April 2019

How Digital versus Non-Digital Modes of Food Ordering Influence Menu Healthfulness Perceptions and Food Choices

Annika Abell
University of South Florida, annika.abell@gmail.com

How Digital versus Non-Digital Modes of Food Ordering

Influence Menu Healthfulness Perceptions and Food Choices

by

Annika Abell

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Marketing
Muma College of Business
University of South Florida

Major Professor: Dipayan Biswas, Ph.D.
Donna Davis, PhD
Maura Scott, Ph.D.
Mark Bender, Ph.D.

Date of Approval:
March 18, 2019

Keywords: Digital Marketing, Dual Processing Theories, Online Ordering, Healthful Consumption

DEDICATION

To my husband Alex and my daughter Avie for their love and support.

ACKNOWLEDGEMENTS

Thanks to my advisor Dr. Dip Biswas for being a mentor, advocate, and friend. I am forever grateful for the time and wisdom you shared with me. To my committee, thank you for your guidance, feedback, and encouraging words. To my office mate Iana, thank you for your friendship. Thank you Wendy and Megan, I very much appreciate your support over the last five years.

This dissertation would not have been possible without the help of several additional people. I would like to thank my friend Miguel and the staff from Heights Pizza for enabling me to conduct research in the restaurant. Thanks to my husband's family and Maristella for babysitting when I needed time to finish this work. Finally, I wish to thank my parents and sister for believing in me and my host parents, without whom I would have never started this journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Do digital devices change the way we think? Recent news reports and studies in education and psychology suggest that using modern internet technology affects our cognitive abilities. Modern technology is part of our daily lives and has facilitated communication. As technology has also changed the ways consumers order foods, the present research aims at investigating how the presence of different types of technology in a food choice context might influence food perceptions and choices. Touch-screen tablets or kiosks are becoming widely available in casual dining and fast-food restaurants. In addition, through collaborations with tech-giants like Uber Eats and Amazon, an increasing number of restaurants are entering the food delivery market. This dissertation research proposes that placing an order with the involvement of digital technology (e.g., ordering through a website or an app) versus a lower degree of technology involvement or no technology (e.g., in person or on paper) would lead to different healthfulness perceptions and food choices. Building on dual processing theories, we propose that using a more digital (vs. non-digital) mode for ordering food triggers reliance on a more experiential and automatic decision-making system, because digital devices are linked to immediate gratification and impulsive behaviors.

The findings from nine experiments in field and lab settings provide evidence for the proposed effects. We show that using a digital device (versus a non-digital medium) leads to a higher reliance on an experiential decision-making style, thus leading consumers to focus on

foods that are high on an affective dimension. This focus results in lower healthfulness perceptions of menus that are displayed digitally and, in turn, leads to unhealthier food choices.

The findings from this research make important contributions to theory and practice. Our findings contribute to our understanding of how the use of technology influences how users interpret different consumption situations in terms of processing style. Apart from choices, this dissertation research investigates menu healthfulness perceptions, which has not received much attention in research. We explore healthy and unhealthy food choices and, therefore, add to the literature on healthful consumption, which identifies simple ways to encourage more mindful food choices.

From a managerial perspective, findings from this research can help food outlets determine the consequences of the use of technology in a food context. While many restaurants introduce ordering kiosks or display their menus digitally, this may influence consumers' perceptions of the food and subsequent choices. Lastly, as researchers often conduct surveys on paper or on digital devices, this research introduces potential differences in responses to food related questions based solely on the survey taking mechanism.

INTRODUCTION

Macro-level technology changes in the last few years have had major influences on consumers' lives. For example, recent technological changes have affected how we connect with others, buy products online, and access information. While technological changes have made our lives more convenient, can such changes also reduce our cognitive abilities? In essence, the assumption is that the use of modern internet technologies makes us more adept to skimming and scanning, leading to a decrease in our ability to think deeply. This so-called "Google Effect" has been discussed in the media in a variety of news articles (Chamorro-Premuzic 2013; Roberts 2015; Sehgal 2016) and has become an interesting avenue for researchers from different disciplines including psychology and education (Greenfield 2009; Sparrow, Liu, and Wegner 2011). Author and journalist Nicholas Carr spurred this discussion with his 2010 bestseller and Pulitzer Prize finalist work "The Shallows: What the Internet is Doing to Our Brains."

The purpose of this dissertation is to investigate the premise of the "Google Effect" in a food choice context and to study how consumers' perceptions and choices might be altered by the ordering mode they use. Digital technology has been a part of food choices since the 1990s. According to a tweet published by Pizza hut in 2013, the first food that was ordered online was a pizza ordered from Pizza Hut in 1994 (Twitter 2014). A lot has changed since 1994. Today, ordering food online, whether it is from a restaurant or a grocery store, has become an everyday convenience to many. GrubHub, a mobile food ordering service, handles more than 274,800 delivery or pickup orders daily (Statista.com 2018). The online food delivery market was

reshaped with the rise of mobile internet technology and smartphones (Hirschberg et al. 2016). Today, online food ordering is a 95 billion dollar industry expected to grow steadily ("Online Food Delivery" 2019). Major players in this industry include Uber Eats, Amazon Restaurants, DoorDash, FoodPanda, and GrubHub. These food delivery aggregators allow even smaller restaurants to generate additional revenue through deliveries without setting up their own online ordering website or even employing their own delivery fleet (Hirschberg et al. 2016). Other companies, like Tapingo, specialize in app-based pre-ordering services that let customers pay ahead and skip the line straight to a pick-up station (Bakker 2015). In light of an increase of technology and internet usage in a food choice setting, this work aims at exploring differences in perception and decision-making when digital technology is involved.

Involvement of digital technology in a food choice process can take different forms. Online food ordering usually refers to the process of ordering food through a website or app for delivery or pick up. Then, consumption will take place at the consumer's home. However, technology has also found its way onto the restaurants' premises. Specifically, screens and touch-screen enabled kiosks constitute new ways to display food options and place orders. For instance, fast-food chains like Panera Bread and McDonalds have initiated the use of touch-screen kiosks for ordering processes in stores (Geddes 2015). These touch-screen technologies are being implemented to make stores more efficient, modern, and put more control into the customers' hands (Kowitt 2016). Many restaurants opt to present their menu items on digital menu boards, because these allow for movement, immediate changes of options and prices, and in extreme cases, even the display of personalized offers to each customer (Arnett 2015; "Data-Driven Menu Psychology (Powered By Digital Menus)" 2018). Some businesses have scrapped in-person food ordering altogether. The popular gas station chain "Wawa" has ordering kiosks

available, which sometimes even feature hidden menu items (McGaw 2019). While Wawa has human cashiers, the Californian food chain "eatsa" is a fully automated restaurant. Here, patrons can place a customized order on a touch-screen kiosk, pay, and pick it up from a type of locker without ever interacting with a human being. Originating in the Silicon Valley, the concept has had mediocre success in other locations (Maze 2017).

Most restaurants still offer traditional paper menus, food ordering counters with real human beings, or waitstaff, giving consumers the choice to order through a non-digital mode. In fact, several types of restaurants, such as many sushi restaurants and the sandwich chain "Which Wich", ask patrons to choose and mark food items on a paper menu (Eng 2017). Some restaurants purposely choose to go for more traditional menu presentation means, such as chalk boards or magnetic menu boards, in an attempt to stand out, appear more personal, traditional, or "artsy" (Arnett 2015). In summary, there are few purely "digital" food-ordering situations, and the degrees of technology involvement in the food ordering process vary.

At this point, little is known if and how these technological advances influence consumers' perceptions and decision processes in a food choice context. How do consumers evaluate food menus when they are presented digitally vs. non-digitally? How does the presence of varying types of technology like smartphones and ordering kiosks in the ordering process influence food choices? Prior research has highlighted the problematic use of technology in our society. For example, while the use of internet technology has led to enhanced visual-spatial skills, it has led to weaknesses in higher-order cognitive processes (Greenfield 2009). As mentioned earlier, author Nicholas Carr summarizes much of this work in his New York Times Bestselling book on how internet technology makes us cognitively shallower and changes the way we process information (Carr 2010; Sehgal 2016).

The goal of the present research is to investigate how the presence of modern technology in a food ordering context might influence consumers' perceptions of restaurant menus and subsequent choices. This dissertation draws from dual processing theories. Dual processing models of decision-making embrace the idea that decision-making can be categorized into two systems (Ferreira et al. 2006; Kahneman and Frederick 2002, 2005). Specifically, consumers make choices under uncertainty under the influence of two basic forms of reasoning: One being quick-and-fast, based on heuristics, more automatic, and experiential, with the other being more deliberate, based on thought, more intentional, and cognitive (Epstein et al. 1996; Ferreira et al. 2006).

Dual processing theories have been used to explain different levels of self-control (Hofmann, Friese, and Strack 2009), including self-control in a food-choice context between vices and virtues (Shiv and Fedorikhin 1999). While many consumers have goals related to healthy foods, they often yield to unhealthy foods, which tend to be more tasty and indulgent (Raghunathan, Naylor, and Hoyer 2006; Romero and Biswas 2016). Presently, as outlined above, many food choices are being made on digital devices, such as smartphones, computers, or ordering kiosks. Based on prior research (Ackerman and Goldsmith 2011; Bodmann and Robinson 2004; Greenfield 2009; Tang et al. 2017; Wilmer and Chein 2016), we suggest that decisions made on a digital device can lead to lower cognitive involvement and activation of a more automated decision-making system. Thus, consumers should focus more on items that are higher on affect versus cognition.

By drawing from dual processing theories, we add to the growing body of literature in marketing that explores consumer behavior in digital environments and identifies techniques to influence decisions made in these environments (Van Kerckhove and Pandelaere 2018; Shen,

Zhang, and Krishna 2016). Dual processing theories have been a fruitful concept for consumer behavior research (Amsel et al. 2009; Martin and Sloman 2013; Scheibehenne, Miesler, and Todd 2007; Shiv and Fedorikhin 1999). We are investigating the presence of digital technology as a potential way of activating or inhibiting underlying cognitive processes. The findings from this research contribute to our understanding of how the use of technology influences how users interpret different consumption situations.

Technology is omnipresent in consumers' environments and can influence decision-making processes substantially (Brasel and Gips 2014; Huyghe et al. 2017; Shen et al. 2016). This research offers multiple contributions to marketing and consumer-firm interactions in the digital age. To our knowledge, research at the intersection of consumer decision-making and digital environments is limited (Yadav and Pavlou 2014). Specifically, we are investigating how consumers make decisions when digital technology is involved and, hence, we are offering nuanced evidence to address a research gap around technology-enabled decision-making (Yadav and Pavlou 2014).

The emphasis of this research lies on comparing digital menu evaluation and food choice (i.e., menus presented on a screen and orders placed on a kiosk, website, tablet, or smartphone) with analog menu evaluation and food choice (i.e., menus presented non-digitally such as on paper and orders placed in person or marked on paper). While online-ordering kiosks and digital menu displays have the ability to present moving and changing content, we aim to investigate how the presence of technology in a food-ordering context influences healthfulness perceptions and choices while holding other factors (e.g. movement, color, images, and general design) constant.

Given the worldwide concerns associated with obesity, we focus on healthy and unhealthy food choices (Ogden et al. 2014; Seiders and Petty 2013; Wang and Beydoun 2007). Several papers have made meaningful theoretical contributions by investigating decision-making processes in digital environments (Brasel and Gips 2014, 2015; Huyghe et al. 2017; Klesse, Levav, and Goukens 2015; Milkman, Rogers, and Bazerman 2010; Shen et al. 2016). However, these studies investigated the differential impact by types of devices or input methods (e.g. touchscreen devices vs. mouse input). In contrast, we are focusing on digital versus analog (i.e., non-digital) modes of menu evaluation and food ordering and how they influence menu healthfulness perceptions and choices.

Clearly, digital technology can be involved in the decision-making process in a variety of ways. Consumers might order on their phone or computer, from home, or on a device provided in the store. When ordering from a paper menu, consumers might at the same time look up options on their phones. Even when placing an order verbally, by phone, this order is placed using a digital device, i.e., a smartphone. While we investigate a potential "degree" of technology involved in the choice process in one of our studies, for the ease of comparability, we focus on a duality of presence (versus absence) of technology in most studies. This is operationalized by using paper surveys or verbal (in-person and phone) orders versus online surveys conducted on tablet computers.

Findings from our research will be impactful from a policy-maker's perspective. As obesity is a major problem and contributor to health expenses in the United States ("Adult Obesity in the United States" 2017; Ogden et al. 2014), knowing how the presence of technology influences healthful or unhealthful food choices can help identify simple ways to encourage more mindful food decision making among different consumer groups. Therefore, findings from

this research contribute to the growing body of transformative consumer research, which aims to nudge consumers toward healthier lifestyles in non-restrictive ways.

From a managerial perspective, our findings provide information that can help restaurants determine the consequences of increased automation and use of technology in a food context. Companies include technology into their restaurants to automate processes, reduce personnel, and make ordering more accurate (Dabholkar 1996); however, little is known about potential unintended consequences connected to introducing new technologies such as digital menu displays, touch-screen kiosks, check-out tablets, and online ordering applications. Restaurants might introduce modern technology in an attempt to appear more up-to-date, exclusive, and potentially healthier (Kowitt 2016). Currently, we do not know how ordering digitally versus non-digitally influences consumers' healthfulness perceptions of the restaurant's offerings.

The rest of this dissertation is organized as follows. We review relevant literature and introduce our conceptual framework regarding how the presence of digital technology in a food choice process influences healthfulness perceptions and choices by priming consumers' processing styles. We are then reporting the results of nine studies. A field study, a scenario-based lab study, an experiment in a field setting, and two additional lab studies that manipulate the ordering mode demonstrate the main effects. To investigate the underlying process of processing mode, we conducted two studies with different foci. First, an implicit association test was administered to investigate subconscious associations between digital (analog) environments and affect (cognition). Second, in a lab study that manipulated the choice modality, we investigated the mediator using introspection by directly asking participants where their focus was when evaluating a menu. Then, we investigated two potential moderators of the effect: Nutrition involvement (measured as an individual difference) and cognitive load (to manipulate

processing mode). We conclude with a discussion of the results, theoretical and managerial implications, and future research ideas.

THEORETICAL BACKGROUND

Several streams of literature are pertinent to the present research: Digital and analog mechanisms and their relations to food choices, dual processing theories, as well as prior literature connecting dual processing theories with food choices and healthful consumption. We consider these first, then discuss impression management as a potential alternative explanation, and lastly, build our conceptual framework.

Digital versus Analog Mechanisms

As digital environments become a substantial part of our lives, the literature on consumer behavior in online environments using a variety of digital devices is growing (Huyghe et al. 2017; Xu et al. 2017; Yadav and Pavlou 2014). Most consumer researchers in marketing and related disciplines have compared different operating mechanisms within digital environments, including the use of touchscreens (Shen et al. 2016) or the effects of swiping motions (Van Kerckhove and Pandelaere 2018). For example, prior research focused on finding differences in behavior based on the input device being used (Brasel and Gips 2014, 2015; Shen et al. 2016). Research shows evidence that the use of touchscreens (vs. traditional computer mice) leads to a higher choice of indulgent or unhealthy options because consumption can be more easily imagined (Shen et al. 2016). Further, prior research found that ordering online for a later point in

time (vs. for immediate consumption) leads to healthier choices due to a higher perceived psychological distance (Milkman et al. 2010).

Thus far, work that compares digital with non-digital or analog environments is limited. One notable exception is research by Huyghe et al. (2017). The authors find that grocery shopping in the store (vs. online) leads to more indulgent or unhealthy choices because products are experienced more vividly in the store (vs. online). Their focus lies on the representation of the product, being displayed in the store versus being represented by a digital image online. This representation leads to different levels of vividness, with the foods being perceived more vividly in the store. In the present research, no food products are being presented and no images are being used, as the focus lies on investigating the perception of a food menu using descriptive text. Hence, we do not hypothesize different levels of vividness. Klesse, Levav, and Goukens (2015) investigate muscular activity as a difference between orders placed verbally and physically (that is, by pushing a button). They found that placing orders verbally (vs. by pushing a button on a vending machine) leads to more indulgent choices. The researchers argue that the motor movement involved with pushing a button manually would lead to a higher focus on so-called virtue (as opposed to vice) products. Verbal decision making, however, would be more automatic. While their focus lies on motor movement, and their studies do not have a digital component, verbal decision-making plays a role in many food ordering situations. Thus, we ask: would consumers choose more indulgent when placing an order verbally with a server compared to digitally with a device?

Several literature streams outside of marketing investigate computer versus paper-based tasks in general and assess the two modes in regard to comparability. Knowing how individuals process information that is presented digitally (as compared to non-digitally) would help us

understand if consumers might read menus differently depending on the presentation mode. Thus, we draw from the relevant research on learning and survey-taking in digital (compared to analog) environments to explore if consumers read and comprehend information differently if it is presented on a screen or on paper.

Early research on the comparison of digital and non-digital environments focused on the effects of television viewing compared to reading books. Here, researchers found negative effects of television use (Glenn 1994); however, this strongly depends on the quantity and the content (Neuman and Neuman 1988). More recent research focuses on the comparison of computers and books. Is it possible that we approach content on a computer with a different mindset, one that is used to quick and simple facts, and is less conducive to contemplation and attending to information (Carr 2010; Greenfield 2009)?

While some digital technology, namely video games and internet applications, have potential to increase visual intelligence and spatial skills, print media might have benefits fostering critical thinking, deeper processing, and reflection (Greenfield 2009). Research in ergonomics finds that paper-based tasks often outperform computer tasks such that comprehension, reading speed, and accuracy are higher on paper (Noyes and Garland 2008). Similarly, there is evidence that in a survey-taking task, surveys taken on a computer screen are being completed faster than paper surveys (Bodmann and Robinson 2004). Further, research comparing digital and non-digital survey taking modes found that participants in the computer-based condition gave less socially desirable responses and reported riskier behaviors related to alcohol consumption and sexual activities (Booth-Kewley, Larson, and Miyoshi 2007). Research on gaming and computer-mediated simulations found that players of an online game (the digital condition) prioritized more immediate solutions to a health problem while players in an analog

version of the game were prioritizing broader, “big picture” solutions (Kaufman and Flanagan 2013).

Apart from deeper thinking, digital environments seem to influence confidence in one’s abilities. Ackerman and Goldsmith (2011) studied prediction of performance and actual test performance in digital (on-screen) vs. paper environments. When study time was fixed, participants tended to overestimate their performance after studying on a screen. When study time was self-regulated, participants in both conditions overestimated their performance, but those completing the test on a screen performed significantly worse. While these results do not answer how individuals study and perform in digital versus non-digital environments and why they study and perform differently, they show that certain differences exist (Ackerman and Goldsmith 2011). Specifically, reading and studying on a screen led to overconfidence in one’s abilities, but lower test scores.

Wästlund et al. (2005) find that participants who completed a reading task on a computer performed lower on a reading comprehension task than those who completed that same task on paper. The authors suggest that the reason for the differences is related to both psychological and physiological factors. Specifically, it is assumed that the text representation on screen is lower in quality and, thus, leads to lower reading speeds, more time pressure, and lower performance. Additionally, participants in the computer task have to deal with handling the technological equipment in addition to completing the reading task (Wästlund et al. 2005).

In summary, findings from prior research suggest differential performance depending on the task presentation modality. A reader in front of a digital device might approach a task with a different mindset, possibly one that is less conducive to cognitive involvement, comprehension,

and learning. Hence, other tasks consumers complete on digital devices might also be approached with this different mindset.

In general, in this digital age, individuals rely more heavily on technology for immediate access to information and knowledge (Sparrow et al. 2011). In fact, Sparrow et al. (2011) found that individuals who are exposed to difficult questions would then think of terms related to search engines and computers. Hence, the exposure to difficult questions primed participants to think of computers. These researchers coined the term "Google Effect".

The use of digital devices, including mobile devices like smartphones and tablets, has further been linked to instant gratification and a greater inclination to impulsive behaviors (Hadar et al. 2015; Wilmer and Chein 2016; Wilmer, Sherman, and Chein 2017). Hadar et al. (2015) found that heavy smartphone users showed decreased information processing capabilities when compared to a control group. Norman, Tjomsland, and Huegel (2016) suggest that mobile technologies can reduce the perceived distance between individuals (Norman, Tjomsland, and Huegel 2016). Effects of smartphone use on gratification and distance might be amplified for millennials, who are constantly connected through smartphones. These consumers often associate online shopping with higher levels of excitement than in-store purchases (Brickmeetsclick.com 2015). Lastly, modern mobile internet technologies, including smartphones, laptops, tablets, and wearables, are linked to multi-tasking (Kazakova et al. 2015; Wiesenfeld 2015). Multitasking in the classroom has been linked with reduced exam performance. Students who were instructed to use computers during a lecture to browse for additional information consequently received lower final grades (Grace-Martin and Gay 2001). Exposure to more than one medium at a time can lead to higher perceptual load and, subsequently, a more local processing style (Kazakova et al. 2015).

The present research proposes that higher involvement of digital technology in a food ordering process can influence consumers' ways of thinking and subsequent perceptions and decisions. In line with dual processing theories like Cognitive-Experiential Self Theory (CEST), for example, we suggest that higher involvement of digital technology in a food ordering scenario will lead to a higher reliance on the more automatic, affective, and experiential decision system. In turn, consumers are expected to focus more on affective characteristics of food items and evaluate menus accordingly. Next, we will examine the role of dual processing theories in general, and CEST in particular.

Dual Processing Theories

Over the years, many dual processing theories have been developed to explain human decision-making on the basis of two different systems, one more experiential in nature, and one more cognitive in nature. Different terminologies have been used for the two systems at play. However, prior research agrees on some basic differences and key properties. Specifically, decision making happens either in a more automatic and quick way, or more deliberately and slow. Termed "impulsive" and "reflective" systems (Hofmann et al. 2009), these two processing styles work in parallel and interact with each other when decisions are made (Chaiken and Maheswaran 1994; Dhar and Gorlin 2013). Often referred to as a "conflict of the head and heart" (Pacini and Epstein 1999; Shiv and Fedorikhin 1999), consumers face decision problems between the more spontaneous desire (something that feels good) and the more controlled or logical decision (something that is sensible) (Epstein 1998). For example, someone might desire a fast and attractive looking sports car, but might know that a fuel-efficient compact car would

be the more sensible decision. For the purpose of this research, and according to Epstein's (1998) Cognitive-Experiential Self Theory, we refer to the automatic mode of processing as the "experiential" system, and to the more rational processing mode as the "cognitive" system.

According to Cognitive-Experiential Self Theory (CEST), a dual processing theory of personality, the two systems operate in parallel. The experiential system is automatic, holistic, and associated with affect, while the cognitive system operates on a conscious level and is intentional, analytic, and affect-free (Epstein et al. 1992, 1996; Norris and Epstein 2011). As the experiential system requires little cognitive resources and is strongly influenced by past experiences, it is guiding most everyday decisions (Epstein 1998). In essence, the two systems do not only interact, but also occur in a sequential order. That is, in processing any type of information, the experiential system is activated in an initial reaction, perceiving the situation automatically. Then, this initial reaction would be followed by a more deliberate, rational interpretation of the situation, which might override the initial reaction and impulse (Epstein and Pacini 1999; Pacini and Epstein 1999). Thus, each behavior would be a joint function of the two processing modes, resulting in a compromise decision in which the advantages and disadvantages of each system are being weighed (Epstein and Pacini 1999).

This interaction of head and heart decisions has been shown as an individual difference (Norris and Epstein 2011), but has also been linked to decisions made under different levels of involvement or importance (Chaiken and Maheswaran 1994), gambling (Amsel et al. 2009), and self-control (Hofmann et al. 2009).

Dual Processing Theories and Food Choices

In terms of food choices, consumers often face this aforementioned conflict of the heart and the head. Consumers will either act impulsively and choose an unhealthy option that fulfills immediate and more hedonic desires in terms of good taste (Raghunathan et al. 2006), or opt for a healthy food that aligns with long-term goals related to fitness and a healthy lifestyle. For example, when offered a piece of chocolate cake, a person might initially feel an impulse toward the tempting object, but will have a certain level of motivation to maintain a healthier lifestyle or lose weight (Hofmann et al. 2009). The focus of this work is on comparing affective with more controlled choices in a food context. Prior research has established that unhealthy food options such as chocolate cake are linked to positive affect, while healthy food options such as fruit salad are linked to cognition (Shiv and Fedorikhin 1999). When foregoing a more immediately rewarding food, a consumer has to exhibit self-control by overriding the impulse to indulge and making a more deliberate judgment (Hofmann et al. 2009). The faster, impulsive, and intuitive route of decision-making, often called System 1, is based on habits and is difficult to influence and change (Kahneman 2003). Additionally, cognitive resources to override the initial impulse and activate a more controlled decision system are limited (Baumeister 2002; Muraven and Baumeister 2000). Shiv and Fedorikhin (1999) showed that limiting cognitive resources even more, would lead to decisions based on affect, hence leading consumers to favor unhealthier food choices over healthier ones.

Today, many food choices are being made on any type of digital device, such as a smartphone, computer, or kiosk. Using digital technology has previously been linked to faster task completion (Bodmann and Robinson 2004), a focus on immediate rewards (Tang et al.

2017; Wilmer and Chein 2016), and exhibiting overconfident behaviors (Ackerman and Goldsmith 2011). The internet, as a source for immediate access to information (Sparrow et al. 2011), has been associated with constant distractions and more automatic thinking (Carr 2010; Greenfield 2009). When completing a task on a screen, thus, consumers should have a higher reliance on heuristics and schemas, all of which are linked to a more automatic, experiential processing style (Moskowitz, Skurnik, and Galinsky 1999). Based on this assumption, consumers might be resorting to a more experiential processing style when using a digital device, make quicker and more impulse-driven decisions, and find it more difficult to activate a more cognitive processing style to override the initial impulse. Thus, we expect them to be focusing on unhealthier options and, accordingly, exhibit a higher likelihood to choose unhealthier options as well.

We propose that the exposure to some degree of technology in the form of a mobile device, a computer, or an ordering kiosk (as compared to a person or a piece of paper) would increase reliance on the experiential system, leading to a more automatic and less thorough decision-making process. When this experiential system is activated, decisions are being made on impulse, with a focus on positive past experiences and what "feels good" (Norris and Epstein 2011). As unhealthy foods are generally associated with pleasant taste they are also related to positive affect (Hofmann et al. 2009; Raghunathan et al. 2006; Shiv and Fedorikhin 1999). Hence, a consumer who is making a decision based on the experiential system would focus more on food items that give immediate gratification and reward characteristics such as taste and enjoyment (Fujita 2008; Gardner et al. 2014). Drawing on the literature and dual processing theories, we hypothesize the following:

H1. Ordering food through a digital (vs. non-digital) mode enhances focus on the unhealthfulness of items and enhances choice of unhealthy items.

H2. Ordering food through a digital (vs. non-digital) mode leads to higher reliance on the experiential (vs. cognitive) system, which mediates the effects of food ordering mode on focus on unhealthfulness of the items and food choice.

In H2, we propose that reliance on an experiential processing mode would mediate the effect of ordering mode on both focus on unhealthy properties of the food and food choice. Building on existing literature related to food perceptions of unhealthfulness and tastiness (Raghunathan et al. 2006), we assume that a focus on the taste (versus health) dimensions of the food would also drive choice of such items. Therefore, we further postulate the following serial mediation effect:

H3. The effects of ordering food through a digital (vs. non-digital) mode on food choice are serially mediated by higher reliance on the experiential system and focus on unhealthful characteristics of the food such that ordering mode → processing mode → focus on unhealthful items → food choice.

Nutrition Involvement as Moderator of the Effect

Previous research shows that the extent to which consumers are using a more experiential versus cognitive processing style might be an inherent trait; however, one that might change with age (Epstein and Pacini 1999). Emotional involvement can also shift the balance between the

two systems accordingly (Epstein 1998). Hence, not all consumers might be influenced equally by the technological interface in the food ordering process.

Specifically, some consumers might be more involved and more knowledgeable in terms of nutrition than others (Chandon and Wansink 2007). In terms of food choices, it can be expected that these consumers generally make more deliberate and controlled food choices by employing a more thorough processing style. This more deliberate processing should enable higher levels of willpower (Metcalfe and Mischel 1999). Therefore, individuals with a focus on a healthy lifestyle and high nutritional involvement are expected to choose healthier independent from ordering mode.

Another argument could be made to support this hypothesis. Individuals high on nutritional involvement might be drawing from past experiences and stable habits to choose healthy. According to CEST, past experiences and habit guide the experiential processing system (Norris and Epstein 2011). That is, even under automatic processing, individuals who always choose healthy will go for this option based on healthy habits without having to deliberate over the decision. Formally:

H4. The effects of ordering mode on food choice will be moderated by nutrition involvement. Individuals with high nutrition involvement choose healthier independent from ordering mode.

Dual Processing Theories and Cognitive Load

Dual processing theories suggest that reasoning and the use of a more cognitive (versus experiential) processing style would be more effortful and, thus, slower (Epstein 1998; Kahneman and Frederick 2005). Exhibiting this effort is only possible when cognitive resources are available. Cognitive load, that is, the effort of using currently available memory resources, would limit availability of such resources and impair deliberate decision-making. Thus, individuals who have a high cognitive load and reduced available cognitive resources would resort to a more automatic and fast decision-making style (Pocheptsova et al. 2009). This, in turn, should lead to choices higher on an affective dimension (Shiv and Fedorikhin 1999).

For example, in order to be able to self-regulate behavior, individuals need to have cognitive resources available. Prior research has postulated that self-control resembles a muscle (Hung and Labroo 2011). Essentially, exhibiting self-control requires energy and can lead to self-control depletion (Baumeister 2002). Hence, using this muscle will lead to less willpower and should result in choosing vice foods (Hung and Labroo 2011). While Labroo et al. (2011) manipulated available self-control resources physically through muscle-flexing, Shiv and Fedorikhin (1999) limited available resources by inducing cognitive load through a memory task. This popular way of manipulating cognitive load is done by asking participants to memorize a longer number (usually 10 or 12 digits) versus a shorter number (usually two digits). Later in the experiment, participants will then be asked to recall that number (McFerran et al. 2010; Shen et al. 2016; Shiv and Fedorikhin 1999; Shiv and Nowlis 2004). Cognitive load can also be induced by giving an auditory task, for example, asking participants to count the numbers of times a letter is spoken on a tape while completing the focal task (Raghubir and Krishna 1999).

We expect that consumers will focus on unhealthy and affective properties of food items when ordering digitally. The fewer digital devices are involved in the decision-making process, the more individuals should use a cognitive decision-making style and, therefore, focus on healthier foods. However, we expect to find this effect only when cognitive resources are fully available. When putting participants under a high cognitive load, limiting their available resources, they should make decisions based on a more experiential or automatic process, independent from the ordering mode. Thus, the previously hypothesized main effects should get attenuated.

Formally stated:

H5. The effect of ordering mode on focus on unhealthfulness of the items and food choice will be moderated by cognitive load. Under low cognitive load, ordering food through a digital (vs. non-digital) mode enhances focus on the unhealthfulness of items and unhealthy choices. Under high cognitive load, the effect will get attenuated.

Alternative Account: Impression Management

When comparing orders placed digitally (through a computer, kiosk, or touchscreen mobile device) with orders placed non-digitally (on paper or in person), several additional differences can be established. Prior research has investigated online orders from an impression management and social presence perspective.

Impression management is the process by which individuals control the impression others form of them (Leary and Kowalski 1990). One possible way to engage in impression

management is through certain types of behaviors, including food consumption (Mori, Chaiken, and Pliner 1987). In the presence of a peer or a potential romantic interest, individuals are more aware of their actions and behave in a socially desirable way (Mori et al. 1987; Pliner and Chaiken 1990; Polivy et al. 1986).

Prior research has documented that ordering online (versus in person) leads to ordering of a higher number of items and with higher total calorie count (McDevitt 2012). One possible explanation behind this phenomenon is a higher degree of perceived anonymity afforded by online ordering (Suler 2004). Orders placed in person include the social presence of another individual, while digital orders are based on machine interaction. Theories related to social presence and social proof highlight how the presence versus absence of others impact consumers' decisions (Goldstein, Cialdini, and Griskevicius 2008; Wood and Hayes 2012). Ordering on the phone or in person implies some form of social interaction with another human being, which in turn might lead to impression management behaviors and dietary restraints (Argo, Dahl, and Manchanda 2005; Polivy et al. 1986). In contrast, being able to act with a higher level of perceived anonymity in an online environment enhances disinhibition (Biswas et al. 2017; Suler 2004). Disinhibition, in turn, leads to unhealthier food choices and higher body mass indices (Bryant, King, and Blundell 2008). This provides some evidence that online ordering (as compared to verbalized or phone orders) might lead to unhealthier food choices overall.

The results predicted by an impression management account should be comparable to those predicted under dual processing theories: A social presence in an in-person food ordering process might lead to healthier food choices. When ordering online, on the other hand, a higher level of perceived anonymity should lead to disinhibition and indulgent food choices (Biswas et

al. 2017; Suler 2004). The present research aims at ruling out impression management behaviors as an explanation for the effect of food ordering mode on subsequent food choices.

OVERVIEW OF STUDIES

We conducted a set of nine studies, with two of these studies being in the field and seven being in the lab, to test H1- H5. Study 1 is a field study based on a restaurant data set and looks at actual food choices made by restaurant patrons, comparing online orders with in-store orders. Study 2 is a study based on an ordering scenario and shows initial main effects on differences in menu perceptions, but not in choices. Study 3a is a between-subjects main effects study that manipulates three ordering modes: Orders placed on a smartphone, orders placed on a tablet computer (digital ordering modes), and orders placed in person (non-digital ordering mode). Here, we investigate the main effects on menu healthfulness perceptions and choice and find support for the hypothesized main effect. Study 3b replicates the main effect on menu healthfulness perceptions without a prior choice using a different menu, and Study 3c replicates the main effect in a field setting, that is, in a restaurant with the excerpt of an existing restaurant menu. Then, in Study 4, we are investigating the underlying process through an Implicit Association Test (IAT). Results provide evidence that underlying associations of digital environments with an automatic and experiential decision-making process exist. Study 5 is testing the proposed mediation effects by manipulating the ordering modes and asking participants directly about their thoughts while making the choice and evaluating the menu. Here, we are comparing orders placed on a computer (digital ordering mode) with orders placed on a paper survey (non-digital ordering mode), thus, ensuring anonymity of the choice. The purpose of Studies 6 and 7 is to examine the effects of two moderators: Nutrition involvement

and cognitive load. Additionally, in Study 6, participants make real food choices instead of hypothetical food orders from a restaurant menu. Figure 1 shows the complete conceptual framework, and table 1 provides an overview of all conducted studies and their contributions to the model.

Figure 1: Conceptual Framework

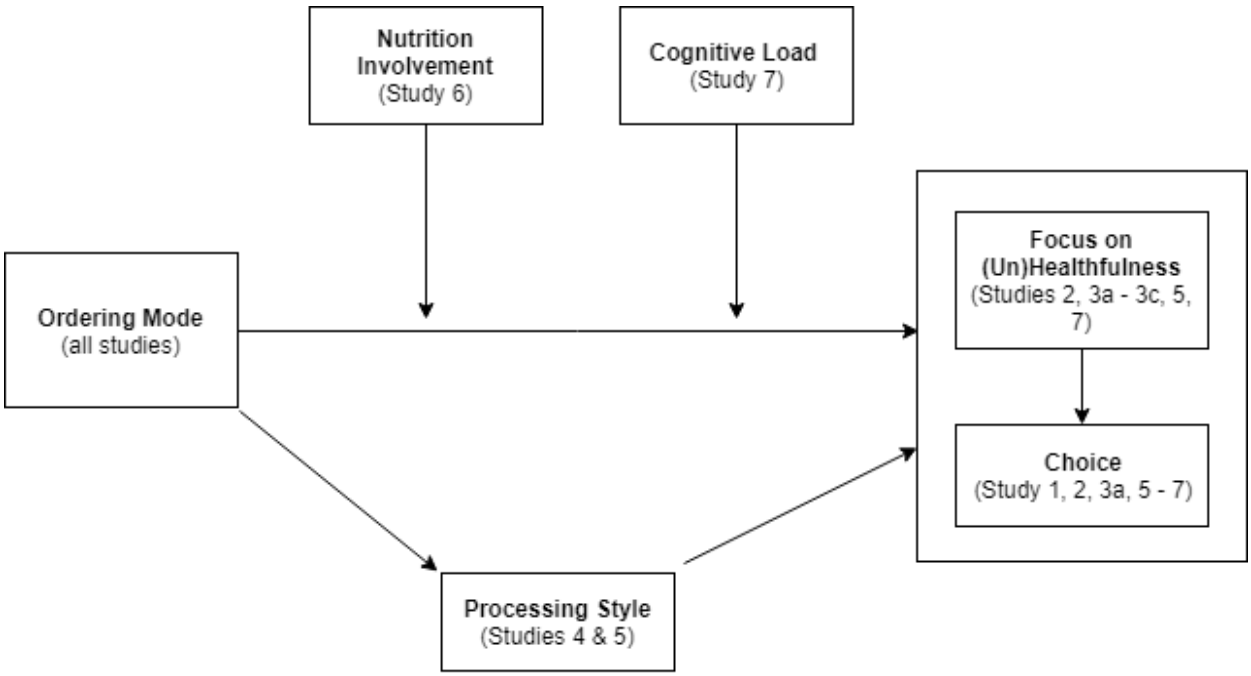


TABLE 1: STUDY OVERVIEW

Study	Type	Design	Results	Hypothesis tested
Study 1	Field	In-Store vs. online (not manipulated)	Online orders (compared to in-stores orders) contain more unhealthy items.	H1
Study 2	Lab	In-Store vs. online (scenario based, between subjects)	Online ordering scenario leads to imagination of a more unhealthful menu (no effects on hypothetical choice).	H1
Study 3a	Lab	In Person vs. Phone Call (digital) vs. Tablet (digital) between-subjects design	Higher percentage of unhealthy orders in digital ordering modes, higher perceived menu unhealthfulness in digital ordering modes.	H1
Study 3b	Lab	Paper (non-digital) vs. tablet (digital) between-subjects design	Directionally higher perceived menu unhealthfulness in digital ordering mode, without prior choice.	H1
Study 3c	Field Setting	Paper (non-digital) vs. tablet (digital) between-subjects design	Higher perceived menu unhealthfulness in digital ordering mode for existing menu.	H1
Study 4	Lab, IAT	Digital only	Mental associations are stronger between digital environments and words related to feelings.	H2
Study 5	Lab	Paper (non-digital) vs. tablet (digital) between-subjects design	Processing mode (measured as focus on affective food characteristics) mediates the effect of ordering mode on both unhealthfulness perceptions of the menu and choice. Found evidence for a serial mediation of ordering mode --> processing style --> unhealthfulness perceptions --> choice.	H1, H2, & H3
Study 6	Lab	Paper (non-digital) vs. tablet (digital) between-subjects design	Nutrition involvement moderates the effect, such that individuals with nutrition involvement of 4.6 and higher (measured on a 7-point scale) are choosing healthier foods independent from the ordering mode.	H4
Study 7	Lab	2 (ordering mode: Paper vs. tablet) x 2 (cognitive load: high vs. control) factorial design	High cognitive load moderates the effect of ordering mode on menu healthfulness perceptions. Under a high load, effects get attenuated.	H5

STUDY 1: FIELD STUDY AT A MAJOR RESTAURANT CHAIN

Study 1 was a field study conducted in collaboration with a major casual dining chain, which has over 1000 locations across several countries. While lab studies have several benefits (such as facilitating controlled environments), field data can demonstrate consumers' real behaviors in actual purchase scenarios. Further, it allows us to investigate data from a longer time period, such as over the course of a week, compared to a lab study, which usually lasts a few minutes. The purpose of this study was to investigate if the mode of ordering (digitally/online or in-person/in-store) might influence the type of food chosen, in terms of healthfulness. Clearly, as this study is using field data, we do not know how restaurant patrons evaluated the menu - digitally, on the restaurant's website or app, or non-digitally on a paper menu in the store or at home. However, we know if the order was placed with a higher degree of digital technology involved (online orders) or a lower degree of digital technology involved (ordering in person and in the store).

The study was a quasi-experiment since we cannot manipulate the mode through which actual customers are placing their orders. The data was retrieved from one outlet in the U.S. and spanned over a period of seven days in August 2018. The timeframe was determined by the retailer. The dataset includes itemized sales for each of the seven days and comprises over 65,535 items, including food, beverage, modifiers, discounts, and special prices. The independent variable (ordering mode) had two conditions (online vs. in-store orders). Modifiers, specials, as well as bar and drink orders were excluded. Several specials were "in store" specific

and online orders did not include alcoholic beverages. Our analysis, therefore, focuses on food orders only.

Each food item was then coded on healthfulness. Two independent coders, who were unaware of the hypothesis and experimental conditions, received an alphabetized list of all the items. They rated each menu item on two variables: Type of item (food, drink, neither) and healthfulness of the item (healthy, unhealthy, neither). The independent coders used their individual judgment in categorizing and rating the menu items. Intercoder reliability was 88% on the classification of food items, and 81% on healthfulness judgment. Disagreements were then resolved through discussion. When no agreement was possible in terms of healthfulness, the item was coded as "neither" and was excluded from the analysis. For example, items like grilled chicken, salmon, vegetables, and salad were coded as healthy. Large steaks, desserts, and fried items were coded as unhealthy. Smaller size steaks (6 ounces) and large salads with high calorie amounts (such as a steak salad) were coded as neither healthy nor unhealthy. For the final analysis, we did not use any of the items that were categorized as neutral in terms of type or healthfulness. Only items that could clearly be identified by healthfulness levels were included in the analysis. The analyzed dataset comprises 21,989 items. About 6% of all items were part of online orders. A full list of items and their coding into healthy, unhealthy, and neutral can be found in Appendix A.

Results and Discussion

The data revealed results in line with our expectations. Overall, online orders had a higher percentage of unhealthy items than orders placed in the restaurant (61% vs. 58%; $\chi^2 =$

4.084, $p = .043$). Further, the data could be analyzed by type of order, as orders were either placed in the restaurant, at the bar in the restaurant, for delivery, or for take-out ("to go" orders). Type of order also influenced the percentage of healthy items ordered, such that delivery orders included the highest percentage of unhealthy items (64.0%), followed by bar orders (59.9%), take-out orders (58.6%) and restaurant orders (57.6%). While the type of order overall had a significant influence on healthfulness of the order ($\chi^2 = 16.68$; $p = .001$), within the delivery and take-out orders, the ordering modality (online vs. in the store or by phone) did not significantly influence the healthfulness of the order.

Next, in order to be able to control for extraneous variables, we examined these effects in a series of lab studies.

STUDY 2:

SCENARIO-BASED CHOICE AND MENU HEALTHFULNESS EVALUATION

In Study 1, we examined field data and found preliminary evidence that consumers who order online order a higher number of unhealthy (vs. healthy) items, and that orders placed for delivery (versus in the restaurant itself) contain a larger percentage of unhealthy items. The purpose of Study 2 was to investigate if participants who think about an online ordering experience (as compared to an ordering process in the restaurant) would focus on different items on a menu in terms of healthfulness, resulting in differences in perceived menu healthfulness and food choice (H1).

Design, Participants, Procedure

Study 2 was a between-subjects experiment with two manipulated conditions (online ordering experience vs. in-store ordering experience). Four hundred ninety participants (46% female, average age 22) participated in this online study for extra credit. The survey link was provided by email and surveys were taken outside of the lab at the participants' own time.

Participants were randomly assigned to one of the two survey conditions and were instructed to read a short scenario ($n_{\text{in-store}} = 244$, $n_{\text{online-order}} = 246$).

In the "in-store" condition, participants read the following:

Imagine the following scenario. It is evening and you are hungry. You have no food at home, so you decide to eat out. You go to a restaurant that you like. A server brings you a menu and you hold it in your hands. You look at the different options. Then, you decide on a food item. The server comes over and you place your order by telling the server what you want.

In the "online-ordering" condition, participants read the following:

Imagine the following scenario. It is evening and you are hungry. You have no food at home, so you decide to order food. You go to your computer and find the website of a restaurant that you like. You click on the menu on the restaurant's website. You look at the different options. Then, you decide on a food item. You select the item you like and place your order.

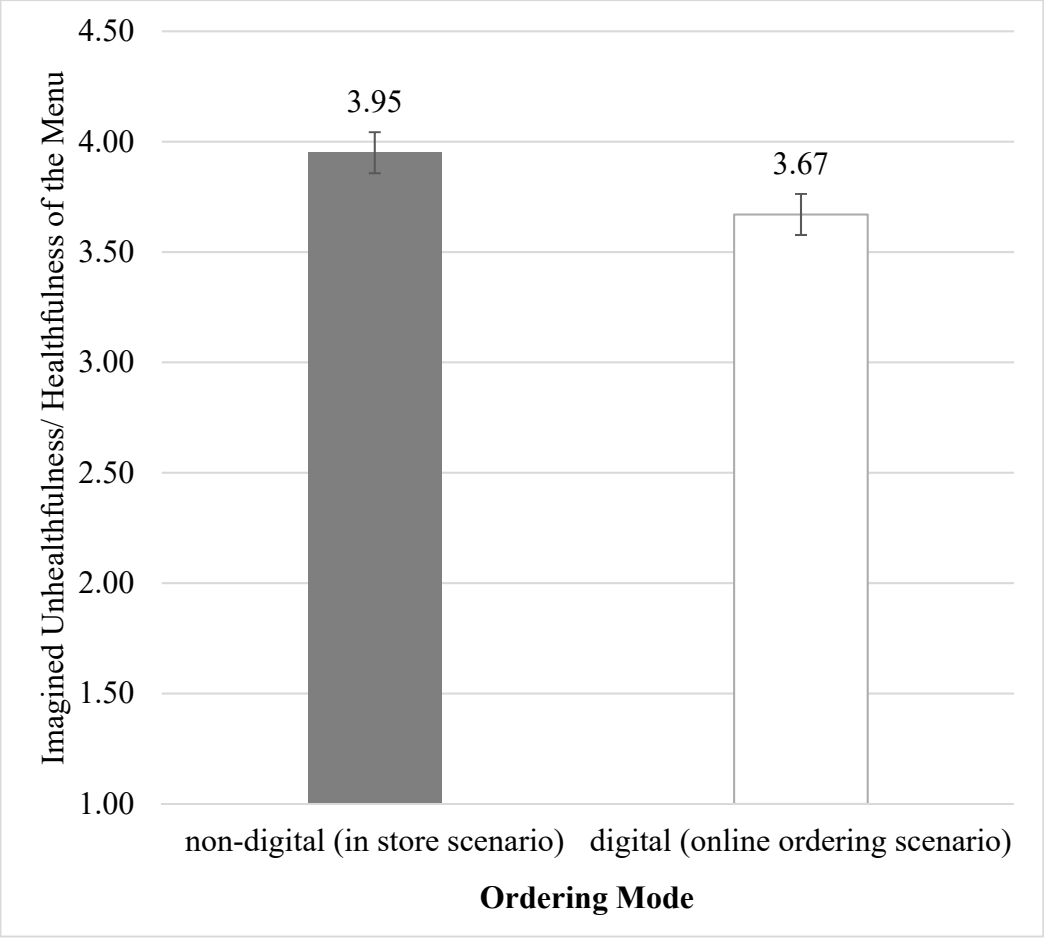
Then, participants were asked to answer the following two questions: "How unhealthy/healthy do you think your order would be?" (1= Very Unhealthy, 7= Very Healthy) and "How unhealthy/healthy did you imagine the menu to be?" (1= Very Unhealthy, 7= Very Healthy).

Results and Discussion

We conducted an ANOVA with order scenario as the independent variable, and expected order healthfulness as the dependent variable. In terms of their order, participants generally thought they would order something slightly unhealthy (M = 3.69, SD = 1.70). Directionally, participants who imagined the digital ordering process would have chosen somewhat unhealthier, however, the differences were not significant (M_{digital} = 3.64 vs. $M_{\text{non-digital}}$ = 3.75; $F(1, 488)$ = .49, $p > 0.05$). Interestingly, a second ANOVA with menu healthfulness perceptions as the

dependent variable revealed that participants imagined the menu to be significantly less healthy in the digital ordering scenario as compared to the in store (non-digital) ordering scenario ($M_{digital}$ = 3.67 vs. $M_{non\text{-}digital}$ = 3.95; $F(1, 488) = 4.52$, $p = 0.034$). See figure 2 for a graphical representation of the results. Error bars in all figures indicate standard errors.

Figure 2: Results for Study 2, Scenario-Based Perceptions of (Un-)Healthfulness by Ordering Modality



The results from this study provide some preliminary evidence that consumers might approach a digital ordering experience with a different frame of mind. However, as this was a scenario-based experiment, participants might be imagining completely different types of restaurants offering different food items in terms of healthfulness. The scenario indicated that the restaurant had a server, which rules out certain self-service and fast-food restaurants. Hence, participants might imagine the restaurant to be healthier for other reasons. Therefore, Studies 3a through 3c were conducted as lab experiments controlling for the type of restaurant and using different menus. Specifically, we used a dinner menu in Study 3a and a dessert menu in Study 3b. Additionally, in Study 3c, we aim to replicate the main effect in a field setting with the excerpt of an existing restaurant menu.

STUDY 3A:

MAIN EFFECTS OF ORDERING MODE ON FOOD CHOICE AND MENU HEALTHFULNESS PERCEPTIONS

The purpose of Study 3a was to investigate the hypothesis that participants who order digitally (vs. non-digitally) would evaluate the menu with a more experiential processing style, thus focusing on more immediately gratifying menu items, which should influence general menu healthfulness perceptions. In this study, instead of reading a scenario, the involvement of digital technology in the ordering process was manipulated. Additionally, instead of imagining a restaurant menu, participants were seeing a restaurant menu on a digital device or on paper. To investigate H1, participants in this study evaluated the menu and subsequently made a hypothetical choice from the same menu.

Pretest

In this study, we used a menu with four relatively healthy and four relatively unhealthy food options (see Appendix B). We conducted a pretest to determine that these food options differed in perceived healthfulness. Thirty five MTurk workers participated in the pretest in exchange for a small payment. We showed each menu item on a separate screen and asked "How unhealthy/healthy is the food item?" (1 = Very Unhealthy, 7 = Very Healthy). The unhealthier items ($M_{\text{Fish\&Chips}} = 2.59$, $M_{\text{Wings}} = 2.81$, $M_{\text{Mac\&Cheese}} = 2.29$, and $M_{\text{FriedChicken}} = 2.71$) were

perceived as significantly unhealthier than the healthier items ($M_{GrilledFish} = 5.71$, $M_{Salad} = 6.10$, $M_{VeggieDip} = 6.06$, and $M_{GrilledChicken} = 5.71$).

Design, Participants, Procedure

Study 3a was a between-subjects experiment with three manipulated conditions (online order, smartphone order, or in-person order). Two hundred twenty-one undergraduate students (52% female, average age 21) participated in exchange for course credit. A restaurant menu was used that featured eight items; four unhealthy items and four healthy items (see Appendix B for the menu showing the list of the menu items). Participants were asked to make a choice from the menu. The exact same menu was used for all three conditions. A logo for a fictional restaurant was created and included in the menu to make it appear more realistic.

In the online condition, participants were handed a touch-screen tablet computer with the menu provided on the screen. Then, participants made a choice within the online survey. In the smartphone condition, participants were given a hard copy menu and were asked to walk to the other end of the room and placed an order over the phone (i.e., verbally). The phone, an Apple iPhone, remained connected to a confederate who was taking orders in a different section of the building. To make the ordering process as realistic as possible, the confederate's name in the phone was changed to the name of the restaurant (True Kitchen). After placing the order on the phone, participants returned to their seats and completed the survey on a touch-screen tablet.

In the in-person ordering condition, participants were also given a hard copy of the menu. In this condition, the confederate (the same confederate employed for the smartphone condition) took orders in the front of the lab. The confederate wore a server's apron, a plain white t-shirt,

and held a notepad to note down the orders to make the ordering process as realistic as possible. After placing the order, participants returned to their seats and completed the survey on a tablet. In both the smartphone and in-person conditions, participants were handed a participant ID upon entering the room. This participant ID was used to connect the phone and in-person orders to the survey responses. While all surveys were completed on a touchscreen device, the main dependent variable was the choice from the menu in one of the three examined ordering modes.

The menu items were coded into four healthy and four unhealthy choices in line with the pretest results. See Appendix B for a visual representation of the menu. After making their choice, participants were asked to evaluate the menu healthfulness on two items: "How unhealthy/healthy are the food items on the restaurant menu?" and "The items on the menu, in general, seem to be". Both items were measured on a 7-point scale (1 = Very Unhealthy and 7 = Very Healthy) and combined for the analyses ($\alpha = .92$).

Due to the different online ordering modalities and the need for students to get up and place orders in person or on the phone, we were not able to randomly assign students to a condition. Instead, groups of students were randomly assigned to conditions. In order to minimize potential confounds related to day of the week and time of the day, sessions were spread over two different weekdays and their timing was randomly decided.

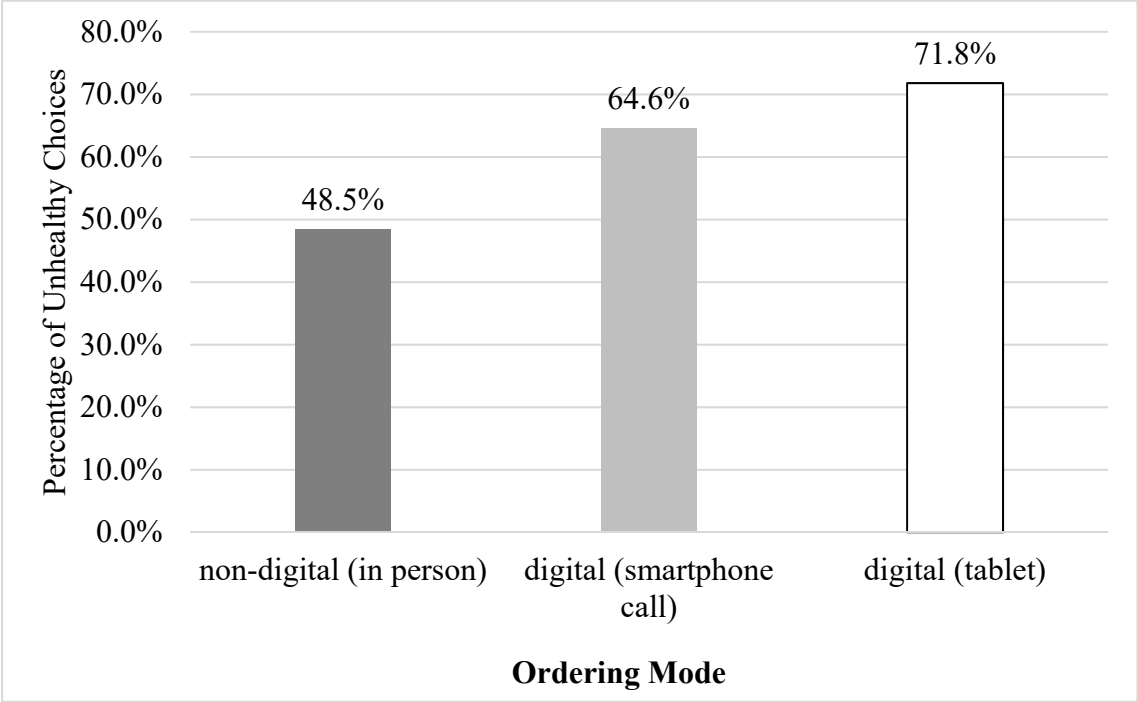
Results

Three participants were excluded from the analysis. Two participants in the phone condition were not able to place an order on the phone due to language insecurities. One other

participant in the phone condition failed to leave an identifiable number with their order, consequently, the order could not be tracked.

The final dataset for analysis consisted of two hundred eighteen orders (n_{person} = 68, $n_{smartphone}$ = 79, n_{tablet} = 71). Consistent with our theorizing, participants ordered unhealthier items when ordering digitally (both online or using the smartphone) compared to in person orders (Proportion of unhealthy foods in person = 49%, on the phone = 65%, online = 72%). We found significant differences both between the in-person and phone conditions (48% vs. 65%; $\chi^2 = 3.83$, $p = .05$) as well as the in-person and online conditions (48% vs. 72%; $\chi^2 = 7.89$, $p = .005$). No significant difference could be found between the two digital ordering processes (smartphone and online, 65% vs. 72%; $\chi^2 = .91$, $p > .05$). See Figure 3 for a graphical representation of these results.

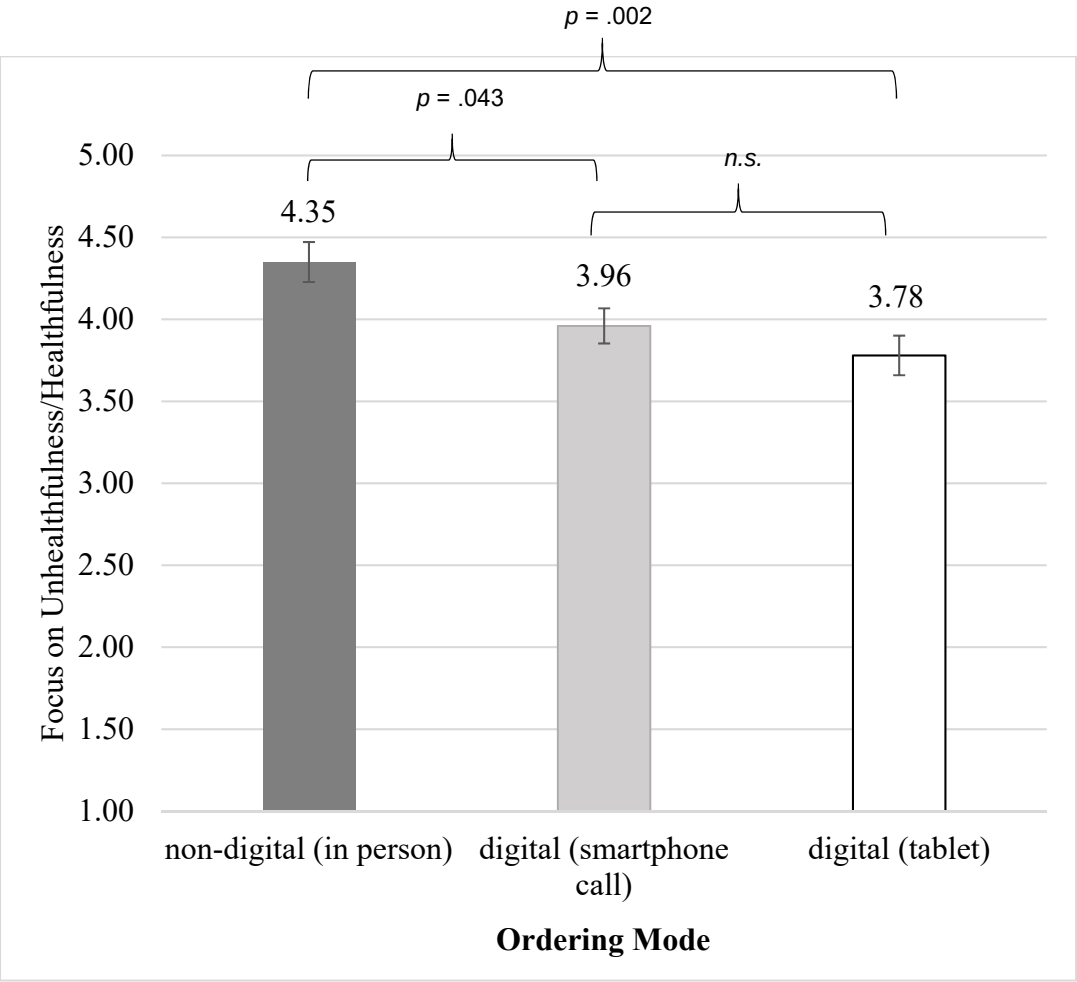
Figure 3: Results for Study 3a, Percentage of Unhealthy Choices by Ordering Modality



Further, we found differences in the healthfulness perception of the menu across the conditions ($F(2, 215) = 6.18$, $p = .002$). As expected, the menu was perceived as healthier in the in-person ordering situation as compared to the digital ordering situations. The results of a post-hoc test (Tukey's HSD test) show a significant difference between both the in-person and the smartphone conditions ($M_{\text{in-person}} = 4.35$, $M_{\text{phone}} = 3.96$; $SE = .164$, $p = .043$) and the in-person and online conditions ($M_{\text{in-person}} = 4.35$, $M_{\text{online}} = 3.78$; $SE = .168$, $p = .002$). Again, no statistically significant difference could be found between the smartphone and online conditions ($M_{\text{phone}} = 3.96$, $M_{\text{online}} = 3.78$; $SE = .162$, $p > .05$). Interestingly, the menu was only presented digitally in the online condition. Both for the in-person and the phone orders, participants evaluated the healthfulness based on a hard copy of the menu. See Figure 4 for a graphical representation of these results.

The results from this study show that in both conditions that involved a digital device in the ordering process (a touchscreen tablet and a smartphone), participants chose relatively unhealthier and perceived the (same) menu to be relatively unhealthier. As the menu was chosen to be neither healthy nor unhealthy (four items of the menu were healthy, and four items were unhealthy), it could be expected that most participants would choose the scale midpoint when asked about perceived healthfulness. In fact, in the smartphone condition, participants rated the menu as neither healthy, nor unhealthy. Similarly, looking at the sample overall, the mean is right at the scale midpoint ($M_{\text{healthfulness}} = 4.02$, $SD = 1.01$). We did not find statistically significant differences between the smartphone and online-ordering conditions. However, directionally, the results reveal that individuals seem to choose slightly healthier in the phone (vs. online) condition and perceive the menu to be slightly healthier. This might imply that there is a degree of technology involvement that influences perceptions and choices.

Figure 4: Results for Study 3a, Focus on (Un)Healthfulness of the Menu by Ordering Modality



Impression Management as Alternative Explanation

One could argue that impression management plays a role in the food choices made by participants, because of the social presence of a confederate in the phone and in-person conditions. However, if impression management had been the reason for the results, we should have found significant differences between the phone and online conditions. Additionally, due to the set up in the lab, both in the phone and in-person conditions, other participants in the same

session were able to overhear the items ordered by their peers. In consequence, the phone condition should have revealed results similar to the in-person condition. In all following studies we compare a paper-based choice with an online choice, ensuring anonymity across conditions.

Discussion

The results from Study 3a support H1. Individuals who use a digital device such as a smartphone or a touch-screen tablet to order food items (vs. ordering in person) focus more on foods high on an affective dimension and, thus, perceive the same menu as less healthy. Additionally, individuals who make a choice on a digital device choose unhealthier foods. Next, Study 3b will show the main effect on menu perceptions without making a choice. Additionally, in study 3b, we are comparing online orders with those orders placed on paper. Doing so will make both conditions equally anonymous thereby eliminating potential impression management behaviors.

STUDY 3B:

DIGITAL VERSUS PAPER MENUS AND MAIN EFFECT ON MENU PERCEPTIONS

In Study 3a, we investigated food choice and menu healthfulness perceptions within the same study. Making a choice before evaluating the menu could have influenced how participants rated the healthfulness of the menu they saw. The goal of Study 3b, therefore, was measuring menu perceptions separately without instructing participants to also make a choice from the menu.

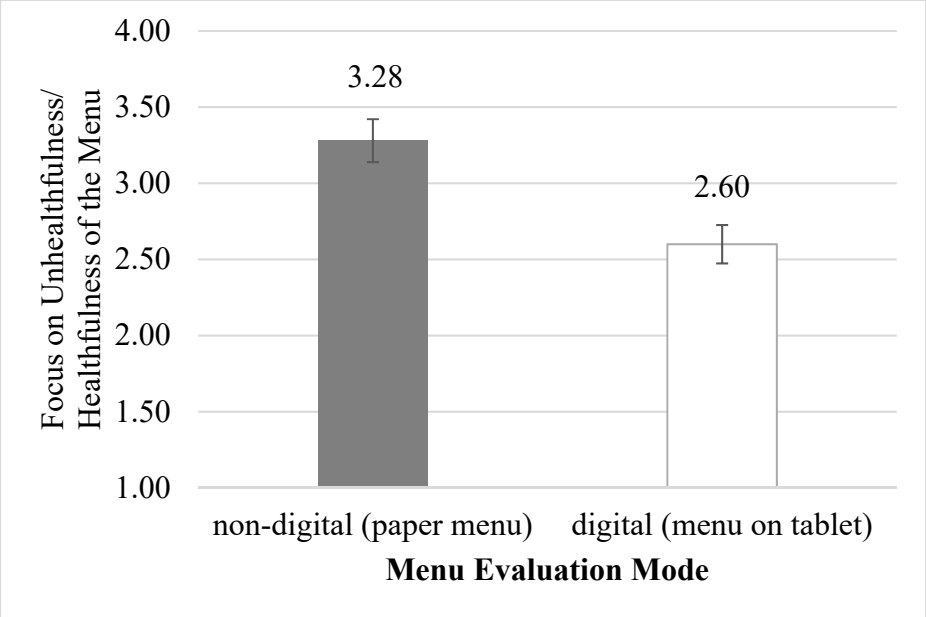
Design, Participants, Procedure

Eighty-two undergraduate students (30% female, average age 22) from a major US university participated in the study for extra credit. Groups of participants were randomly assigned to complete the survey on a tablet computer or on paper. Participants were shown a dessert menu (see Appendix C). Just like the menu used in Study 3a, the dessert menu had four healthy and four unhealthy options. Participant in the digital condition viewed the menu within the Qualtrics survey. Participants in the paper condition viewed the menu printed on paper. Then, they were asked to rate the menu items in terms of healthfulness (How unhealthy/healthy are the items on the food menu? 1 = Very Unhealthy, 7 = Very Healthy).

Results and Discussion

Participants who indicated dietary restrictions (such as allergies and vegetarianism) were removed from the analysis, leaving a final sample of seventy-two (n_{paper} = 32 and n_{tablet} = 40). Overall, as this menu was a dessert menu, it was perceived as relatively unhealthy, as the mean was below the scale midpoint (M = 2.84, SD = 1.62). We found that, directionally, participants who viewed the menu digitally perceived it to be unhealthier than those participants who viewed it on paper (M_{online} = 2.60, M_{paper} = 3.28). However, results were not significant at the 95% level ($F(1, 70) = 3.24$, $p = .076$). First, this shows robustness of our effect, as differences in healthfulness perceptions were found for a different menu. Second, this rules out concerns regarding order effects such that a prior choice might influence what type of food items individuals might focus on. Please see figure 5 for a graphical representation of the results.

Figure 5: Results for Study 3b, Focus on (Un)Healthfulness of Menu Items by Evaluation Modality



STUDY 3C:

DIGITAL VERSUS PAPER MENUS AND MAIN EFFECT ON MENU PERCEPTIONS IN A FIELD SETTING

The goal of Study 3c was to show the main effect in a field setting. While Studies 3a and 3b employed fictitious restaurant menus, we used an excerpt from an existing menu in Study 3c. Further, participants were restaurant patrons who were in the store to place or pick up a food order. Hence, they were all familiar with the restaurant's menu and offerings. The study was being conducted in collaboration with a locally owned pizzeria with one location. The pizzeria has been in business since April 2015.

Design, Participants, Procedure

Eighty-two restaurant patrons (42% female, 32% between 18 and 24, 43% between 25 and 34, 21% between 35 and 44, and 4% 45 and older) participated in exchange for a $5 online gift card to redeem at the restaurant. The study was conducted over three weeks. Participants waiting for their food orders were approached by a member of the staff and randomly handed either a paper survey with a printed excerpt of the restaurant's menu, or a tablet with an online survey that contained the same menu excerpt as a color image. The excerpt included eight popular menu items and used the restaurant's logo and colors. See Appendix D for an image of the menu used for the study.

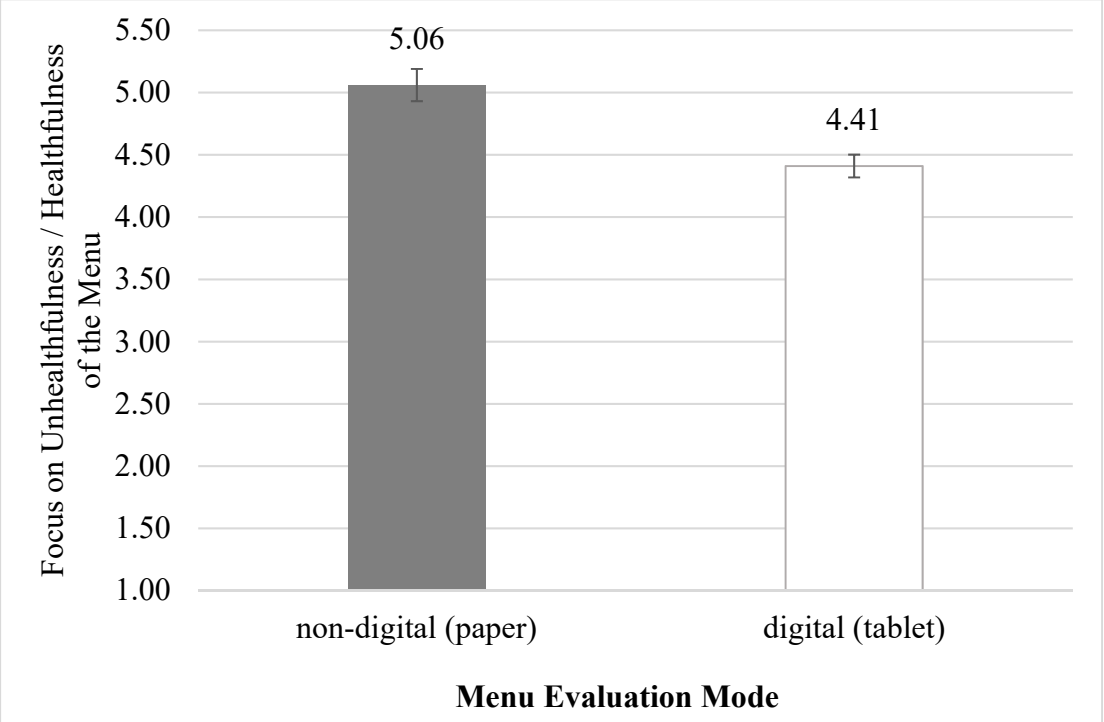
Restaurant patrons were asked to rate the menu items in terms of healthfulness "How unhealthy/healthy are the food items on the restaurant menu?" and "The items on the menu, in general, seem to be". Both items were measured on a 7-point scale (1 = Very Unhealthy and 7 = Very Healthy) and combined for the analyses ($\alpha = .90$). Afterwards, they indicated their age and gender and left an email address if they chose to receive an e-gift card as a reward.

Results and Discussion

Ten participants who failed the attention check were excluded from the analysis. Interestingly, only participants completing the survey digitally failed the attention check. All participants in the paper condition passed the check. The final analysis was conducted with a sample of seventy-two responses ($n_{paper} = 35$ and $n_{tablet} = 37$). Overall, the menu was perceived relatively healthy, which is a surprise given the fact that, except for one salad, the items on the menu excerpt were rather unhealthy ($M = 4.72$, $SD = 1.37$). However, as participants were actually consuming food at this restaurant, they were likely hesitant to admit that they chose to eat at an unhealthy food outlet.

Importantly, we found that participants who viewed the menu digitally perceived it to be less healthy than those participants who viewed it on paper ($M_{paper} = 5.06$, $M_{online} = 4.41$). An ANOVA with display mode as independent variable and menu healthfulness perceptions as a dependent variable revealed that this difference was significant ($F(1, 70) = 4.29$, $p = .042$). See figure 6.

Figure 6: Results for Study 3c, Focus on (Un)Healthfulness of Menu Items by Evaluation Modality



STUDY 4:

IMPLICIT ASSOCIATION TEST: ASSOCIATING DIGITAL VERSUS ANALOG WORDS WITH EXPERIENTIAL OR COGNITIVE DIMENSIONS

The purpose of Study 4 was to investigate the association between digital devices and an experiential processing style. We used an Implicit Association Test (IAT) first, to evaluate if implicit associations between the concepts exist and, second, to evaluate the strength of existing associations. The advantage of conducting an IAT is that it captures subconscious associations. Thus, participants' introspection is not required. If the processing style (experiential versus cognitive) is the underlying process of the effect, then we predict that participants in the IAT would associate terms related to an experiential thinking style with digital environments, and terms related to a cognitive thinking style with analog processes.

The IAT measures reaction time and thereby assesses the strengths of associations between concepts. It has been used in research in psychology (Bar-Anan, Liberman, and Trope 2006) and marketing (Lee et al. 2014, 2017; Raghunathan et al. 2006) to show how strongly two concepts are related. The idea is that the task would be easier for items that are consistent with one's associations, and that this would be evident by a faster categorization speed. For example, if participants associate digital environments with feelings (versus thoughts), then the word "emotional" should be faster to be categorized with the target combination "digital / feelings".

Pretest

We conducted a pretest to identify labels for use during the IAT. Twenty-four undergraduate students participated in the pretest in exchange for extra credit. Participants were shown a series of 18 words (pencil, letter, paper, book, internet, screen, computer, email, notepad, offline, website, desk, postcard, electronic, mouse, online, sheet, and physical) and were instructed to categorize each of those words on a sliding scale ranging from "digital" (=1) to "analog" (=10). Based on the pretest results, we decided to use three pairs of words representing digital and analog environments. To elaborate, we selected paper (M = 7.38), offline (M = 5.75), and book (M = 6.33) as exemplars for analog environments, and internet (M = 1.79), online (M = 1.67), and computer (M = 2.00) to represent digital environments. The word offline by itself was rated close to the scale midpoint (representing neither digital / nor analog). The mean 5.75 was not significantly different from 5.00 ($t(1, 23)= 1.01$, $p > .05$). However, it was chosen because the words were representing pairs of opposites and in the IAT it would appear as an opposite to the word "online".

We also selected the stimulus words emotional, fast, and pleasure as exemplars for the anchor term "feelings" and rational, slow, and reason as exemplars for the anchor term "thoughts" based on descriptors used to explain the two systems in research on cognitive-experiential self-theory (Epstein and Pacini 1999).

Design, Participants, Procedure

During the IAT, stimuli (i.e., words or images) are presented on the screen in seven blocks, five of which are practice blocks to familiarize participants with the target words and labels. Participants are instructed to put their fingers on the "E" and "I" key on their keyboard. Then, in each trial, they see the stimulus on the screen in the practice blocks, two target words (in our case, "digital" and "analog" for target words "A" and "feelings" and "thoughts" for target words "B") appear in the top left and right corners (counterbalanced). Words related to these concepts appear in the middle of the screen and participants are asked to categorize these words using the "E" (=left) and "I" (=right) keys.

The IAT for this study was built using the iatgen application (Carpenter et al. 2018). In line with standard IAT guidelines, the IAT built with iatgen for Qualtrics has four permutations. These permutations guarantee counterbalancing to eliminate order effects. See Appendix E for a table of the different IAT rounds describing the four permutations in detail. Iatgen provides researchers with an application that allows both building an IAT and analyzing the data within the interface. The online application creates a Qualtrics survey file that can be imported into an online survey and customized accordingly. See Appendix F for Screenshots of the Instructions and one round of the IAT.

Participants were completing the task in class on their own laptop computers. The survey was created to prevent mobile access. That is, participants accessing the survey from a mobile device without a full keyboard were redirected to an "end of survey" message and instructed to open the survey from a different device such as a desktop computer or laptop computer.

Participants were instructed not to talk while completing the task and to complete it as fast and accurately as possible.

Results and Discussion

Forty-two undergraduate students (45% female, average age 21) participated in the study in exchange for extra credit. The data was cleaned in line with previous research and established guidelines (Greenwald, Nosek, and Banaji 2003). Two participants were dropped due to excessive speed. Specifically, they responded in less than 300 milliseconds for 10% or more of the trials (Greenwald et al. 2003). This leaves a final sample of forty participants for subsequent analysis.

We found that the mean response time categorizing the exemplars correctly was shorter in compatible blocks that paired "digital" with "feelings" and "analog" with "thoughts". D-scores, measuring the difference between the response times during critical tries, were calculated such that a higher, positive D-score indicated faster response time (and stronger associations) for compatible rounds. A negative D-score, then, would imply faster response times for incompatible rounds (pairing analog with feelings). The difference between response times in compatible and incompatible rounds was positive and significant as the mean D-score was different from zero ($M_d = .16$, $SD_d = .45$; $t(39) = 2.25$, $p = .03$). The fact that individuals were significantly faster categorizing the compatible rounds suggests that individuals subconsciously associate the two concepts (digital environments and an affective dimension). Cohen's *d* was .36, indicating a small to moderate effect. The recorded mean differences and Cohen's *d* are comparable to association tests previously reported in the marketing and consumer behavior literature (Lee et al. 2014; Rozin et al. 2012).

While the IAT is exploring underlying, subconscious associations in the minds of individuals, in Study 5, we measured the mediator by asking participants directly how their thought process was while evaluating the menu.

STUDY 5:

DIGITAL VERSUS PAPER ORDERS AND

MEDIATING EFFECTS OF EXPERIENTIAL PROCESSING MODE

The purpose of Study 5 is threefold. First, we aim to replicate the main effects that participants order unhealthier and evaluate a menu to be less healthy when ordering digitally (vs. non-digitally). Second, while we used a confederate in Study 3a to replicate an "in-person" ordering situation, Study 5 follows the procedure of Study 3b and compares paper orders with online orders. As in Study 3b, this should eliminate potential impression management behaviors, as choices do not have to be directly communicated to another person. Third, Study 5 aims at investigating the underlying process of the finding. Would participants who order digitally focus more on the enjoyment and taste dimensions of the food item and, thus, order more unhealthily?

Design, Participants, Procedure

Study 5 was a between-subjects experiment with two experimental conditions (digital ordering mode vs. non-digital ordering mode). 75 undergraduate students participated in this study in exchange for course credit (52% female, average age 23). Seven students who reported dietary restrictions and two students who did not follow instructions (they took the survey twice) were excluded from the analysis, leaving a final sample of 66 (n_{online} = 29 and n_{paper} = 37).

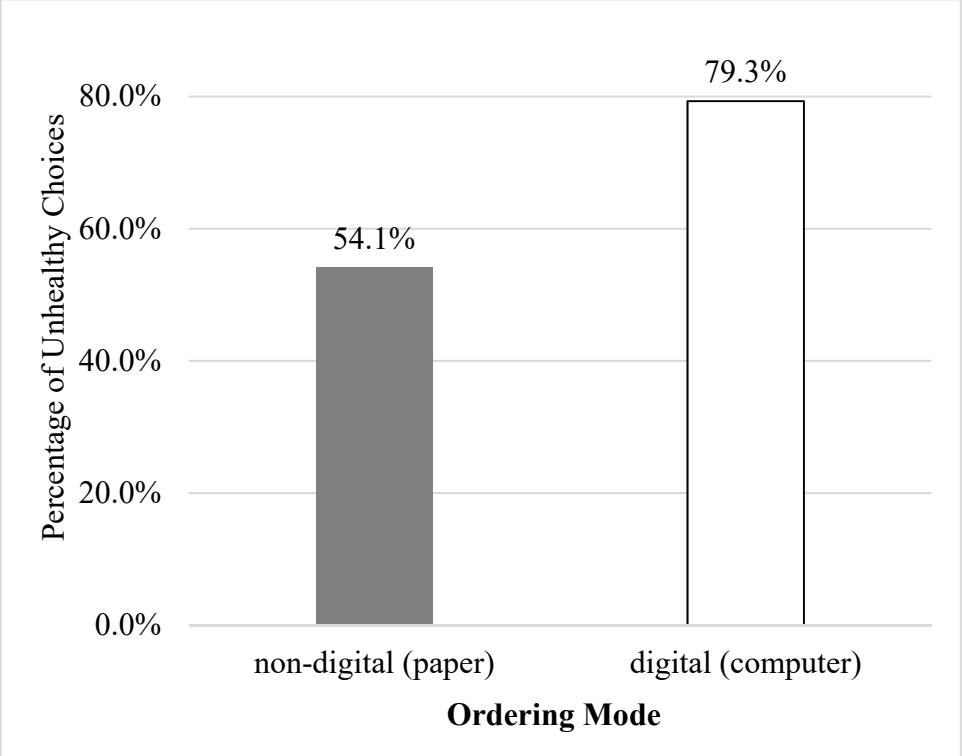
Participants in the digital ordering mode condition were given a link to a Qualtrics survey and used their own devices at their own time. To hold the size of the menu as consistent as possible across the different conditions, we only allowed devices with a large enough screen size, that is, participants were not allowed to complete the survey on a smartphone. From the survey, they were led to an online ordering system that the researchers set up using an online ordering template from WordPress. We used the same menu items as in Study 3a, but a different menu design and restaurant name ("Open Eatery"). Participants looked at the menu, selected one of the eight items (four healthy, four unhealthy), and completed a short check-out process. See Appendix G for the menu used in this study and a list of the healthy and unhealthy food items. No payment or personal information was required to check out. In order to link the online order to the Qualtrics survey, Qualtrics generated a unique participant ID that was entered during the check-out process on the website. After successfully completing the online order, participants closed the tab and returned to the Qualtrics survey. Then, they answered the same questions about healthfulness perception of the menu used in Study 3a ("How unhealthy/healthy are the food items on the restaurant menu?" and "The items on the menu, in general, seem to be" with 1 = Very Unhealthy and 7 = Very Healthy). Next, participants answered two questions related to their thoughts of the food-ordering process (How were your thoughts while you were evaluating the menu? 1= Enjoyment-oriented, 7= Health-oriented and 1= Taste-oriented, 7= Nutrition-oriented). The two questions were combined ($\alpha = .91$) (Gardner et al. 2014).

In the non-digital ordering mode, participants were given the same tasks on paper surveys in class. They were handed a print-out of the online menu in color to evaluate and were asked to mark their choice on the paper survey. The menu was printed in landscape format in order to ensure that it would closely resemble the online menu.

Results

In the paper-survey condition, 54% of participants ordered one of the unhealthy food items. In the online-ordering condition, 79% of participants ordered one of the unhealthy food items ($\chi^2 = 4.57$, $p < .05$; See figure 7). In line with the results found in Studies 3a-c, we found that participants in the paper condition evaluated the menu items to be healthier than participants in the online-ordering condition ($M_{paper} = 4.34$ vs. $M_{online} = 3.66$; $F(1, 64) = 5.80$, $p = .019$).

Figure 7: Results for Study 5, Percentage of Unhealthy Choices by Ordering Modality



Test of Mediation

To test for the underlying process (H2), we conducted a mediation analysis with order mode as the independent variable and choice as the dependent variable; Participant's processing mode was measured on two items: focus on enjoyment or taste (= affective) versus focus on health or nutrition (= cognitive). The items were combined to an index which served as the mediator. We used SPSS Macro Model 4 with 5,000 bootstrap samples to generate a 95% confidence interval, where mediation occurs if the CI excludes zero (Hayes 2013). The indirect effect was significant (B = 1.51, SE = 1.27; 95% CI = [.02, 3.55]). The direct effect of the mediation (that is, the effect of the independent variable on the dependent choice variable when including the mediator) was not significant (B = .62, SE = .772; 95% CI = [-.89, 2.14]), indicating full mediation.

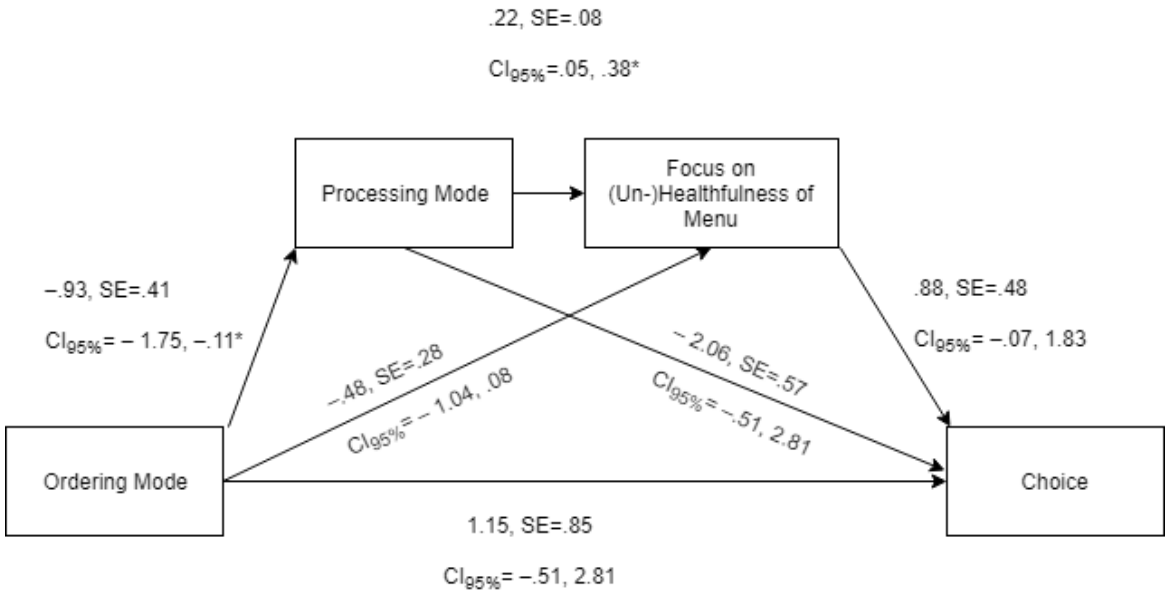
Next, we tested for mediation using healthfulness perception of the menu as dependent variable and participant's processing mode (enjoyment/taste vs. health/nutrition) as the mediator. Again, the indirect effect was significant (B = -.20, SE = .12; 95% CI = [-.54, -.03]), because the CI excludes zero. Also, the direct effect was not significant (B = -.48, SE = .28; 95% CI = [-1.04, .08]). These results support our hypothesizing in H2.

Test of Serial Mediation

In H3, we hypothesized serial mediation such that a focus on taste and enjoyment characteristics of the food, which shows a more experiential processing mode, would influence focus on unhealthier food items, and in turn, lead to unhealthier choices.

We performed a serial mediation test using Hayes's Model 6 with ordering modality as the independent variable, focus on enjoyment and taste (versus health and nutrition) and focus on menu unhealthfulness measured as menu perceptions as mediators (in that sequential order) and food choice as dependent variable. The serial indirect mediation effect was significant at 95% (B= 1.92, SE = .18, 95% CI = [-.73, -.01].) as the CI excludes zero. Again, the direct effect when controlling for the two mediators was not significant (B = 1.15, SE = .85, 95% CI = [-.51, 2.81]. See figure 8 for a representation of the mediation model and the results for individual paths. See Appendix H for the PROCESS output.

Figure 8: Study 5, Serial Mediation Results



Discussion

The results from Study 5 provide evidence for the underlying process. Ordering through a digital device (vs. non-digitally) primes a focus on the affective dimensions of the food, such as

taste and enjoyment (vs. the cognitive dimensions of health and nutrition). The results are consistent with the idea that the focus on enjoyment and taste triggers unhealthier food choices in an online environment. Further, participants perceive the online menu to be less healthy. Findings from Study 5 support the proposed model and underlying process hypothesized in H2 (mediation) and H3 (serial mediation).

We found evidence for a serial mediation account, such that the differential ordering mode (digital vs. on paper) triggers an affective processing mode, which leads to a focus on unhealthfulness of a restaurant menu, which, in turn, leads to unhealthier food choices. These findings align with prior research on processing mode and affective dimensions of food items (Raghunathan et al. 2006; Shiv and Fedorikhin 1999). Next, Study 6 aims at investigating one of two moderators, that is, nutrition involvement.

STUDY 6:

REAL FOOD CHOICES IN A DIGITAL VERSUS NON-DIGITAL CONTEXT AND NUTRITION INVOLVEMENT

Not all consumers are expected to be influenced equally by the technological interface in the food ordering process. Results from the field study show that, overall, online orders included a higher proportion of unhealthy items. However, some consumers might be more involved in nutrition and generally more focused on long-term health goals (Chandon and Wansink 2007). As previously mentioned, a more cognitive processing style is related to greater self-control and a higher likelihood to focus on long-term benefits like a healthy lifestyle (Fujita et al. 2006; Fujita and Han 2009). Therefore, individuals who exhibit a focus on healthy eating would generally adopt a more long-term perspective and might be less likely to change this focus in digital environments.

The purpose of Study 6 is twofold. First, we plan to gain more insights into the underlying process by investigating nutrition involvement as a potential moderator. In previous studies, we find that placing an order digitally (vs. non-digitally) leads to a stronger focus on immediate taste and enjoyment-goals (versus health and nutrition). Individuals who focus on healthy eating (and long-term benefits) should be less susceptible to subconscious priming by digital environments. A focus on long-term goals related to a healthy lifestyle should, therefore,

attenuate the results. Second, while our previous lab studies had hypothetical food choices from a menu, in Study 6, we let participants choose a food item for consumption.

Design, Participants, Procedure

Seventy undergraduate students (48% female, average age 21) from a major US university participated in exchange for course credit. The experiment had two factors. The first factor was mode of ordering (paper-based versus digital), which was manipulated between-subjects (n_{paper} = 35, n_{tablet} = 35). Participants in the digital food choice condition were given a link to a Qualtrics survey, while participants in the non-digital food choice condition received a paper survey. In both survey versions, participants completed a categorization task. The second factor was nutrition involvement, which was measured by asking participants to rate the extent to which they agree to the following three statements: "I watch how much I eat", "Eating healthily is important to me", and "I pay attention to calorie information" (1= Strongly Agree, 7= Strongly Disagree). These items were combined to form an index of nutrition involvement.

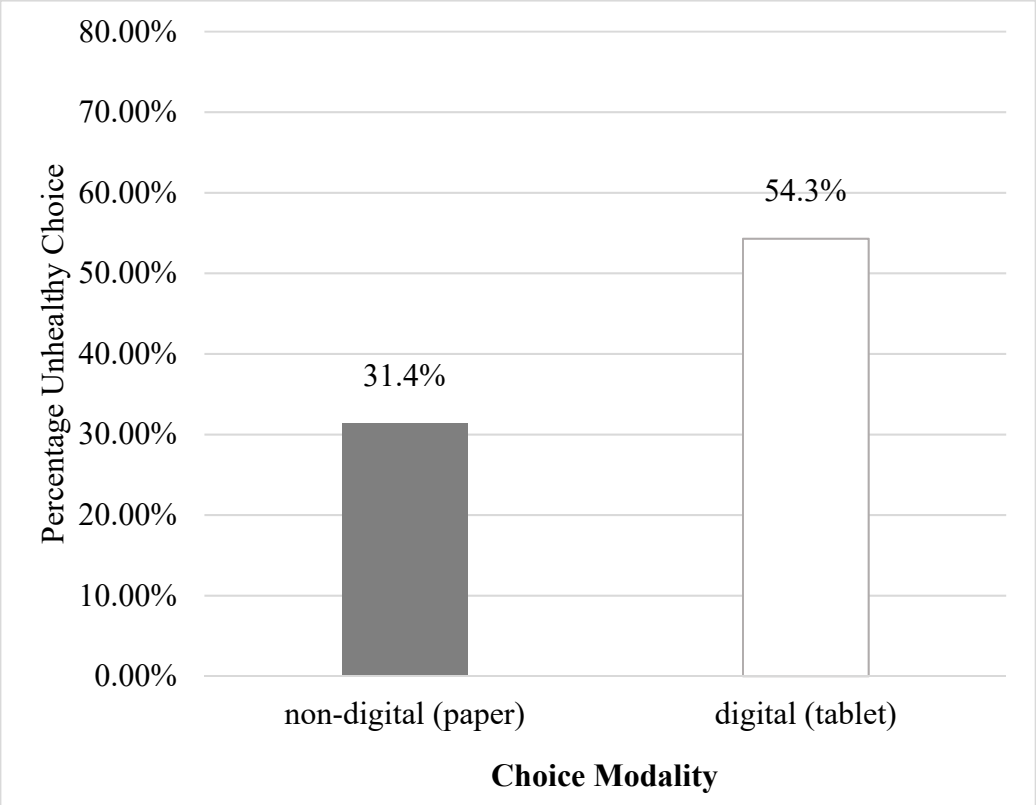
After the survey, participants were instructed that they would receive a snack item as a gift for participation. They chose one out of a list of four snacks, two healthy (100 calorie pack of almonds, KIND fruit snack) and two unhealthy ones (Snickers chocolate bar, Cheetos single serve bag). Healthy and unhealthy snack items were pretested with 35 MTurk workers in terms of healthfulness perceptions (How unhealthy/healthy is the food item? 1 = Very Unhealthy, 7 = Very Healthy). The Snickers and Cheetos packages were rated as significantly unhealthier than the almonds and KIND fruit snacks ($M_{Snickers}$ = 1.97, $M_{Cheetos}$ = 2.03, $M_{Almonds}$ = 5.97, $M_{Fruitsnack}$ = 5.29). Participants in the paper condition made their choice on the paper survey, while

participants in the online condition marked their choice within the survey. Upon showing the tablet or paper survey to the researcher, they received the snack of their choosing.

Results

When making a snack choice after completing the task on a digital device (vs. on paper), participants were more likely to choose one of the two unhealthy options (54.3% vs. 31.4%, $\chi^2 = 3.733$, $p = .05$). See figure 9 for a graphical representation of these results.

Figure 9: Results for Study 6, Percentage Unhealthy Choice by Choice Modality



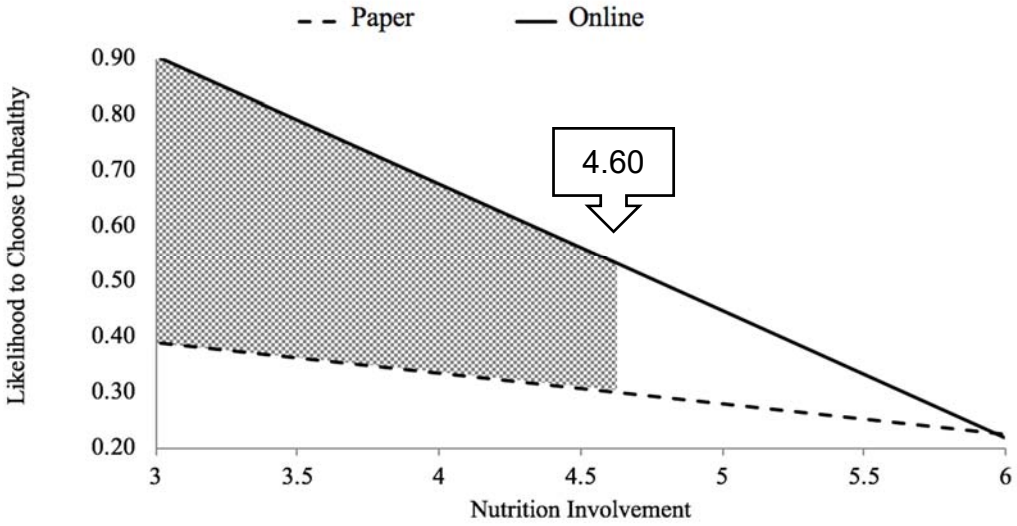
Floodlight Analysis

To investigate potential moderating effects by nutrition involvement, which can take on values between 1 and 7, we conducted a floodlight analysis using the Johnson-Neyman technique comparing the two choice modalities (Spiller et al. 2013). The results of PROCESS Model 1 (Hayes 2013; Preacher and Hayes 2008) showed a marginally significant interaction effect of healthy eating goals and ordering modality (B = -.887, SE = .467, z = -1.90, p = .058.). However, the effect of ordering mode on unhealthy food choice was significant for participants with lower levels of nutrition involvement. Specifically, when healthy eating goals are very low (i.e., 3.00) participants are more strongly affected by the ordering modality (B = 2.52, SE = .927; z = 2.72, p < .01), but when healthy eating goals are very high (i.e. 6.33), these effects no longer exist (B = -.43, SE = .993; z = -.434, p > .05). The effects get attenuated for individuals who reported their nutrition involvement to be higher than 4.60 (Johnson-Neyman significance point). Figure 10 graphically presents these results and the significance region below 4.60.

Discussion

The findings from Study 6 provide support for H4. While the choice modality overall plays a role in food choices, participants who generally exhibit high nutrition involvement are likely to choose relatively healthier independent from the choice modality.

Figure 10: Study 6, Floodlight Analysis Results



STUDY 7:

DIGITAL VERSUS NON-DIGITAL ORDERS AND THE MODERATING EFFECTS OF COGNITIVE LOAD

The purpose of Study 7 was twofold. The primary goal was to investigate the underlying process in greater depth (H2) and to examine cognitive load as a potential moderator of the effects (H5). If the underlying process is related to a higher investment of cognitive resources in a non-digital food choice situation (and a higher reliance on automatic processes in a digital environment), then limiting cognitive resources should attenuate the results. Specifically, limiting cognitive resources has been shown to lead to a higher reliance on affective characteristics of foods, and thus, a preference for foods high on this dimension, such as chocolate cake (Shiv and Fedorikhin 1999). Thus, we expect that limiting cognitive resources in non-digital environments would also lead to a focus on unhealthy choices and lower healthfulness perceptions of the overall menu, which, in turn, should lead to unhealthier choices.

Second, research on temporal discounting of decisions found that consumers act in accordance with the so-called immediacy effect and generally prefer immediate rewards over a more valuable reward in the future (Read and Van Leeuwen 1998). Therefore, for present consumption, consumers should have a tendency to choose an indulgence over a virtue. However, when making an advance choice for a food item (to be received in the future), participants choose healthier. In a similar vein, Milkman et al. (2010) find that consumers order a higher percentage of healthy items like vegetables when they order for delivery in the future as

compared to ordering foods for immediate consumption (Milkman et al. 2010). Similarly, research supports the idea that individuals exert greater self-control for decisions that lie in the future (Fujita et al. 2006; Laran 2010). Thus, in Study 7, we tested the idea that consumers would be more likely to choose something unhealthy for immediate consumption and something healthy for later consumption, if they were asked to make two choices. We expected for this pattern to arise independent from the ordering mode.

Design, Participants, Procedure

Study 7 was a 2 (ordering mode: digital vs. paper-based) x 2 (cognitive load: high vs. low/control) x 2 (time frame: now vs. tomorrow) mixed design, with the last variable manipulated within subjects. Two hundred forty-four undergraduate students (51% female, 47% male, 2% non-binary or preferred not to say, average age 21) participated in exchange for extra credit. To avoid hypothesis guessing, ordering mode and cognitive load were randomized by session. Participants were signing up for 15-minute sessions. These sessions were conducted in a lab. In the digital ordering mode sessions, participants were given a tablet computer and were shown the menu within the survey on the device. We used the same restaurant menu as used in Studies 3a and 5, with a slightly different logo and design (see Appendix I for the menu used in this study). In the paper-based ordering mode conditions, participants were handed a paper survey and a print-out of the restaurant menu in color.

For half of the sessions, we manipulated cognitive load through a digital multitasking exercise. During the high cognitive load sessions, we played a video showing an excerpt of a

documentary about the FYRE festival. This documentary was released on streaming services a week before the study, hence, this content was timely and of interest to students.

Participants in the digital condition were exposed to different content on two screens at the same time (the documentary on a large screen in the front of the room and the survey on the tablet they were using), while participants in the analog condition were exposed to the video while attending to the paper survey. Resources were, therefore, divided between the two media. During digital multitasking, participants have to rapidly switch from one task (i.e., watching the video) to another (i.e., attending to and completing the digital or paper survey) (Brasel and Gips 2011). Task switching has been associated with switching costs, which result in higher load in working memory (Kazakova et al. 2015; Liefooghe et al. 2008; Yeung and Monsell 2003). We decided to manipulate cognitive load with a multitasking assignment as this reflects a realistic setting in a food choice context, such as attending to a food menu while watching a sports game or other entertainment content on a screen.

The video was shown on a large screen in front of the room, with the volume on a medium level. In the "high load" sessions, participants were told that, besides evaluating a restaurant menu, we were also investigating their multi-tasking abilities. Thus, they were instructed to pay attention to the video playing on the screen in the front of the room while also answering the survey. Their surveys contained two additional questions related to the documentary.

In all of the low-load (=control) conditions, no video was playing, and the surveys did not include any additional questions. Participants in these conditions were instructed to fully concentrate on taking the survey. Participants in all conditions were instructed to answer all questions in the order provided in the survey and not to skip ahead.

First, participants were instructed to make a choice from the provided restaurant menu. Then, participants were told they get to make a second choice from the menu. This second choice was to be made for a take-home item to eat for lunch the next day. Hence, each participant made two sequential food choices.

As in previous studies, participants were then asked two questions about healthfulness perception of the menu ("How unhealthy/healthy are the food items on the restaurant menu?" and "The items on the menu, in general, seem to be" with 1 = Very Unhealthy and 7 = Very Healthy). Answers to these questions were combined to an index ($\alpha = .80$).

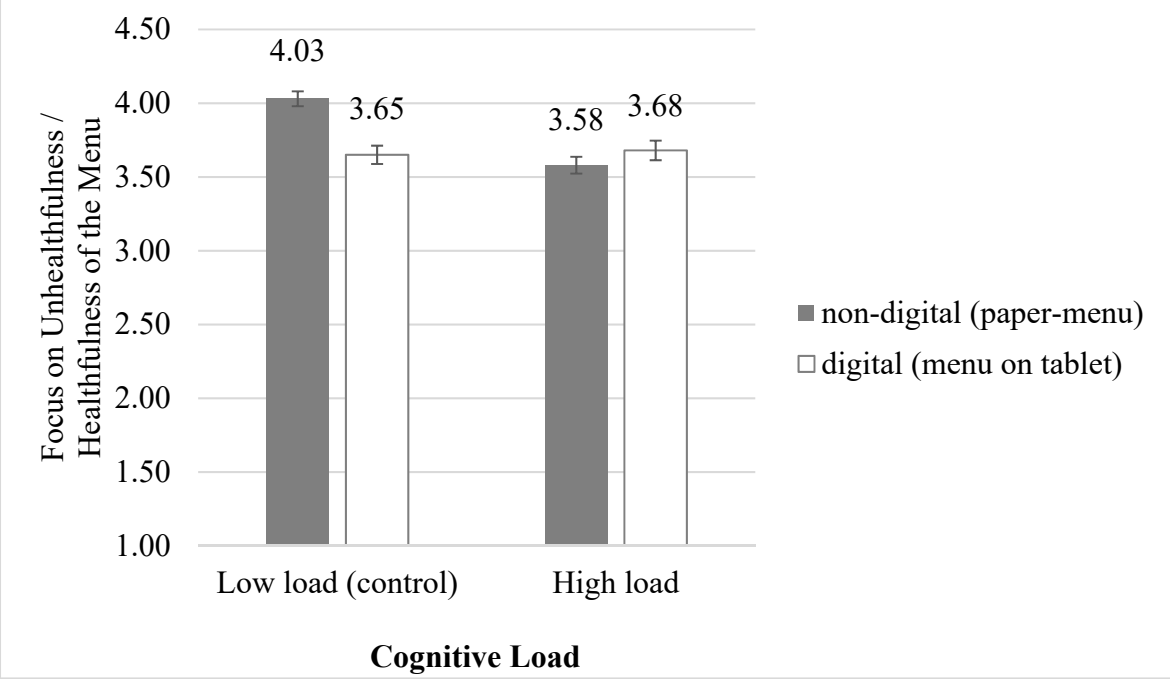
Results

One person was excluded from the analysis because the person indicated that s/he was intermittently fasting and, thus, not eating. Five participants in the paper conditions did not follow instructions and selected more than one item from the menu. Their answers on the perceptions of the menu were still included in the analysis, leaving a final sample of two hundred forty-three ($n_{paper\_high} = 59$, $n_{paper\_low} = 59$, $n_{tablet\_high} = 62$, $n_{tablet\_low} = 63$). For the choice analysis, the final dataset included two hundred thirty-eight responses, because multiple selections of items could not be coded into healthy or unhealthy ($n_{paper\_high} = 57$, $n_{paper\_low} = 56$, $n_{tablet\_high} = 62$, $n_{tablet\_low} = 63$).

In order to test our prediction that the effects of ordering mode on focus on unhealthfulness of the menu would get attenuated under high cognitive load, we conducted an ANOVA with ordering mode and cognitive load as the independent variables, and healthfulness perceptions of the menu as dependent variable. The results showed a significant interaction effect

of ordering mode and cognitive load ($F(1, 239) = 3.976$, $p = .047$). As expected, within the digital ordering mode, the menu was perceived equally unhealthy, as participants focused on the food items high on affect ($M_{digital\_control} = 3.65$ vs. $M_{digital\_high} = 3.68$; $F(1, 123) = .023$, $p = .88$). However, in the paper-based ordering mode, a higher cognitive load led to higher unhealthfulness perceptions of the menu ($M_{paper\_control} = 4.03$ vs. $M_{paper\_high} = 3.58$; $F(1, 116) = 7.879$, $p = .006$). These results provide support for the moderation effect hypothesized in H4. Additionally, comparing the mean healthfulness perceptions by ordering mode within the low load (= control) conditions, we were able to replicate the main effect. In a digital ordering mode, consumers evaluate a restaurant menu to be relatively unhealthier ($M_{paper\_control} = 3.65$ vs. $M_{paper\_control} = 4.03$; $F(1, 120) = 4.205$, $p = .042$), thus providing additional support for H1. See figure 11 for a graphical representation of the interaction effect.

Figure 11: Results for Study 7, Cognitive Load Moderating the Effect on Healthfulness Perceptions of the Menu



Additionally, we examined the choices made for immediate versus for later consumption. As choice was measured within subjects, we used a Generalized Estimating Equations (GEE) procedure. The GEE methodology allows for categorical repeated measures in within-subjects designs (Senecal and Nantel 2004). The dependent variables were "choice now" and "choice later" as within-subjects variables (that is, two measurements per subject) and ordering mode and cognitive load manipulation as independent variables. This analysis revealed that the interaction effect of ordering mode and cognitive load was not significant at the 95% level (Wald $\chi^2 = 2.844$, $p = .092$). The main effect of ordering mode was significant (Wald $\chi^2 = 3.883$, $p = .049$).

See figures 12 and 13 for choice percentages under high and low cognitive load. Interestingly, under high load, participants exhibited a similar pattern to our previous studies. Specifically, independent from the time frame, participants who saw the menu in a digital mode and made the choice within the online survey chose (directionally) unhealthier than participants in the non-digital condition ($Percentage_{digital\_now} = 69.4\%$, $Percentage_{paper\_now} = 49.1\%$, $Percentage_{digital\_later} = 66.1\%$, $Percentage_{paper\_later} = 49.1\%$).

In the low load conditions, which served as our control conditions, making two choices (instead of just one choice for immediate consumption) changed the patterns of results. When ordering digitally, directionally, participants chose healthier for the future. However, when ordering non-digitally (i.e., on paper) participants overwhelmingly decided for a healthy option in the future, and an indulgent option now.

Figure 12: Results for Study 7, Percentage of Unhealthy Choices within High Cognitive Load

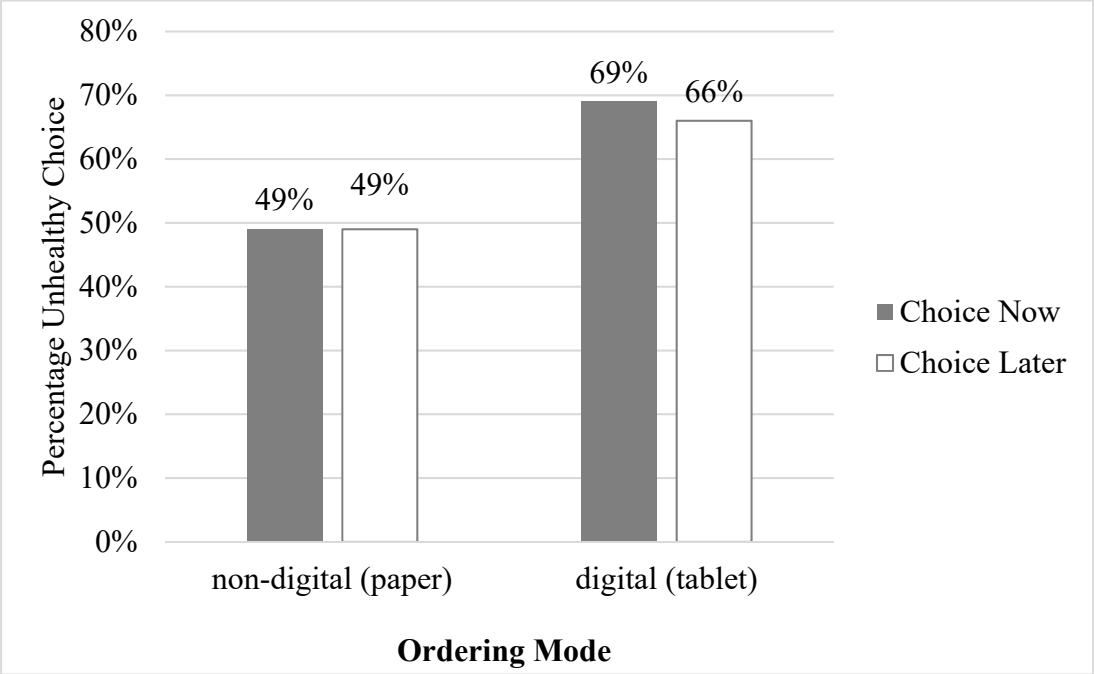
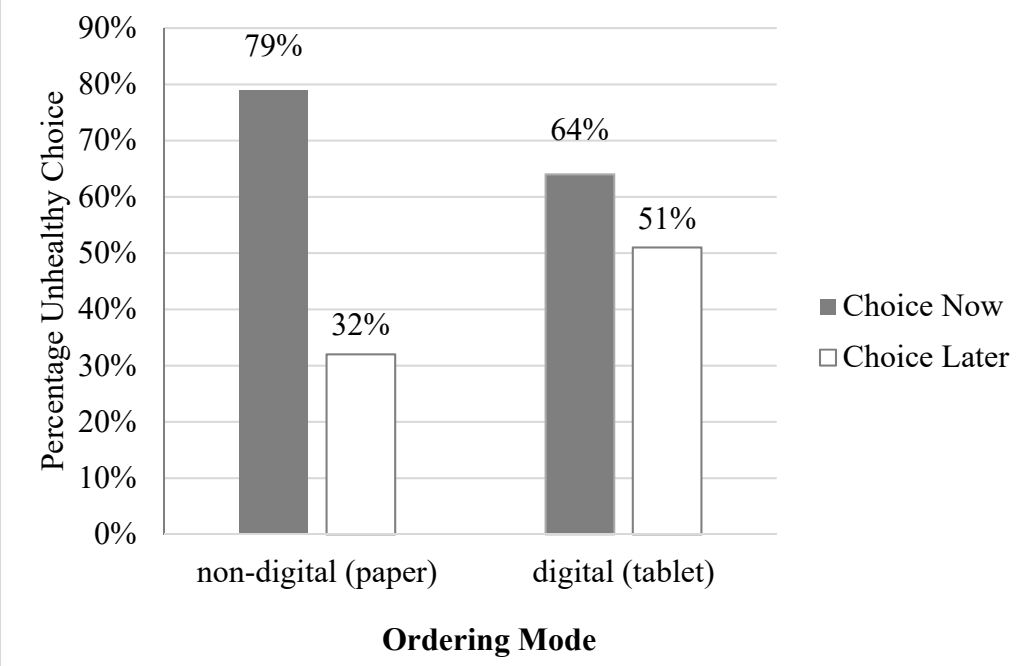


Figure 13: Results for Study 7, Percentage of Unhealthy Choices within Low Cognitive Load (Control Condition)



Discussion

Consistent with our expectations in H5, consumers evaluate a restaurant menu to be unhealthier when presented digitally (versus on paper). As expected, these results became attenuated when cognitive resources were restrained.

Result patterns were different for choices. Deliberately making two choices might lead consumers with a high availability of cognitive resources to engage in licensing effects. To elaborate, as the choices were made without time constraints and under low cognitive load, participants might consciously choose a healthy item for the future, which justifies their choice of an indulgence for the present (Khan and Dhar 2006). Research has shown that individuals are more likely to make "should" choices for their future, and so-called "want" choices in the present (Rogers and Bazerman 2008). Interestingly, this licensing effect can only be observed under low load and diminishes under high load, where we found no differences between the "now" and "later" choices in the non-digital decision mode, because decisions are being made more automatically. We also need to emphasize that, in the paper conditions, individuals were able to look ahead and, therefore, they knew that they were about to make two choices, while participants in the digital ordering condition were not able to see the next question before committing to a choice. Hence, H5 was only partially supported.

GENERAL DISCUSSION

Conclusions and Implications

In the present research we examine effects of ordering and display mode (digital vs. non-digital) on perceptions of restaurant menus and choices of healthy/unhealthy foods. Findings from this work suggest that higher involvement of digital technology in a food choice process leads to a reliance on the experiential (versus cognitive) decision-making system, which leads to a focus on affect-laden food options and, in turn, increases likelihood to choose such items. We investigate the process by showing the existence of underlying, subconscious associations of a more experiential processing mode with digital environments through an Implicit Association Test. Also, we show the process by asking participants directly what dimension of the food (taste or healthfulness) they were focusing on when making evaluations.

We further investigate two moderators of the effect. First, we find that the effect of ordering mode on choice depends on personal health-related goals. Individuals who generally tend to focus on living a healthy lifestyle will not be influenced by technology in the decision-making process. Instead, they choose healthy foods independent from the choice modality. Additionally, by manipulating cognitive load, we provide evidence for the underlying process through moderation. Limiting cognitive resources by manipulating a high cognitive load leads to reliance on a more automatic, experiential processing style independent from the evaluation modality (digital or paper-based).

The findings from this research make important contributions to theory. Our findings contribute to our understanding of how the use of technology influences how users interpret different consumption situations. Our findings support the view that consumers choose more indulgent options when focusing more on affect-laden food items (Shiv and Fedorikhin 1999). Linking different processing styles with the presence or absence of digital technology in decision-making processes provides a theoretical framework that future research can build upon. While previous work has shown that using digital technology (as compared to paper) in a task completion setting might lead to different outcomes (Noyes and Garland 2008), the present research shows consequences for a consumption context.

Further, we add to existing work on healthy and unhealthy food decision-making. Several papers have made meaningful theoretical contributions by investigating decision-making processes in digital environments (Brasel and Gips 2014, 2015; Van Kerckhove and Pandelaere 2018; Milkman et al. 2010; Shen et al. 2016). However, these studies investigated the differential impact by types of devices or input methods (e.g. touchscreen devices vs. mouse input). In contrast, we are focusing on the involvement of digital technology in the food ordering process and how this technology can influence perceptions and food choices by activating different processing styles.

Additionally, this research is impactful in terms of how researchers conduct food-related research surveys. If, in situations of uncertainty, consumers in digital environments generally rely more on the experiential, automatic, and emotional processing system, then food-related research conducted on internet-enabled devices should also show a higher preference for unhealthy items as compared to research conducted using paper-and-pencil methods. For example, Shen et al. (2016) used the same binary choice as Shiv and Fedorikhin (1999) in their

research (Cake versus fruit salad). Instructing participants to use either a mouse or a touch input device, they found higher percentages of participants opting for the cake than the original 1999 experiment (which conducted the research using photographs of the items instead of digital images). To elaborate, Shiv and Fedorikhin (1999) conducted their research on paper using a photograph of a cake and salad. They found that 42% opted for the cake. Shen et al. (2016) found that 95% of participants chose the cake when choosing on a touch-screen device and 73% chose the cake when choosing on a desktop computer. Of course, the comparability here is imperfect as these are only two studies and 17 years lie between these two papers.

Apart from choices, this dissertation research investigates a dependent variable that has not received much attention in research; that is, overall menu healthfulness perceptions. We add to research that has investigated how food descriptions and names influence perceptions (McCall and Lynn 2008; Wansink, van Ittersum, and Painter 2005) and how fonts and menu paper influence quality perceptions (Magnini and Kim 2016). A variety of studies have been conducted to investigate so-called "menu engineering" (Wansink and Love 2014) in terms of placing menu items on a menu in a specific order or location. To our knowledge, no research has investigated how external influences such as display modality affect overall menu healthfulness perceptions regardless of menu design and composition. Overall perceptions of the menu and restaurant can have a strong impact on healthfulness perceptions of the restaurant and subsequent choices as shown in Study 5 (serial mediation) and in Chandon and Wansink's research on health halos (2007).

Lastly, this research builds on a research stream in services marketing, which has investigated adoption of digital self-service technology (Meuter et al. 2005). As adoption of digital technology in a food choice context (i.e., online food ordering) is wide spread, this

dissertation is taking the next step by investigating the consequences of technology adoption in restaurants.

Importantly, findings from our research are impactful from a policy-maker's perspective. As obesity is a major problem and contributor to health expenses in the United States (James 2008; Ogden et al. 2014), knowing how the presence of technology influences healthful/unhealthful food choices can help identify simple ways to encourage more mindful food decision making among different consumer groups. Therefore, findings from the proposed research can contribute to the growing body of transformative consumer research, which aims to nudge consumers toward healthier lifestyles in non-restrictive ways.

From a managerial perspective, findings from this research provide information that can help restaurants determine the consequences of increased automation and use of technology in a food context. Companies include technology into their restaurants to automate processes, reduce personnel, and make ordering more accurate (Dabholkar 1996); however, little is known about potential unintended consequences related to introducing new technologies such as touch-screen kiosks, check-out tablets, and online ordering applications. Restaurants might introduce modern technology in an attempt to appear more up-to-date, exclusive, and potentially healthier (Kowitt 2016). Studies 3b and 3c provide some evidence that, independent from a choice process, consumers perceive menus that are displayed digitally as less healthy. Consequently, more traditional displays of menus such as paper displays, cardboard, or chalk boards might lend themselves to create a healthier image in the minds of consumers.

Limitations and Future Research

The current research is not without limitations. First, for studies involving choices, we specifically choose items that are mainly healthy or unhealthy, while many food items might exist on a continuum. It would be worthwhile to investigate if a specific food item that is considered to be neither healthy nor unhealthy would be perceived as more or less healthy if presented digitally or non-digitally.

Second, in most of our studies, we are investigating technology in a dichotomous manner (present vs. absent). However, digital technology includes a variety of devices that differ in regard to size (smartphone vs. computer screen) and input modality (touch-screen vs. mouse or trackpad). Prior research found different browsing behaviors when comparing the use of tablets with smartphones and computers, such that browsing on tablets led to increased impulse purchases (Xu et al. 2017). The present research could be extended to investigate the influence of different devices on food choices. Display size and resolution constitute another fruitful area for future research. Screen size has been found to influence browsing behavior especially for complex tasks (Chae and Kim 2004). Would a smaller screen size also lead to a different processing style in terms of experiential versus cognitive thinking? Does the effort involved in scrolling on a smaller screen lead to more indulgent choices in line with Kivetz and Simonson (2002)? While the present investigation focuses on ordering digitally (versus non-digitally), future research might want to focus on consumer perceptions in regard to different types of technology.

Third, in Study 3a, we find preliminary evidence that the degree of technology involved might influence subsequent food choices (with a phone call placed on a smartphone being a

lower degree of technology than an order placed completely online). However, in most of our studies, to be able to investigate the differences in thought processing, we focused on a duality (that is, having a digital device present versus using paper). In a real food choice situation, the involvement of digital technology is considerably more complex. Consumers might be looking at a digital menu while also having a paper menu available. They might be using a digital menu but place an order with a person, or might be using a paper menu while ordering on their smartphone. There are additional layers of temporal and spatial distance in terms of ordering for delivery at home (which is often digital) or for take-out in the store (which might be analog). For example, some consumers might live closer to a restaurant and, therefore choose a non-digital ordering mode (Forman, Ghose, and Goldfarb 2009). Study 1 was a field study and, thus, sheds some light on the question if consumers still exhibit unhealthier choices when ordering online, even if they chose the ordering modality (versus being assigned). In summary, additional work especially in the area of field studies is needed to investigate this phenomenon from different angles. How do different types of technology (that is, smartphones, computers, and ordering kiosks) interact with analog modes of evaluation (such as a paper menu)? Are there differences in evaluation and choice depending on the location of ordering (from a computer at home as compared to an ordering tablet in the store)? There is substantial scope for future research in this domain and we hope that this work will encourage further research in this area.

Technology is omnipresent in consumers' environments and can influence decision-making processes substantially (Brasel and Gips 2014; Huyghe et al. 2017; Shen et al. 2016). Therefore, more theoretical work is needed regarding consumer-firm interactions in the digital age and technology-enabled decision-making (Yadav and Pavlou 2014). With the increased use of technology in relation to food choices and food ordering, it is important to investigate how

technology influences perceptions and choices. There are several additional moderators that might be worth investigating. In Study 6, we investigate differences in healthy lifestyles, and we find that consumers with active health goals choose healthier items regardless of ordering modality. Another moderator that comes to mind is familiarity with technology. Does digital technology have a different effect on digital natives who are very familiar with technologies?

In our research, we focus on choice and healthfulness perceptions of the menu. A worthwhile avenue for researchers is the investigation of other consumer behavior related outcomes that differ depending on processing style. These include price perceptions, consumption volume, and willingness to pay, restaurant quality, and perceived product variety. Additionally, future research on the involvement of digital technology in a consumer choice context can be extended to include a variety of products not related to foods. For example, future research could examine if consumers choose more experiential products when ordering online.

As mentioned above, this research has implications for research being conducted on paper-and-pencil surveys versus digital devices. If our results hold, then food-related research conducted on internet-enabled devices should generally show a higher preference for unhealthy items. While a meta-analysis was beyond the scope of this dissertation, this would be a final and interesting extension of the present work. Challenges include that, due to different manipulations, only control conditions would be comparable. As many authors fail to state the exact way of data collection (in terms of the modality used by participants) and the exact cell sizes for control groups, this information would need to be collected by contacting individual authors. Additionally, different researchers compared different sets of food items (different number of options, menus versus binary choices, percentages versus means etc.), hence, comparability is limited.

REFERENCES

Ackerman, Rakefet and Morris Goldsmith (2011), "Metacognitive Regulation of Text Learning: On Screen Versus on Paper," *Journal of Experimental Psychology: Applied*, 17(1), 18–32.

"Adult Obesity in the United States" (2017), *State of Obesity*, https://stateofobesity.org/adult-obesity/.

Amsel, Eric, Jason Close, Eric Sadler, and Paul Klaczynski (2009), "College Students' Awareness of Irrational Judgments on Gambling Tasks: A Dual-Process Account," *Journal of Psychology: Interdisciplinary and Applied*, 143(3), 293–317.

Argo, Jennifer J., Darren W Dahl, and Rajesh V Manchanda (2005), "The Influence of a Mere Social Presence in a Retail Context," *Journal of Consumer Research*, 32(2), 207–12.

Arnett, Lisa (2015), "Are Digital Menus The Way To Go?," *Restaurant Business*, https://www.restaurantbusinessonline.com/technology/are-digital-menus-way-go.

Bakker, Evan (2015), "Quick-Service Restaurants like Taco Bell Are Using Mobile Commerce Apps to Drive Higher Order Values and Boost Sales," *businessinsider.com*, http://www.businessinsider.com/fast-food-chain-mobile-order-ahead-apps-2015-4.

Bar-Anan, Yoav, Nira Liberman, and Yaacov Trope (2006), "The Association Between Psychological Distance and Construal Level: Evidence From an Implicit Association Test," *Journal of Experimental Psychology: General*, 135(4), 609–22.

Baumeister, Roy F. (2002), "Yielding to Temptation: Self-Control Failure, Impulsive Purchasing, and Consumer Behavior," *Journal of Consumer Research*, 28(4), 670–76.

Biswas, Dipayan, Courtney Szocs, Brian Wansink, and Roger Chacko (2017), "Shining Light on Atmospherics: How Ambient Light Influences Food Choices," *Journal of Marketing Research*, 54(1), 111–23.

Bodmann, Shawn M. and Daniel H. Robinson (2004), "Speed and Performance Differences among Computer-Based and Paper-Pencil Tests," *Journal of Educational Computing Research*, 31(1), 51–60.

Booth-Kewley, Stephanie, Gerald E. Larson, and Dina K. Miyoshi (2007), "Social Desirability Effects on Computerized and Paper-and-Pencil Questionnaires," *Computers in Human Behavior*, 23(1), 463–77.

Brasel, S. Adam and James Gips (2015), "Interface Psychology: Touchscreens Change Attribute Importance, Decision Criteria, and Behavior in Online Choice," *Cyberpsychology, Behavior, and Social Networking*, 18(9), 534–38.

——— (2011), "Media Multitasking Behavior: Concurrent Television and Computer Usage," *Cyberpsychology, Behavior, and Social Networking*, 14(9), 527–34.

——— (2014), "Tablets, Touchscreens, and Touchpads: How Varying Touch Interfaces Trigger Psychological Ownership and Endowment," *Journal of Consumer Psychology*, 24(2), 226–33.

Brickmeetsclick.com (2015), "Digital Dopamine: How Digital Changes the Way Shoppers Feel & What to Do about It," *brickmeetsclick.com*, https://www.brickmeetsclick.com/digital-dopamine--how-digital-changes-the-way-shoppers-feel---what-to-do-about-it.

Bryant, E. J., N. A. King, and J. E. Blundell (2008), "Disinhibition: Its Effects on Appetite and Weight Regulation," *Obesity Reviews*, 9(5), 409–19.

Carpenter, Thomas, Ruth Pogacar, Chris Pullig, Michal Kouril, Stephen Aguilar, Jordan LaBouff, Naomi Isenberg, and Alek Chakroff (2018), *Survey-Based Implicit Association Tests: A Methodological and Empirical Analysis*, Mycological Research.

Carr, Nicholas (2010), "Does the Internet Make You Dumber?," *The Wall Street Journal*, 1–5.

Chae, Minhee and Jinwoo Kim (2004), "Do Size and Structure Matter to Mobile Users? An Empirical Study of the Effects of Screen Size, Information Structure, and Task Complexity on User Activities with Standard Web Phones," *Behaviour and Information Technology*, 23(3), 165–81.

Chaiken, Shelly and Durairaj Maheswaran (1994), "Heuristic Processing Can Bias Systematic Processing: Effects of Source Credibility, Argument Ambiguity, and Task Importance on Attitude Judgment," *Journal of Personality and Social Psychology*, 66(3), 460–73.

Chamorro-Premuzic, Tomas (2013), "Is Technology Making Us Stupid (and Smarter)?," *Psychology Today*, https://www.psychologytoday.com/us/blog/mr-personality/201305/is-technology-making-us-stupid-and-smarter.

Chandon, Pierre and Brian Wansink (2007), "The Biasing Health Halos of Fast-Food Restaurant Health Claims: Lower Calorie Estimates and Higher Side-Dish Consumption Intentions," *Journal of Consumer Research*, 34(3), 301–14.

Dabholkar, Pratibha A. (1996), "Consumer Evaluations of New Technology-Based Self-Service Options: An Investigation of Alternative Models of Service Quality," *International Journal of Research in Marketing*, 13(1), 29–51.

"Data-Driven Menu Psychology (Powered By Digital Menus)" (2018), *Restaurant Business*, https://www.restaurantbusinessonline.com/consumer-trends/data-driven-menu-psychology-powered-digital-menus.

Dhar, Ravi and Margarita Gorlin (2013), "A Dual-System Framework to Understand Preference Construction Processes in Choice," *Journal of Consumer Psychology*, 23(4), 528–42.

Eng, Dinah (2017), "For Which Wich, Success Is in the Bag," *Fortune.com*, http://fortune.com/2017/04/22/which-wich-sandwiches-jeff-sinelli/.

Epstein, Seymour (1998), "Cognitive-Experiential Self-Theory," in *Advanced Personality*, ed. David F Barone, Michel Hersen, and Vincent B Van Hasselt, New York: Plenum Press, 211–35.

Epstein, Seymour, Abigail Lipson, Carolyn Holstein, and Eileen Huh (1992), "Irrational Reactions to Negative Outcomes: Evidence for Two Conceptual Systems," *Journal of Personality and Social Psychology*, 62(2), 328–39.

Epstein, Seymour and Rosemary Pacini (1999), "Some Basic Issues Regarding Dual-Process Theories from the Perspective of Cognitive-Experiential Self-Theory," in *Dual-Process Theories in Social Psychology*, ed. Shelly Chaiken and Yaacov Trope, New York: Guildford Press, 462–82.

Epstein, Seymour, Rosemary Pacini, Veronika Denes-Raj, and Harriet Heier (1996), "Individual Differences in Intuitive-Experiential and Analytical-Rational Thinking Styles," *Journal of Personality and Social Psychology*, 71(2), 390–405.

Ferreira, Mario B., Leonel Garcia-Marques, Steven J. Sherman, and Jeffrey W. Sherman (2006), "Automatic and Controlled Components of Judgment and Decision Making," *Journal of Personality and Social Psychology*, 91(5), 797–813.

Forman, Chris, Anindya Ghose, and Avi Goldfarb (2009), "Competition Between Local and Electronic Markets: How the Benefit of Buying Online Depends on Where You Live," *Management Science*, 55(1), 47–57.

Fujita, Kentaro (2008), "Seeing the Forest Beyond the Trees: A Construal-Level Approach to Self-Control," *Social and Personality Psychology Compass*, 3, 1475–96.

Fujita, Kentaro and Anna H. Han (2009), "Moving Beyond Deliberative Control of Impulses: The Effect of Construal Levels on Evaluative Associations in Self-Control Conflicts," *Psychological Science*, 20(7), 799–804.

Fujita, Kentaro, Yaacov Trope, Nira Liberman, and Maya Levin-Sagi (2006), "Construal Levels and Self-Control," *Journal of Personality and Social Psychology*, 90(3), 351–67.

Gardner, Meryl P., Brian Wansink, Junyong Kim, and Se Bum Park (2014), "Better Moods for Better Eating? How Mood Influences Food Choice," *Journal of Consumer Psychology*, 24(3), 320–35.

Geddes, James (2015), "McDonald's Introduces IPad-Like Kiosks For Ordering New Gourmet Burger Options," *Techtimes.com*, http://www.techtimes.com/articles/74094/20150812/mcdonalds-introduces-ipad-like-kiosks-for-ordering-new-gourmet-burger-options.htm.

Glenn, Norval D (1994), "Television Watching , Newspaper Reading , and Cohort Differences in Verbal Ability," *Sociology of Education*, 67(3), 216–30.

Goldstein, Noah J., Robert B. Cialdini, and Vladas Griskevicius (2008), "A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels," *Journal of Consumer Research*, 35(3), 472–82.

Grace-Martin, Michael and Geri Gay (2001), "Web Browsing, Mobile Computing and Academic Performance," *Educational Technology & Society*, 4(3), 95–107.

Greenfield, Patricia M. (2009), "Technology and Informal Education: What Is Taught, What Is Learned," *Science*, 323(5910), 69–71.

Greenwald, Anthony G, Brian A Nosek, and Mahzarin R Banaji (2003), "Understanding and Using the Implicit Association Test: An Improved Scoring Algorithm," *Journal of Personality and Social Psychology*, 85(2), 197–216.

Hadar, A.A., D. Eliraz, A. Lazarovits, U. Alyagon, and A. Zangen (2015), "Using Longitudinal Exposure to Causally Link Smartphone Usage to Changes in Behavior, Cognition and Right Prefrontal Neural Activity," *Brain Stimulation*, 8(2), 318.

Hayes, Andrew F (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.*, New York: Guildford Press.

Hirschberg, Carsten, Alexander Rajko, Thomas Schumacher, and Martin Wrulich (2016), "The Changing Market for Food Delivery," *McKinsey*, http://www.mckinsey.com/industries/high-tech/our-insights/the-changing-market-for-food-delivery.

Hofmann, Wilhelm, Malte Friese, and Fritz Strack (2009), "Impulse and Self-Control Dual-Systems Perspectiv," *Perspectives on Psychological Science*, 4(2), 162–76.

Hung, Iris W. and Aparna A. Labroo (2011), "From Firm Muscles to Firm Willpower: Understanding the Role of Embodied Cognition in Self-Regulation," *Journal of Consumer Research*, 37(6), 1046–64.

Huyghe, Elke, Julie Verstraeten, Maggie Geuens, and Anneleen Van Kerckhove (2017), "Clicks as a Healthy Alternative to Bricks: How Online Grocery Shopping Reduces Vice Purchases," *Journal of Marketing Research*, 54(1), 61–74.

James, W Philip T (2008), "WHO Recognition of the Global Obesity Epidemic," *International Journal of Obesity*, 32, S120–26.

Kahneman, Daniel (2003), "Maps of Bounded Rationality: Psychology for Behavioral Economics," *The American Economic Review*, 93(5), 1449–75.

Kahneman, Daniel and Shane Frederick (2005), "A Model of Heuristic Judgment," in *The Cambridge Handbook of Thinking and Reasoning*, ed. Keith J Holyoak and Robert G Morrison, New York: Cambridge University Press, 267–93.

——— (2002), "Representativeness Revisted: Attribute Substitution in Intuitive Judgement," in *Heuristics of Intuitive Judgment: Extensions and Applications*, ed. T Gilovich, D Griffin, and Daniel Kahneman, New York: Cambridge University Press, 1–30.

Kaufman, Geoff F. and Mary Flanagan (2013), "Lost in Translation," *International Journal of Gaming and Computer-Mediated Simulations*, 5(3), 1–9.

Kazakova, Snezhanka, Veroline Cauberghe, Mario Pandelaere, and Patrick De Pelsmacker (2015), "Can't See the Forest for the Trees? The Effect of Media Multitasking on Cognitive Processing Style," *Media Psychology*, 18(4), 425–50.

Van Kerckhove, Anneleen and Mario Pandelaere (2018), "Why Are You Swiping Right? The Impact of Product Orientation on Swiping Responses," *Journal of Consumer Research*, 45(3), 633–47.

Khan, Uzma and Ravi Dhar (2006), "Licensing Effect in Consumer Choice," *Journal of Marketing Research*, 43(2), 259–66.

Klesse, Anne Kathrin, Jonathan Levav, and Caroline Goukens (2015), "The Effect of Preference Expression Modality on Self-Control," *Journal of Consumer Research*, 42(4), 535–50.

Kowitt, Beth (2016), "Why Eating at McDonald's Is about to Undergo A Massive Makeover," *Fortune.com*, http://fortune.com/2016/11/18/mcdonalds-kiosks-table-service/.

Laran, Juliano (2010), "Choosing Your Future: Temporal Distance and the Balance between Self-Control and Indulgence," *Journal of Consumer Research*, 36(6), 1002–15.

Leary, Mark R. and Robin M. Kowalski (1990), "Impression Management: A Literature Review and Two-Component Model," *Psychological Bulletin*, 107(1), 34–47.

Lee, Hyojin, Xiaoyan Deng, H. Rao Unnava, and Kentaro Fujita (2014), "Monochrome Forests and Colorful Trees: The Effect of Black-and-White versus Color Imagery on Construal Level," *Journal of Consumer Research*, 41(4), 1015–32.

Lee, Hyojin, Kentaro Fujita, Xiaoyan Deng, and H. Rao Unnava (2017), "The Role of Temporal Distance on the Color of Future-Directed Imagery: A Construal-Level Perspective," *Journal of Consumer Research*, 43(5), 707–25.

Liefooghe, Baptist, Pierre Barrouillet, André Vandierendonck, and Valérie Camos (2008), "Working Memory Costs of Task Switching," *Journal of Experimental Psychology: Learning Memory and Cognition*, 34(3), 478–94.

Magnini, Vincent P. and Seontaik Kim (2016), "The Influences of Restaurant Menu Font Style, Background Color, and Physical Weight on Consumers' Perceptions," *International Journal of Hospitality Management*, 53, 42–48.

Martin, Justin W. and Steven A. Sloman (2013), "Refining the Dual-System Theory of Choice," *Journal of Consumer Psychology*, 23(4), 552–55.

Maze, Jonathan (2017), "Eatsa Closes All but 2 Locations," *Nation's Restaurant News*, https://www.nrn.com/operations/eatsa-closes-all-2-locations.

McCall, Michael and Ann Lynn (2008), "The Effects of Restaurant Menu Item Descriptions on Perceptions of Quality, Price, and Purchase Intention," *Journal of Foodservice Business Research*, 11(4), 439–45.

McDevitt, Ryan C. (2012), "The Internet Lowers Inhibitions: Implications for the Long Tail," *University of Rochester Working Paper*.

McFerran, Brent, Darren W. Dahl, Gavan J. Fitzsimons, and Andrea C. Morales (2010), "I'll Have What She's Having: Effects of Social Influence and Body Type on the Food Choices of Others," *Journal of Consumer Research*, 36(6), 915–29.

McGaw, Jeff (2019), "How Touch Screen Digital Kiosks Are Changing Our Dining Experience at Berks Restaurants," *Reading Eagle*, https://www.readingeagle.com/news/article/touchy-subject-more-automated-kiosks.

Metcalfe, Janet and Walter Mischel (1999), "A Hot/Cool-System Analysis of Delay of Gratification: Dynamics of Willpower," *Psychological Review*, 106(1), 3–19.

Meuter, Matthew L., Mary Jo Bitner, Amy L. Ostrom, and Stephen W. Brown (2005), "Choosing Among Alternative Service Delivery Modes: An Investigation of Customer Trial of Self-Service Technologies," *Journal of Marketing*, 69(2), 61–83.

Milkman, Katherine L, Todd Rogers, and Max H. Bazerman (2010), "I'll Have the Ice Cream Soon and the Vegetables Later: A Study of Online Grocery Purchases and Order Lead Time," *Marketing Letters*, 21(1), 17–35.

Mori, D, S Chaiken, and P Pliner (1987), "'Eating Lightly' and the Self Presentation of Femininity," *Journal of Personality and Social Psychology*, 53(4), 693–702.

Moskowitz, Gordon B, Ian Skurnik, and Adam D. Galinsky (1999), "The History of Dual-Process Notions, and the Future of Preconscious Control," in *Dual-Process Theories in Social Psychology*, ed. Shelly Chaiken and Yaacov Trope, New York: Guildford Press, 12–36.

Muraven, Mark and Roy F Baumeister (2000), "Self-Regulation and Depletion of Limited Resources : Does Self-Control Resemble a Muscle ?," *Psychological Bulletin*, 126(2), 247–59.

Neuman, Susan B and Susan B Neuman (1988), "The Displacement Effect: Assessing the Relation Between Television Viewing and Reading Performance," *Reading Research Quarterly*, 23(4), 414–40.

Norman, Elisabeth, Hege E. Tjomsland, and David Huegel (2016), "The Distance between Us: Using Construal Level Theory to Understand Interpersonal Distance in a Digital Age," *Frontiers in Digital Humanities*, 3(June), 1–6.

Norris, Paul and Seymour Epstein (2011), "An Experiential Thinking Style: Its Facets and Relations with Objective and Subjective Criterion Measures," *Journal of Personality*, 79(5), 1043–80.

Noyes, Jan M. and Kate J. Garland (2008), "Computer- vs. Paper-Based Tasks: Are They Equivalent?," *Ergonomics*, 51(9), 1352–75.

Ogden, Cynthia L., Margaret D Carroll, Brian K Kit, and Katherine M Flegal (2014), "Prevalence of Childhood and Adult Obesity in the United States, 2011-2012," *Jama*, 311(8), 806–14.

"Online Food Delivery" (2019), *Statista.com*, https://www.statista.com/outlook/374/100/online-food-delivery/worldwide#market-revenue.

Pacini, Rosemary and Seymour Epstein (1999), "The Relation of Rational and Experiential Information Processing Styles to Personality, Basic Beliefs, and the Ratio-Bias Phenomenon," *Journal of Personality and Social Psychology*, 76(6), 972–87.

Pliner, Patricia and Shelly Chaiken (1990), "Eating, Social Motives, and Self-Presentation in Women and Men," *Journal of Experimental Social Psychology*, 26(3), 240–54.

Pocheptsova, Anastasiya, On Amir, Ravi Dhar, and Roy F Baumeister (2009), "Deciding Without Resources: Resource Depletion and Choice in Context," *Journal of Marketing Research*, 46(3), 344–55.

Polivy, Janet, C. Peter Herman, Rick Hackett, and Irka Kuleshnyk (1986), "The Effects of Self-Attention and Public Attention on Eating in Restrained and Unrestrained Subjects," *Journal of Personality and Social Psychology*, 50(6), 1253–60.

Preacher, Kristopher J and Andrew F Hayes (2008), "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavior Research Methods*, 40(3), 879–91.

Raghubir, Priya and Aradhna Krishna (1999), "Vital Dimensions in Volume Perception: Can the Eye Fool the Stomach?," *Journal of Marketing Research*, 36(3), 313.

Raghunathan, Rajagopal, Rebecca Walker Naylor, and Wayne D Hoyer (2006), "The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products," *Journal of Marketing*, 70(4), 170–84.

Read, Daniel and Barbara Van Leeuwen (1998), "Predicting Hunger: The Effects of Appetite and Delay on Choice," *Organizational Behavior and Human Decision Processes*, 76(2), 189–205.

Roberts, Genevieve (2015), "Google Effect: Is Technology Making Us Stupid?," *Independent*, https://www.independent.co.uk/life-style/gadgets-and-tech/features/google-effect-is-technology-making-us-stupid-10391564.html.

Rogers, Todd and Max H. Bazerman (2008), "Future Lock-In: Future Implementation Increases Selection of 'Should' Choices," *Organizational Behavior and Human Decision Processes*, 106(1), 1–20.

Romero, Marisabel and Dipayan Biswas (2016), "Healthy-Left, Unhealthy-Right: Can Displaying Healthy Items to the Left (Versus Right) of Unhealthy Items Nudge Healthier Choices?," *Journal of Consumer Research*, 43(1), 103–12.

Rozin, Paul, Julia M. Hormes, Myles S. Faith, and Brian Wansink (2012), "Is Meat Male? A Quantitative Multimethod Framework to Establish Metaphoric Relationships," *Journal of Consumer Research*, 39(3), 629–43.

Scheibehenne, Benjamin, Linda Miesler, and Peter M. Todd (2007), "Fast and Frugal Food Choices: Uncovering Individual Decision Heuristics," *Appetite*, 49(3), 578–89.

Sehgal, Kabir (2016), "The Internet Makes Us Stupid and Here's Why," *Fortune*, http://fortune.com/2016/02/03/nicholas-carr-internet/.

Seiders, Kathleen and Ross D Petty (2013), "Obesity and the Role of Food Marketing: A Policy Analysis of Issues and Remedies," *Journal of Public Policy and Marketing*, 23(2), 153–69.

Senecal, Sylvain and Jacques Nantel (2004), "The Influence of Online Product Recommendations on Consumers' Online Choices," *Journal of Retailing*, 80(2), 159–69.

Shen, Hao, Meng Zhang, and Aradhna Krishna (2016), "Computer Interfaces and the 'Direct-Touch' Effect: Can IPads Increase the Choice of Hedonic Food?," *Journal of Marketing Research*, 53(5), 745–58.

Shiv, Baba and Alexander Fedorikhin (1999), "Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making," *Journal of Consumer Research*, 26(3), 278–92.

Shiv, Baba and Stephen M. Nowlis (2004), "The Effect of Distractions While Tasting a Food Sample: The Interplay of Informational and Affective Components in Subsequent Choice," *Journal of Consumer Research*, 31(December), 599–608.

Sparrow, Betsy, Jenny Liu, and Daniel M Wegner (2011), "Google Effects on Memory: Information at Our Fingertips," *Science*, 333(August), 776–79.

Spiller, Stephen A, Gavan J Fitzsimons, John G Lynch, and Gary H McClelland (2013), "Spotlights, Floodlights, and the Magic Number Zero: Simple Effects Tests in Moderated Regression," *Journal of Marketing Research*, 50(2), 277–88.

Statista.com (2018), "Average Number of GrubHub Orders Per Day Worldwide from 2011-2016," *Statista*, https://www.statista.com/statistics/668094/orders-per-day-grubhub/.

Suler, John (2004), "The Online Disinhibition Effect," *CyberPsychology & Behavior*, 7(3), 321–26.

Tang, Zixuan, Huijun Zhang, An Yan, and Chen Qu (2017), "Time Is Money: The Decision Making of Smartphone High Users in Gain and Loss Intertemporal Choice," *Frontiers in Psychology*, 8(March), 1–12.

Twitter, Pizza Hut Tells (2014), "Pizza Hut Tells Twitter It Made The First Online Sale In 1994," *Huffingtonpost.com*, https://www.huffingtonpost.com/2013/09/09/pizza-hut_n_3894981.html.

Wang, Youfa and May A. Beydoun (2007), "The Obesity Epidemic in the United States - Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-Regression Analysis," *Epidemiologic Reviews*, 29(1), 6–28.

Wansink, Brian, Koert van Ittersum, and James E. Painter (2005), "How Descriptive Food Names Bias Sensory Perceptions in Restaurants," *Food Quality and Preference*, 16(5), 393–400.

Wansink, Brian and Katie Love (2014), "Slim by Design: Menu Strategies for Promoting High-Margin, Healthy Foods," *International Journal of Hospitality Management*, 42, 137–43.

Wästlund, Erik, Henrik Reinikka, Torsten Norlander, and Trevor Archer (2005), "Effects of VDT and Paper Presentation on Consumption and Production of Information: Psychological and Physiological Factors," *Computers in Human Behavior*, 21(2), 377–94.

Wiesenfeld, Batia M (2015), "Seeing the Forest for the Trees: Exploratory Learning, Mobile Technology, and Knowledge Workers' Role Integration Behaviors," *Academy of Management Journal*, 58(3), 739–62.

Wilmer, Henry H. and Jason M. Chein (2016), "Mobile Technology Habits: Patterns of Association Among Device Usage, Intertemporal Preference, Impulse Control, and Reward Sensitivity," *Psychonomic Bulletin and Review*, 23(5), 1607–14.

Wilmer, Henry H., Lauren E. Sherman, and Jason M. Chein (2017), "Smartphones and Cognition: A Review of Research Exploring the Links Between Mobile Technology Habits and Cognitive Functioning," *Frontiers in Psychology*, 8(April), 1–16.

Wood, Wendy and Timothy Hayes (2012), "Social Influence on Consumer Decisions: Motives, Modes, and Consequences," *Journal of Consumer Psychology*, 22(3), 324–28.

Xu, Kaiquan, Jason Chan, Anindya Ghose, and Sang Pil Han (2017), "Battle of the Channels: The Impact of Tablets on Digital Commerce," *Management Science*, 63(5), 1469–92.

Yadav, Manjit S. and Paul A. Pavlou (2014), "Marketing in Computer-Mediated Envorironments: Research Synthesis and New Directions," *Journal of Marketing*, 78(January), 20–40.

Yeung, Nick and Stephen Monsell (2003), "Switching Between Tasks of Unequal Familiarity: The Role of Stimulus-Attribute and Response-Set Selection," *Journal of Experimental Psychology: Human Perception and Performance*, 29(2), 455–69.

APPENDICES

Appendix A: Coded Data for Field Study

Only food items displayed. Signature items' names that would allow identification of the restaurant were anonymized. Several items were changed into descriptive names.
Item Healthfulness: Healthy =1, Unhealthy = 2, Neither = 3 (excluded)

Item Name	Healthy, Unhealthy
1/2 AHI APP	1
1/2 [redacted] QUESADILLAS	2
1/2 COCONUT SHRIMP	1
1/2 STEAK QUESADILLA	2
8OZ PRIME RIB	2
ADD 4 COCO SHRIMP	1
ADD 4 GRILLED SHRIMP	1
ADD BACON	2
ADD BACON BITS	2
ADD BREAD CRUMB	2
ADD BREAD	2
ADD CHEDDAR CHEESE	2
ADD CHEESE&BACON BITS	2
ADD CHICKEN 5OZ	1
ADD CROUTONS	2
ADD EGG	1
ADD GRILLED ONION	1
ADD LOBSTER	1
ADD LOBSTER STUFFED SHRIMP	2
ADD MIXED CHEESE	2
ADD COOKIE CRUMBLES	2
ADD PICKLES	2
ADD RED ONION	1
ADD SWISS CHEESE	2
ADD TOMATO	1
ADD BLUE CHEESE CRUMBLES	2
ADD SAUTEED MUSHROOMS	1
AHI TUNA APPETIZER	1
[redacted] QUESADILLAS	2
[redacted] [redacted] OVEN BAKED CHICKEN	2
CARROTS	1
SQUASH	1
SWEET POTATO TOPPINGS	2
AMERICAN CHEESE	2
ASPARAGUS	1
[redacted] CHICKEN TACOS	2
[redacted] GRILLED FISH TACOS	1
[redacted] APPETIZER SAMPLER	2
[redacted] [redacted] SALMON	1
BAKED POTATO	2
FRIED ONION	2
[redacted] BURGER	2
BOWL CHICKEN TORTILLA [redacted]	1
BOWL FRENCH ONION	1
BOWL POTATO SOUP	2
BROCCOLI AND CHEESE SOUP	2
BROCCOLI	1

CAESAR SALAD	1
CARROT CAKE	2
CHEESE CAKE	2
CHEESE FRIES	2
CHICKEN CAESAR SALAD	1
CHICKEN FINGERS	2
CHICKEN GRILLED	1
CHICKEN TENDERS PLATTER	2
CHIPS	2
[redacted] SALAD	2
[redacted] STEAK SALAD	2
COBB SALAD W/ CHICKEN	1
COBB SALAD W/CRISPY CHICKEN	1
COCONUT SHRIMP	1
CRAB CAKE APPETIZER	2
CRISPY CHICKEN SANDWICH	2
FRENCH ONION SOUP	2
CUP POTATO SOUP	2
[redacted] RIBS & CHICKEN	2
ENDLESS FRENCH ONION SOUP&SALAD	3
ENDLESS FRENCH ONION SOUP&SALAD	3
ENDLESS SOUP & SALAD	3
[redacted] QUESADILLAS	2
GRILLED SHRIMP	1
[redacted] WINGS	2
SCAMPI DIP	2
STEAK QUESADILLAS	2
[redacted] SHRIMP	2
FILET 10OZ & LOBSTER	2
FILET 10OZ WITH SIDES	2
FILET 6OZ & LOBSTER	2
FILET 6OZ & SHRIMP	1
FILET 6OZ WITH SIDES	1
FRENCH ONION SOUP & SALAD	3
GRASS FED CHEDDAR BURGER	2
[redacted] [redacted] (SEAFOOD) PLATTER	2
GRILLED CHEESE	2
HALF CHEESE FRIES	2
HAND-BREADED SHRIMP	2
HOUSE SALAD	1
[redacted] 5OZ GRILLED CHICKEN	1
KID BURGER	2
KID RIBS	1
KID SIRLOIN	1
LARGE CAESAR SALAD	1
CHEESE ON CHIPS	2
[redacted] [redacted] FRIED ONION	2
LUNCH [redacted] QUESADILLAS COMBO	2
LUNCH CHICKEN TACO COMBO	2
LUNCH FISH TACO COMBO	1
LUNCH [redacted] BURGER W/ CHEESE COMBO	2
LUNCH STEAK TACO COMBO	2
MACARONI & CHEESE	2
MASHED POTATOES	2
DESSERT - CHOCOLATE [redacted]	2
BURGER	2
[redacted] CENTER-CUT SIRLOIN PARTY PLATTER	2

[redacted]HERB CRUSTED CHICKEN	1
PORK PORTERHOUSE WITH SIDES	2
PORTERHOUSE 20OZ WITH SIDES	2
PRIME RIB 12OZ	2
PRIME RIB 16OZ	2
PRIME RIB 8OZ	2
QUESADILLA - STEAK	2
QUESADILLA SMALL - STEAK	2
RIBEYE 10OZ WITH SIDES	1
RIBEYE 12OZ WITH SIDES	1
RIBEYE 22OZ BONE IN WITH SIDES	2
RIBS HALF	3
RIBS	3
[redacted] MEDALLIONS	2
SALMON 10OZ WITH SIDE	1
SALMON 7OZ WITH SIDE	1
SCAMPI DIP	2
SHRIMP CEASAR SALAD	1
SIDE ASPARAGUS WITH ENTREE	1
SIDE BAKED POTATO WITH ENTREE	2
SIDE BROCCOLI & CHEESE WITH ENTREE	2
SIDE BROCCOLI WITH ENTREE	1
SIDE FRENCH FRIES KID WITH ENTREE	2
SIDE FRENCH FRIES WITH ENTREE	2
SIDE KID FRUIT WITH ENTREE	1
SIDE MASHED POTATOES WITH ENTREE	2
SIDE MIXED VEGETABLES WITH ENTREE	1
SIDE SAUTEED MUSHROOMS WITH ENTREE	1
SIDE MACARONI & CHEESE WITH ENTREE	2
SIDE SWEET POTATO WITH ENTREE	1
SIRLOIN 12OZ & GRILLED SHRIMP	2
SIRLOIN 12OZ & LOBSTER	2
SIRLOIN 12OZ WITH SIDES	2
SIRLOIN 6OZ & COCONUT SHRIMP WITH SIDES	2
SIRLOIN 6OZ & GRILLED SHRIMP WITH SIDES	1
SIRLOIN 6OZ & LOBSTER	1
SIRLOIN 6OZ WITH SIDES	1
SIRLOIN 9OZ & COCONUT SHRIMP WITH SIDES	2
SIRLOIN 9OZ & GRILLED SHRIMP WITH SIDES	2
SIRLOIN 9OZ & LOBSTER WITH SIDE	2
SIRLOIN 9OZ WITH SIDES	2
[redacted] PIE - SALTED CARAMEL [redacted]	2
SOUP BOWL CHICKEN TORTILLA	1
SOUP CUP CHICKEN TORTILLA	1
[redacted] [redacted] ICE CREAM	2
[redacted] MAC N CHEESE BITES	2
[redacted] MACARONI AND CHEESE	2
[redacted] PHILLY SANDWICH	2
[redacted] SALAD	3
STRIP 13OZ WITH SIDES	2
SWEET POTATO	1
[redacted] CHOCOLATE BROWNIE	2
TILAPIA WITH SIDE	1
VEGGIES	1
[redacted] SHRIMP	2
BOWL FRENCH ONION [redacted] [redacted]	2
WEDGE SALAD	1

WITH KID MAC	2
10 FILET& GARLIC BUTTER	2
ADD CHEDDAR CHEESE	2
ADD-ON 1/3 RIB	2
ADD-ON SAUTEED MUSHROOMS	1
[redacted] CHICKEN 5OZ	2
CHICKEN TENDERS PLATTER W/2SD_15.98	2
[redacted] SALAD	2
[redacted] SEAFOOD PLATTER 0	2
[redacted] WINGS PARTY PLATER	2
[redacted] DESSERT - STRAWBERRY	2
[redacted]-HERB CRUSTED CHICKEN	1
PORK PORTERHOUSE WITH SIDES	2
SIDE FRUIT	1
SOUP CUP CHICKEN TORTILLA	1
SOUP AND SALAD	3
[redacted] PHILLY SANDWICH WITH SIDE	2
STRIP 13OZ WITH SIDES	2
SUB FRIES	2
[redacted] CHICKEN SANDWICH	2
[redacted] FRIED MUSHROOMS	2
WITH PASTA OPTION	2
1/2 AHI APPETIZER	1
1/2 [redacted] QUESADILLAS	2
8OZ PRIME RIB	2
ADD ALFREDO SAUCE	2
ADD CELERY	1
ADD CUCUMBER	1
ADD DICED ONIONS	1
ADD LETTUCE	1
ADD PECANS	1
ZUCCHINI	1
[redacted] STEAK SALAD WITH SIDES	2
CRAB TILAPIA	1
ICE CREAM KID	2
LARGE SALAD	1
[redacted] (SEAFOOD) CHEESE ON CHIPS	2
LOADED [redacted] (SEAFOOD) ONION	2
LOBSTER TAILS GRILLED	1
LOBSTER TAILS STEAMED	1
BABY BACK RIBS PARTY PLATTER	2
CHICKEN TENDERS PARTY PLATTER	2
HOUSE SALAD PARTY PLATTER	1

Appendix B: Menu Used In Study 3a

True Kitchen

Fried Chicken Sandwich
Fried chicken breast tossed in buffalo sauce, tomatoes and blue cheese with mayo, on a buttery roll. $7.50

Veggies & Cucumber-Dill Yogurt Dip
Carrot sticks, celery sticks and cucumber slices served with cucumber-dill yogurt dip. $7.50

Mac & Cheese with Fried Chicken Tenders
Chicken tenders tossed in honey pepper sauce, served atop of Mac & Cheese with bacon. $7.50

House Salad
Mixed greens, tomatoes, red peppers, and cucumbers with vinaigrette dressing. Topped with grilled chicken. $7.50

Grilled Lemon Chicken
Grilled chicken garnished with Granny Smith apple relish. Topped with a vinaigrette over rice and quinoa. $7.50

Double Crunch Bone-In Wings
With choice of honey BBQ or classic & hot buffalo sauce. $7.50

Grilled Fish Wrap
Grilled white fish, lettuce and tomato on a wheat wrap. $7.50

Hand-Battered Fried Fish & Chips
Battered white fish fillets, golden fried, with fries and tartar sauce. $7.50

Healthy Items: Veggie & Cucumber-Dill Yogurt Dip, House Salad, Grilled Lemon Chicken, Grilled Fish Wrap

Unhealthy Items: Fried Chicken Sandwich, Mac & Cheese with Fried Chicken Tenders, Double-Crunch Bone-In Wings, Hand-Battered Fried Fish & Chips

Appendix C: Dessert Menu Used In Study 3b

Appendix D: Menu Excerpt Used in Study 3c

HEIGHTS
FRESH · STONE · BAKED
PIZZA

Italiana Pizza
Homemade Dough Topped with Ham, Tomatoes, Italian Sausage, Mozzarella, and Parmesan.

Heights Chicken Pizza
Homemade Dough Topped with Ricotta Base, Shredded Chicken, Spinach, Red Onions, Tomatoes, Mozzarella Cheese, and Mushrooms.

Spinach & Feta Pizza
Homemade Dough Topped with Garlic Oil Base, Spinach, Tomatoes, Red Onions, Feta and Mozzarella Cheeses, and Mushrooms.

Greek Salad
Spring Mix, Tomatoes, Feta Cheese, Black Olives, Onions, Cucumbers, Artichoke Hearts, with a Greek Dressing.

Cheese Calzone
Mega Cheese Indulgence with Mozzarella, Ricotta, and Parmesan in Homemade Pizza Dough Glazed with Garlic Parmesan Butter.

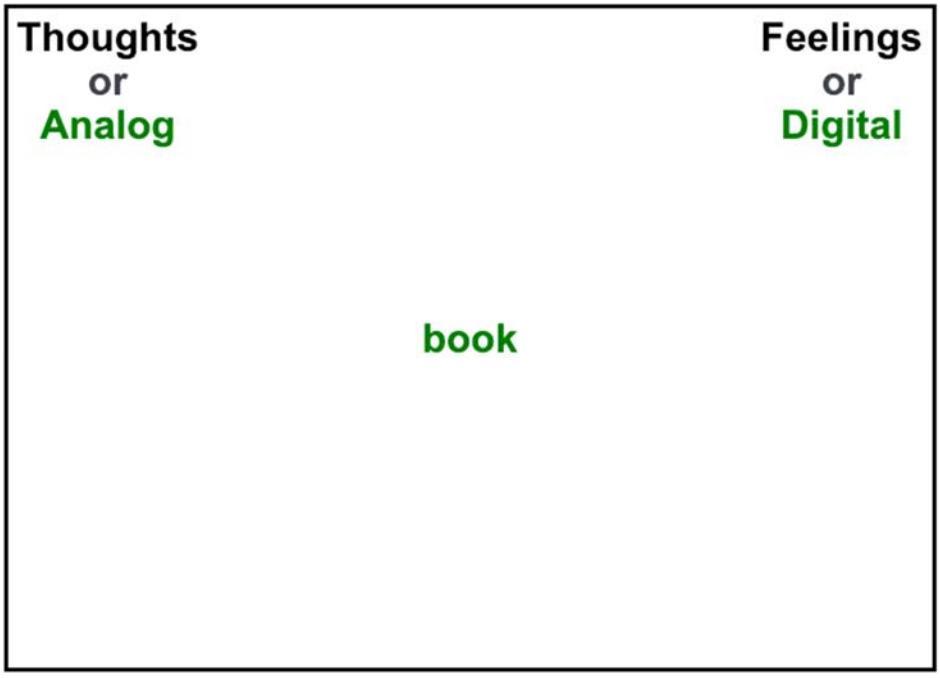
Chicken Parmesan Sandwich
Chicken Breast Tenders on Sandwich Bread Topped With Parmesan Cheese and Tomato Sauce.

Appendix E: Permutations Used in Implicit Association Test

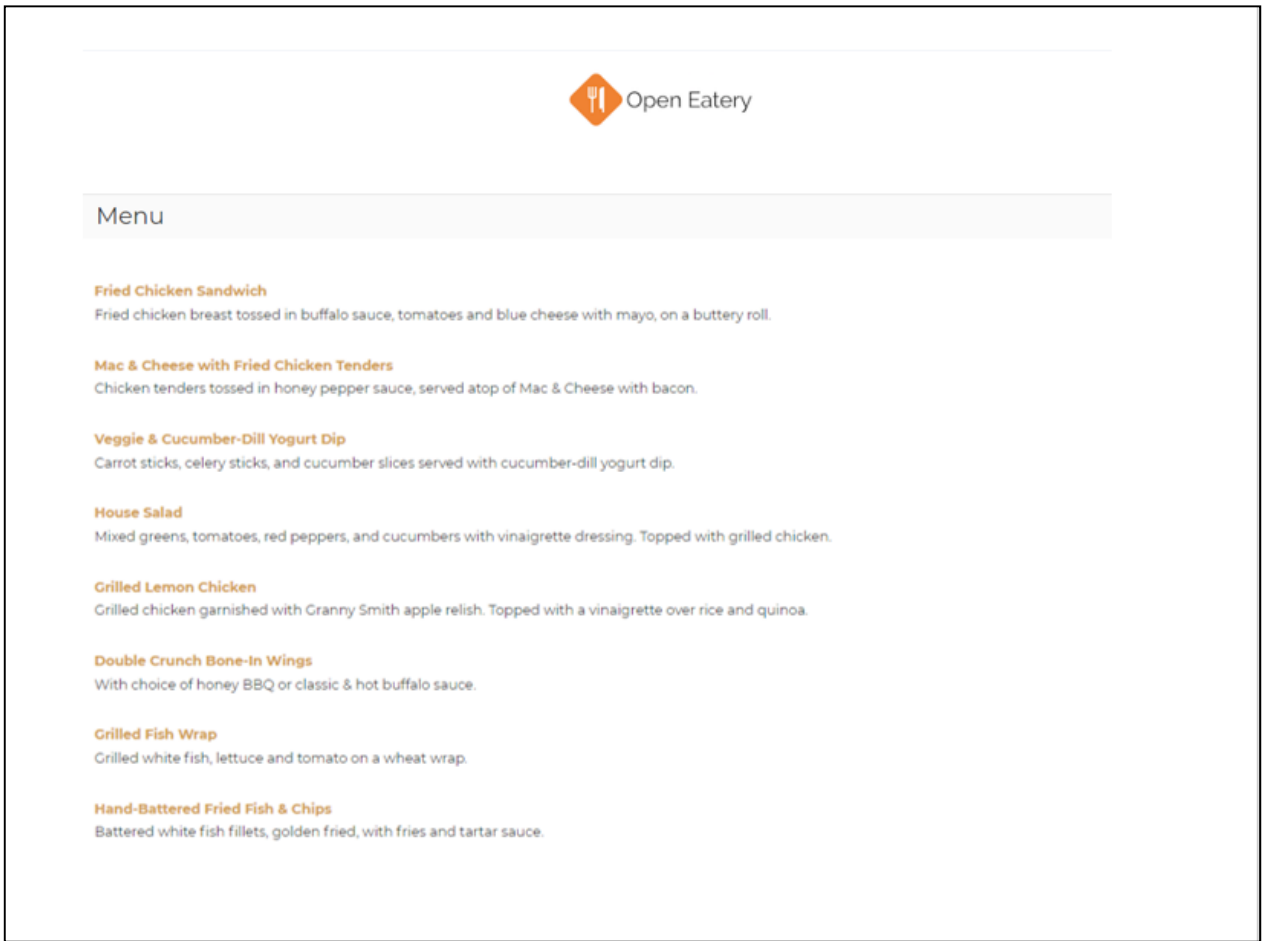
Condition A				
Block	**Trials**	**Function**	**Items assigned to left key**	**Items assigned to right key**
1	20	Practice	Thoughts	Feelings
2	20	Practice	Analog	Digital
3	20	Practice compatible	Thoughts or Analog	Feelings or Digital
4	40	Critical test block compatible	Thoughts or Analog	Feelings or Digital
5	40	Practice	Digital	Analog
6	20	Practice incompatible	Thoughts or Digital	Feelings or Analog
7	40	Critical test block incompatible	Thoughts or Digital	Feelings or Analog
Condition B				
1	20	Practice	Thoughts	Feelings
2	20	Practice	Digital	Analog
3	20	Practice incompatible	Thoughts or Digital	Feelings or Analog
4	40	Critical test block incompatible	Thoughts or Digital	Feelings or Analog
5	40	Practice	Analog	Digital
6	20	Practice compatible	Thoughts or Analog	Feelings or Digital
7	40	Critical test block compatible	Thoughts or Analog	Feelings or Digital
Condition C				
1	20	Practice	Feelings	Thoughts
2	20	Practice	Digital	Analog
3	20	Practice compatible	Feelings or Digital	Thoughts or Analog
4	40	Critical test block compatible	Feelings or Digital	Thoughts or Analog
5	40	Practice	Analog	Digital
6	20	Practice incompatible	Feelings or Analog	Thoughts or Digital
7	40	Critical test block incompatible	Feelings or Analog	Thoughts or Digital
Condition D				
1	20	Practice	Feelings	Thoughts
2	20	Practice	Analog	Digital
3	20	Practice incompatible	Feelings or Analog	Thoughts or Digital
4	40	Critical test block incompatible	Feelings or Analog	Thoughts or Digital
5	40	Practice	Digital	Analog

6	20	Practice compatible	Feelings or Digital	Thoughts or Analog
7	40	Critical test block compatible	Feelings or Digital	Thoughts or Analog

Appendix F: Instructions for IAT (Study 4), Compatible Practice Block



Appendix G: Menu Used In Study 5



Healthy Items: Veggie & Cucumber-Dill Yogurt Dip, House Salad, Grilled Lemon Chicken, Grilled Fish Wrap

Unhealthy Items: Fried Chicken Sandwich, Mac & Cheese with Fried Chicken Tenders, Double-Crunch Bone-In Wings, Hand-Battered Fried Fish & Chips

Appendix H: Mediation Results Output (Serial Mediation)

Run MATRIX procedure:

********** PROCESS Procedure for SPSS Release 2.16.3 **********

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

****
Model = 6
Y = h_u
X = cell
M1 = enjtaste
M2 = healthy

Sample size
66

****
Outcome: enjtaste
Model Summary

R	R-sq	MSE	F	df1	df2	p
.2733	.0747	2.7330	5.1668	1.0000	64.0000	.0264

Model

	coeff	se	t	p	LLCI	ULCI
constant	4.5536	.6243	7.2944	.0000	3.3065	5.8007
cell	-.9320	.4100	-2.2731	.0264	-1.7510	-.1129

****
Outcome: healthy
Model Summary

R	R-sq	MSE	F	df1	df2	p
.4160	.1731	1.1965	6.5939	2.0000	63.0000	.0025

Model

	coeff	se	t	p	LLCI	ULCI
constant	4.0344	.5590	7.2177	.0000	2.9174	5.1514
enjtaste	.2165	.0827	2.6183	.0111	.0513	.3818
cell	-.4809	.2820	-1.7050	.0931	-1.0444	.0827

****
Outcome: h_u

Coding of binary DV for analysis:

h_u	Analysis
1.00	.00
2.00	1.00

Logistic Regression Summary

-2LL	Model LL	p-value	McFadden	CoxSnell	Nagelkrk	n
39.6879	45.6506	.0000	.5349	.4993	.6881	66.0000

Model

	coeff	se	Z	P	LLCI	ULCI
constant	2.8799	2.2545	1.2774	.2015	-1.5389	7.2986
enjtaste	-2.0617	.5737	-3.5937	.0003	-3.1861	-.9372
healthy	.8825	.4835	1.8253	.0680	-.0651	1.8301
cell	1.1456	.8468	1.3528	.1761	-.5142	2.8054

********** DIRECT AND INDIRECT EFFECTS **********

Direct effect of X on Y

Effect	SE	Z	p	LLCI	ULCI
1.1456	.8468	1.3528	.1761	-.5142	2.8054

Indirect effect(s) of X on Y

	Effect	Boot SE	BootLLCI	BootULCI
Total:	1.3189	1.4921	-.5594	4.2324
Ind1 :	1.9214	1.6656	.0000	4.9709
Ind2 :	-.1781	.1791	-.7370	-.0060
Ind3 :	-.4244	.4907	-1.5977	.1396

Indirect effect key

Ind1 :	cell	->	enjtaste ->	h_u		
Ind2 :	cell	->	enjtaste ->	healthy ->	h_u	
Ind3 :	cell	->	healthy ->	h_u		

********** ANALYSIS NOTES AND WARNINGS **********

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
5000

Level of confidence for all confidence intervals in output:
95.00

Appendix I: Menu Used In Study 7

Fried Chicken Sandwich
Fried chicken breast tossed in buffalo sauce, tomatoes and blue cheese with mayo, on a buttery roll. $7.50

Veggies & Cucumber-Dill Yogurt Dip
Carrot sticks, celery sticks and cucumber slices served with cucumber-dill yogurt dip. $7.50

Mac & Cheese with Fried Chicken Tenders
Chicken tenders tossed in honey pepper sauce, served atop of Mac & Cheese with bacon. $7.50

House Salad
Mixed greens, tomatoes, red peppers, and cucumbers with vinaigrette dressing. Topped with grilled chicken. $7.50

Grilled Lemon Chicken
Grilled chicken garnished with Granny Smith apple relish. Topped with a vinaigrette over rice and quinoa. $7.50

Double Crunch Bone-In Wings
With choice of honey BBQ or classic & hot buffalo sauce. $7.50

Grilled Fish Wrap
Grilled white fish, lettuce and tomato on a wheat wrap. $7.50

Hand-Battered Fried Fish & Chips
Battered white fish fillets, golden fried, with fries and tartar sauce. $7.50

Appendix J: IRB Approval Letter

USF
UNIVERSITY OF
SOUTH FLORIDA

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

January 30, 2018

Annika Abell
Marketing
University of South Florida
4202 E. Fowler Avenue
Tampa, FL 33620

RE: **Expedited Approval for Initial Review**
IRB#: Pro00033184
Title: The Influence of Digital Devices on Product Choice and Product Positioning

Study Approval Period: 1/29/2018 to 1/29/2019

Dear Ms. Abell:

On 1/29/2018, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):
V1_digital devices_studyprotocol.docx

Consent/Assent Document(s)*:
Consent form for online conditions
Consent form on paper

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent documents are valid until the consent document is amended and approved. The Online and Paper consent are not stamped forms.

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110. The research

Appendix K: IRB Approval Letter For Continuing Review

USF
UNIVERSITY OF
SOUTH FLORIDA

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

1/15/2019

Annika Abell
Marketing
University of South Florida
4202 E. Fowler Avenue
Tampa, FL 33620

RE: **Expedited Approval for Continuing Review**
IRB#: CR1_Pro00033184
Title: The Influence of Digital Devices on Product Choice and Product Positioning

Study Approval Period: 1/29/2019 to 1/29/2020

Dear Dr. Abell:

On 1/12/2019, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents contained within including those outlined below.

Approved Item(s):
Protocol Document(s):
V1_digital devices_studyprotocol.docx

The IRB determined that your study qualified for expedited review based on federal expedited category number(s):

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with USF HRPP policies and procedures and as approved by the USF IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) business days.