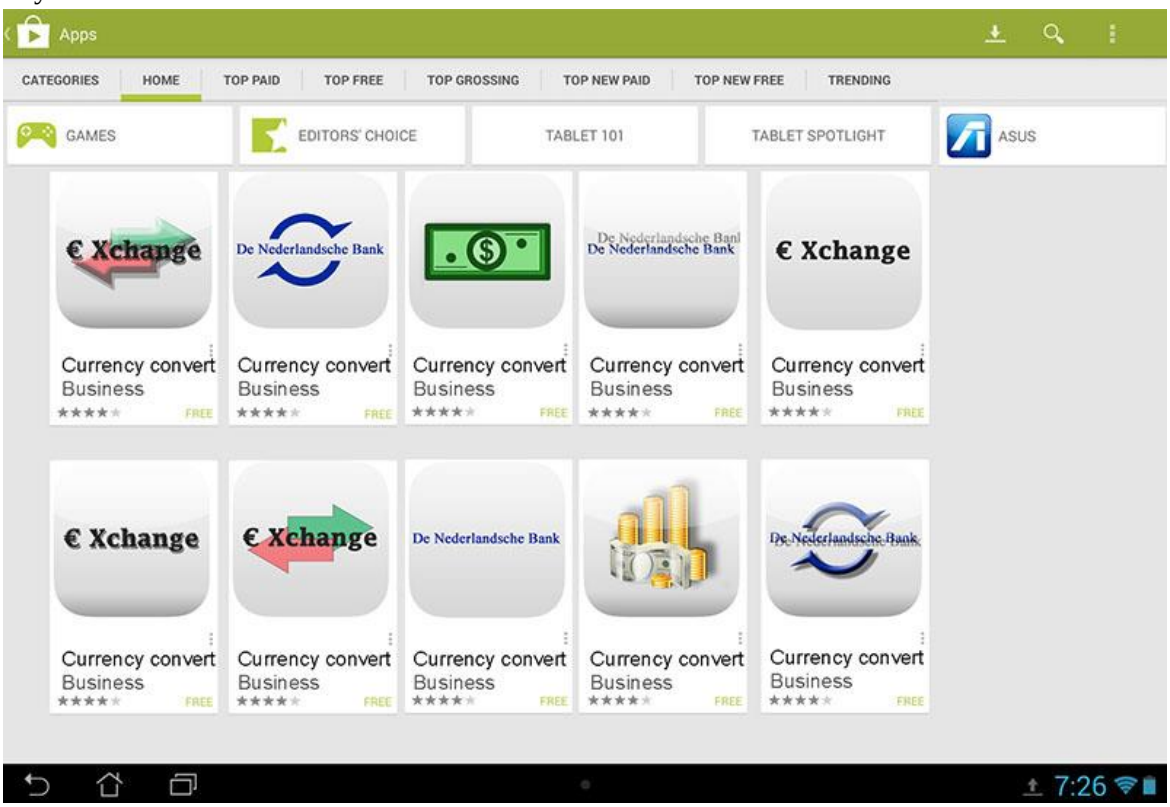
Case 7:
Imagine: you want to bake a cake and need a recipe so you are looking for such an app. While browsing through the application store, the following apps are presented to you.



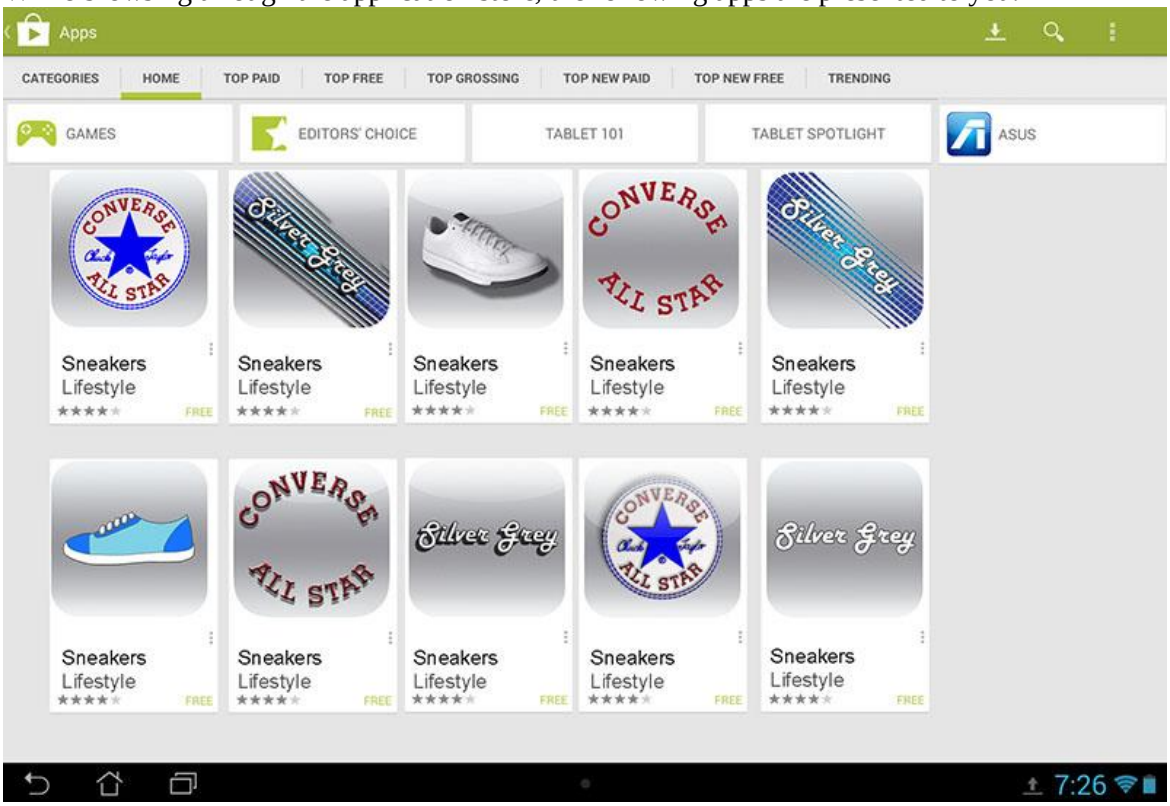
Case 2:
Imagine: you want to log your running activities and are looking for such an app.
While browsing through the application store, the following apps are presented to you.



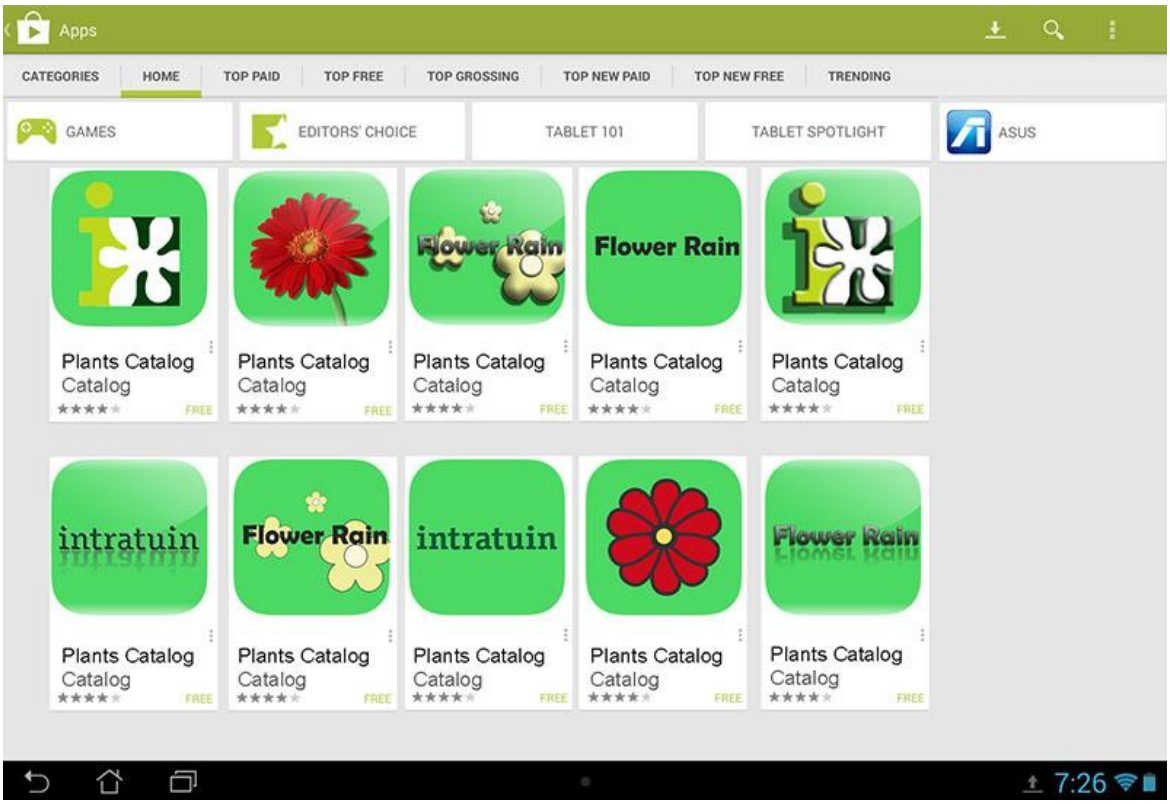
Case 8:
Imagine: you want to know how much money you will receive when converting some of your money into another currency. While browsing through the application store, the following apps are presented to you.



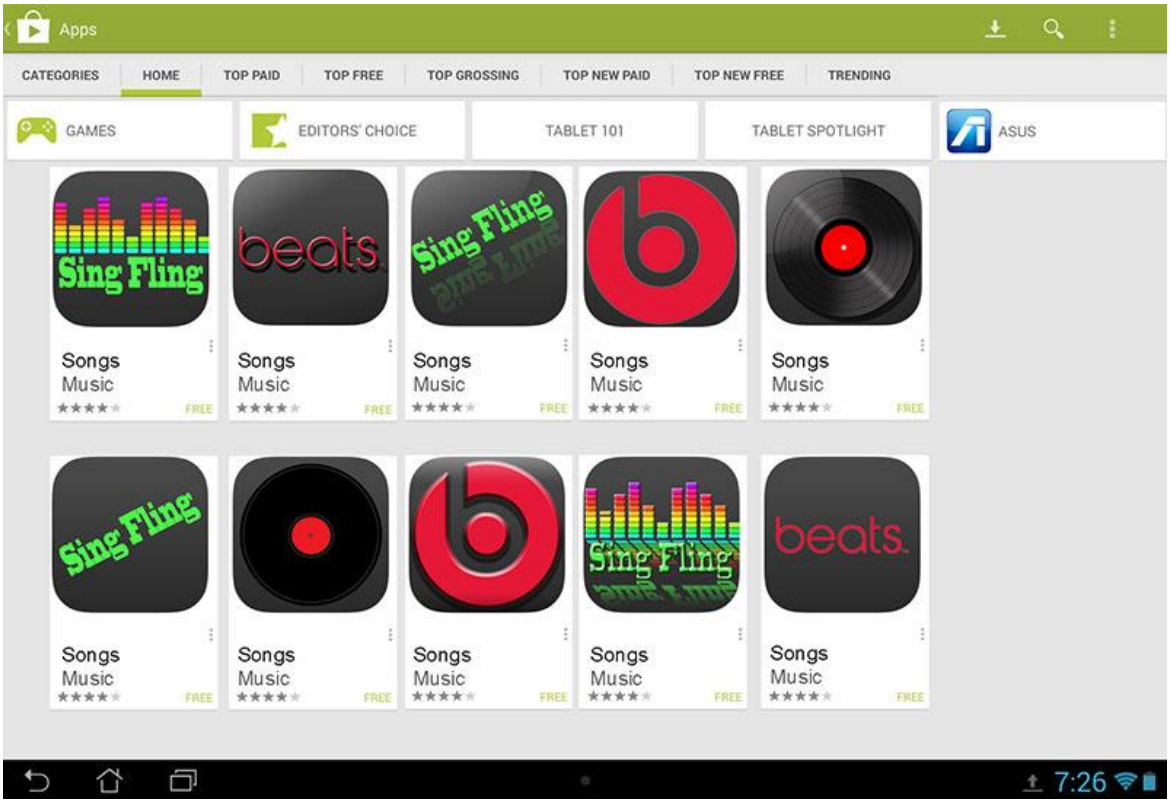
Case 3:
Imagine: you want to make your own customized shoes and to order these shoes.
While browsing through the application store, the following apps are presented to you.



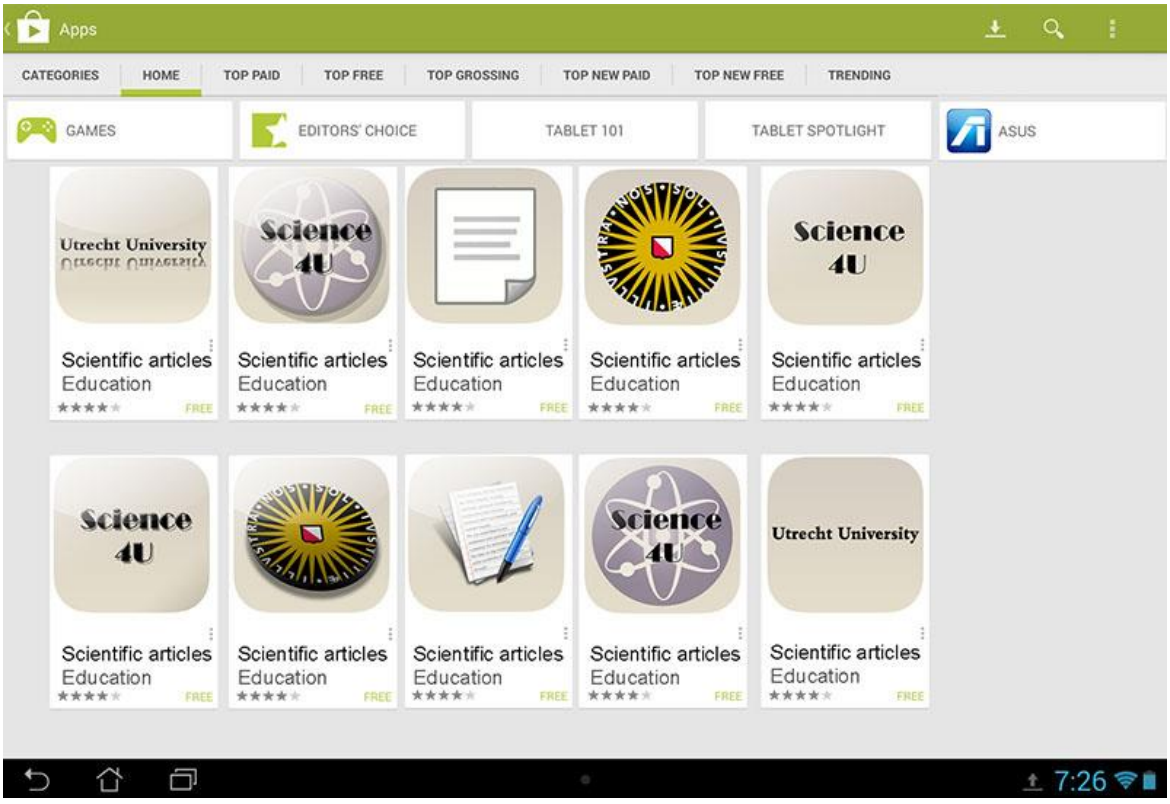
Case 9:
Imagine: you want to know which flowers and plants will grow best in your living room.
While browsing through the application store, the following apps are presented to you.



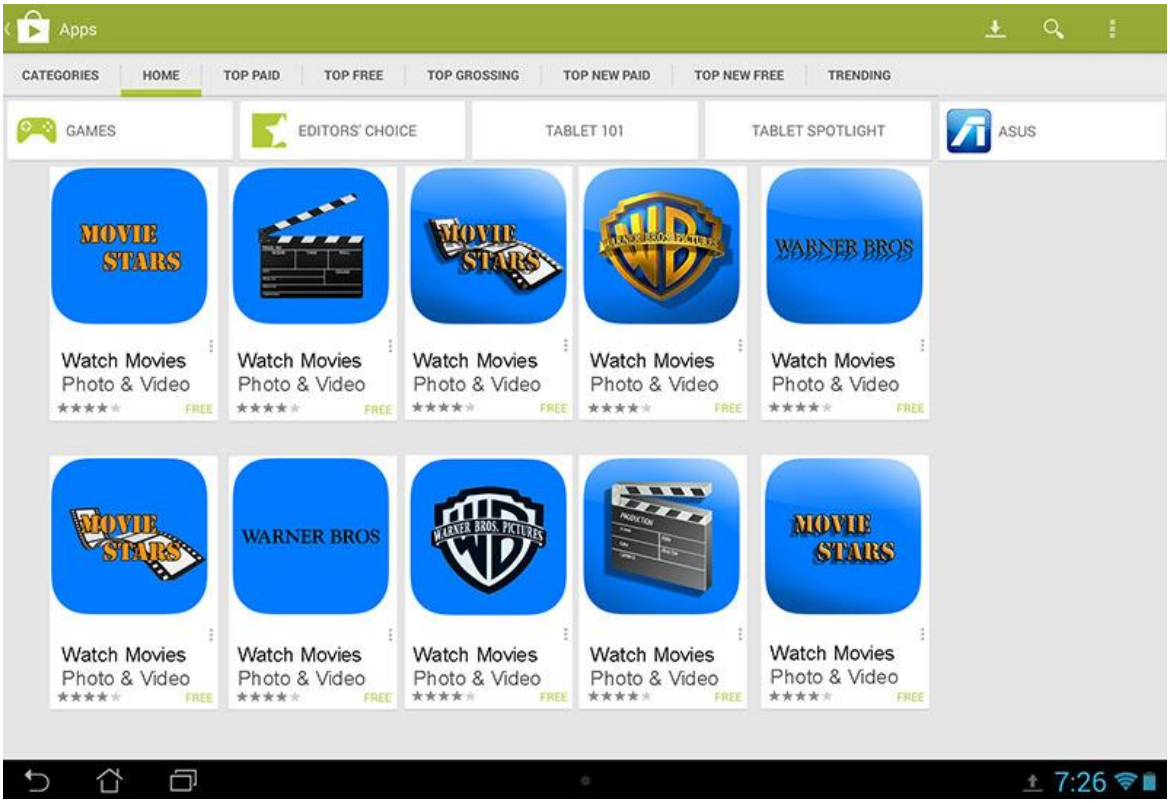
Case 4:
Imagine: you want to listen to your favorite songs and are looking for such an app.
While browsing through the application store, the following apps are presented to you.



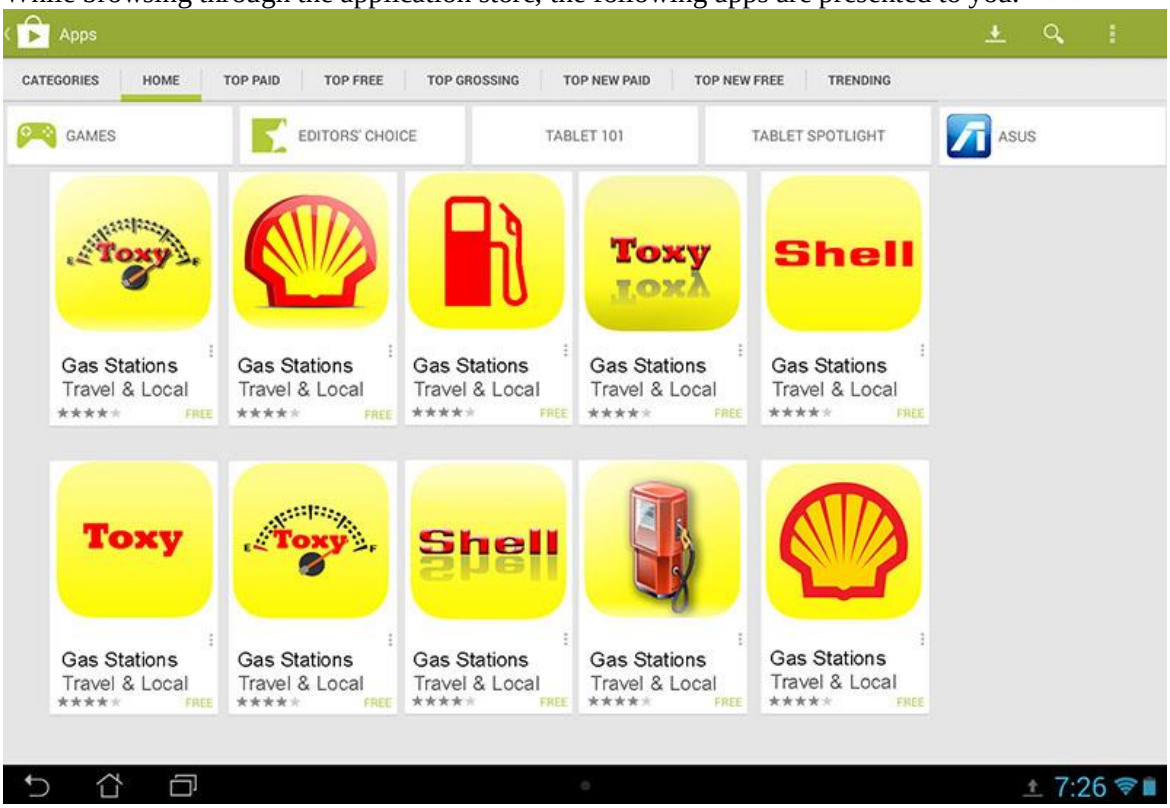
Case 10:
Imagine: you want to read scientific articles on your mobile device and are looking for such an app.
While browsing through the application store, the following apps are presented to you.



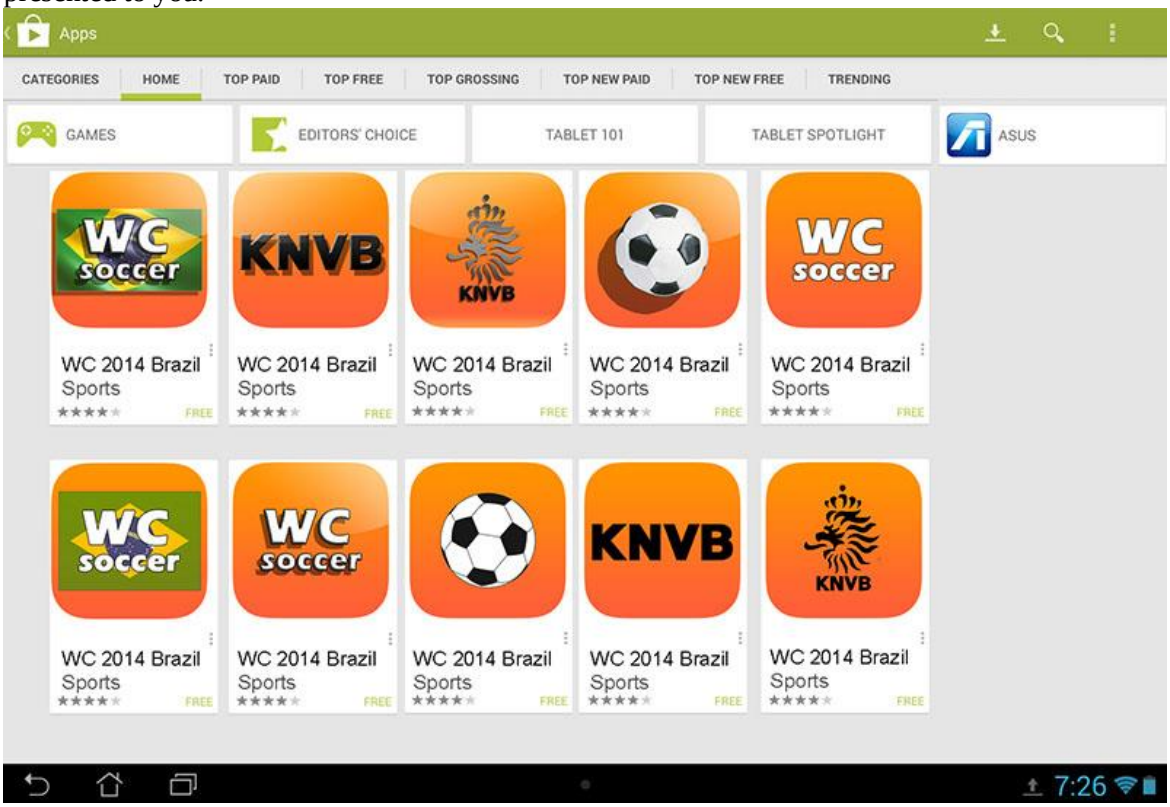
Case 5:
Imagine: you want to watch movies on your mobile device.
While browsing through the application store, the following apps are presented to you.



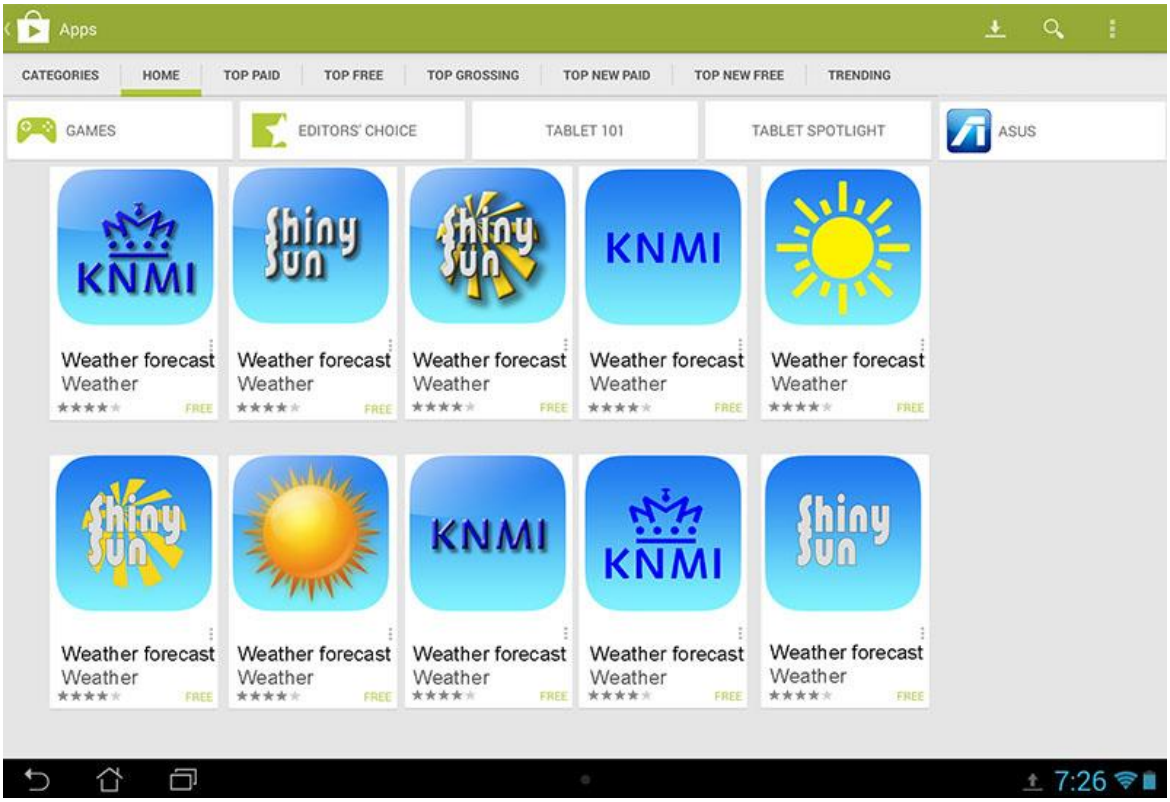
Case 11:
Imagine: you want to know where the nearest gas station is and are looking for such an app.
While browsing through the application store, the following apps are presented to you.



Case 6:
Imagine: you want to keep an eye on the soccer rankings of the World Cup Brazil 2014 so you are looking for such an app. While browsing through the application store, the following apps are presented to you.



Case 12:
Imagine: you want to know how many hours of sun is predicted for tomorrow and are looking for such an app. While browsing through the application store, the following apps are presented to you.



Note: For each of the twelve cases: (X will be name of the scenario).

[Icon of choice]

You preferred the abovementioned app icon within the *X* scenario.
What do you think about the app behind the abovementioned app icon?

Perceived quality		Strongly disagree	Strongly agree
This app is of high quality		0 0 0 0 0 0 0	
The likely quality of this app is extremely high		0 0 0 0 0 0 0	
The app must be of very good quality		0 0 0 0 0 0 0	
The app appears to be of very poor quality	*(reversed coded)*	0 0 0 0 0 0 0	

Download intention	Strongly disagree	Strongly agree
I would download this app:	0 0 0 0 0 0 0	
I would consider downloading X:	0 0 0 0 0 0 0	
The probability that I would download this app is high	0 0 0 0 0 0 0	

Brands
Which brand do you know if only by name?
Ben & Jerry's, Dr. Oetker, Asics, De Nederlandse Bank, Converse All Star, Intratuin, Beats by Dr. Dre, Utrecht University, Warner Brothers, Shell, KNVB, KNMI.

Note: For each of the twelve well-known brands: (X will be the brand name).

What is you opinion about the following statements regarding X?

Brand awareness		Strongly disagree	Strongly agree
I can recognize X among other competing brands.		0 0 0 0 0 0 0	
I am aware of X.		0 0 0 0 0 0 0	
Some characteristics of X come to my mind quickly.		0 0 0 0 0 0 0	
I can quickly recall the symbol or logo of X.		0 0 0 0 0 0 0	
I have difficulty in imagining the brand X in my mind.	*(reverse coded)*	0 0 0 0 0 0 0	

Attitude toward the brand
What is your overall feeling about X?

Unappealing	0 0 0 0 0 0 0	Appealing
Bad	0 0 0 0 0 0 0	Good
Unpleasant	0 0 0 0 0 0 0	Pleasant
Unfavorable	0 0 0 0 0 0 0	Favorable
Unlikable	0 0 0 0 0 0 0	Likeable

Please fill in your e-mail address if you want to win a gift voucher of your choice worth € 15.
If you do not want to, please click on [Complete] to complete the survey.

Thank you for your participation! Your response has been recorded.

Appendix G: Mediation analyses brand awareness and attitude toward the brand

Mediation analyses for brand awareness and attitude toward the brand was executed, to find out if these variables mediate between brand presence and perceived app quality. Figure 8 and Figure 9 give an overview of the relations investigated for the mediation analyses of respectively brand awareness and attitude toward the brand. If all relations from Step 1 through Step 3 are significant, the author will proceed to Step 4. Step 4 will investigate whether some form of mediation is supported, by testing whether the effect of brand awareness/ attitude toward the brand to perceived app quality remains significant after controlling for brand presence.

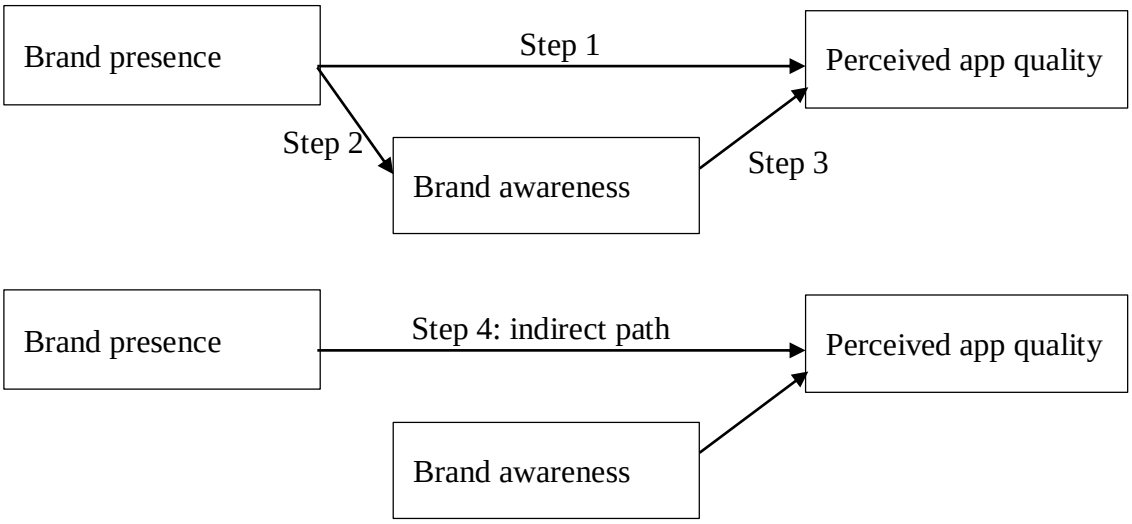


Figure 8 **Relations investigated for the mediation analysis of brand awareness**

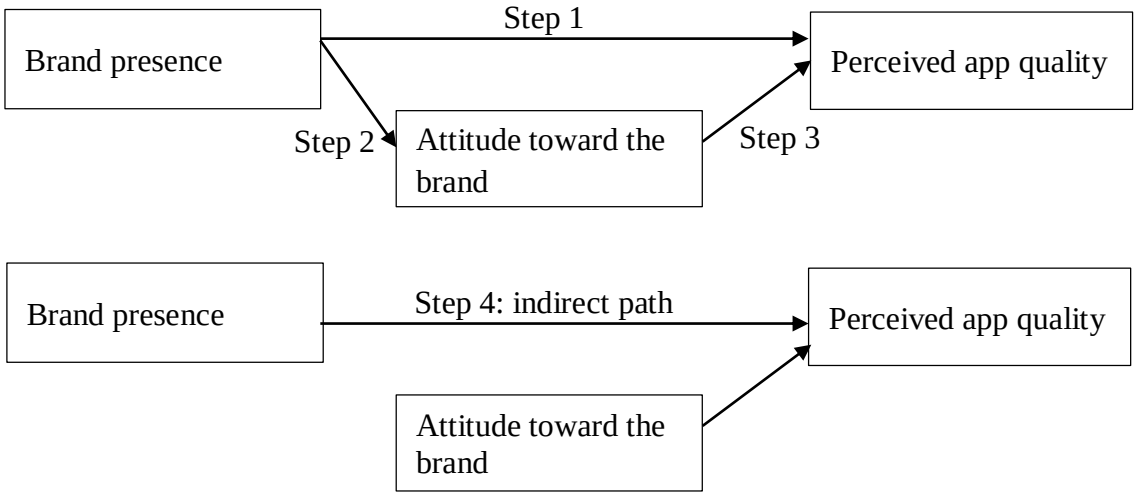
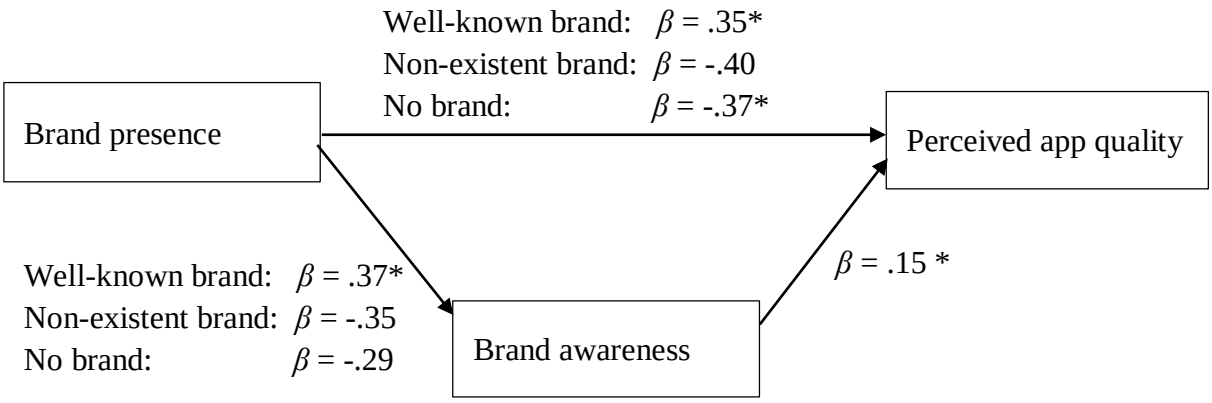


Figure 9 **Relations investigated for the mediation analysis of attitude toward the brand**

Mediation analysis brand awareness

For entertainment apps, the relationship between brand presence and perceived app quality was not mediated by brand awareness. As Figure 10 illustrates, the regression coefficients between brand presence and perceived app quality and between brand presence and brand awareness were not statistically significant for non-existent brand. Therefore, no mediation of brand awareness is possible for entertainment apps.

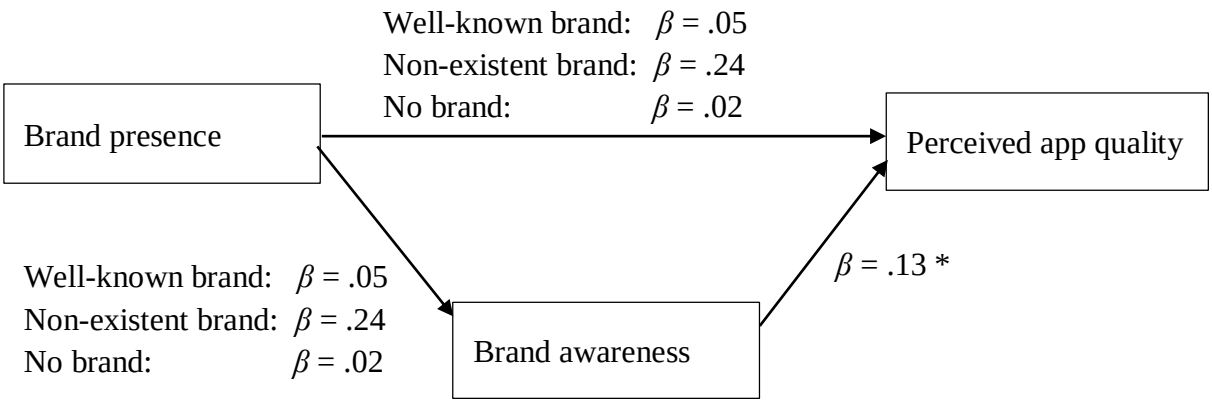
Figure 10 **Model testing hypothesis that brand awareness mediates the relationship between brand presence and perceived app quality for entertainment apps**



Note: * *p* <.05

For informative apps, the relationship between brand presence and perceived app quality was not mediated by brand awareness. As Figure 11 illustrates, the regression coefficients between brand presence and perceived app quality and between brand presence and brand awareness were not statistically significant. Therefore, no mediation of brand awareness is possible for informative apps.

Figure 11 **Model testing hypothesis that brand awareness mediates the relationship between brand presence and perceived app quality for informative apps**

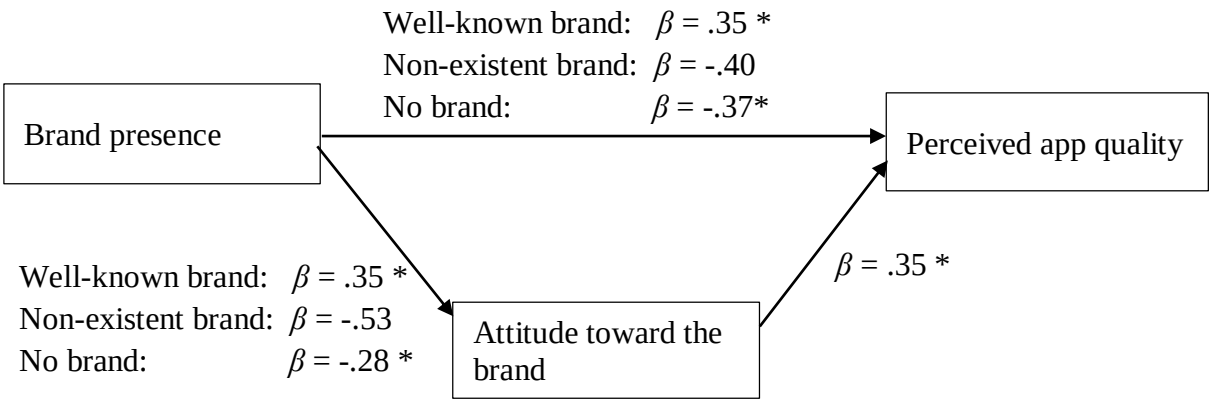


Note: * *p* <.05

Mediation analysis attitude toward the brand

For entertainment apps, the relationship between brand presence and perceived app quality was not mediated by attitude toward the brand. As Figure 12 illustrates, the regression coefficients between brand presence and perceived app quality and between brand presence and brand awareness were not statistically significant for non-existent brand. Therefore, no mediation of attitude toward the brand is possible for entertainment apps.

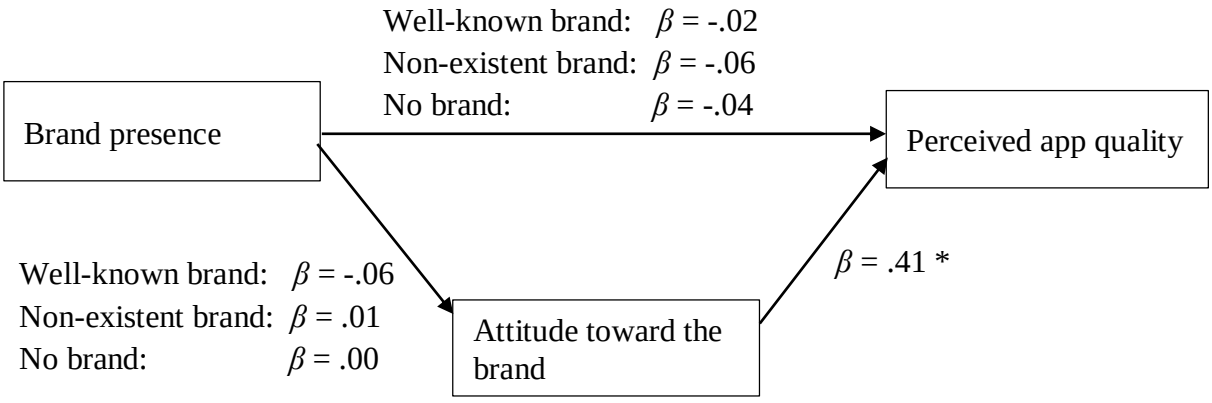
Figure 12 **Model testing hypothesis that attitude toward the brand mediates the relationship between brand presence and perceived app quality for entertainment apps**



Note: * p <.05

For informative apps, the relationship between brand presence and perceived app quality was not mediated by attitude toward the brand. As Figure 12 illustrates, the regression coefficients between brand presence and perceived app quality and between brand presence and brand awareness were not statistically significant. Therefore, no mediation of attitude toward the brand is possible for informative apps.

Figure 13 **Model testing hypothesis that attitude toward the brand mediates the relationship between brand presence and perceived app quality for informative apps**



Note: * p <.05