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Shopper Behavior at the Point of Purchase

Drivers of In-Store Decision-Making and Determinants of Post-Decision Satisfaction in a High-Involvement Product Choice

PL ACADEMIC RESEARCH

Schriften zu Marketing und Handel

Herausgegeben von Martin Fassnacht

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1 Introduction

1.1 Motivation and Relevance of the Topic

The dissertation is titled *Shopper Behavior at the POP – Drivers of In-Store Decision-Making and Determinants of Post-Decision Satisfaction in a High-Involvement Product Choice*. It is dedicated to advancing our understanding of shopper behavior at the point of purchase in an offline setting.

As the title implies, the work mainly focuses on two central aspects of shopper behavior at the POP: (1) the decision-making itself and how it is affected by in-store and out-of-store factors, with a focus on the role of in-store attention. And (2) the post-decision choice satisfaction and its determinants.

The empirical findings of the dissertation stem from an eye-tracking field experiment that was conducted in two stores of a leading DIY-retailer. It allows for a precise analysis of attention at the POP, as well as many other important variables of in-store decision-making.

Both the consumer behavior and the retail literature call for further research in the area of the dissertation, for several reasons. Attention is one of the scarcest resources in today's business (Davenport and Beck 2002; Pieters and Wedel 2004), but shopper attention at the point of purchase is still little understood. So is the interplay between attention and evaluation (Chandon et al. 2009). Research has been neglecting attention in favor of a focus on higher order stages in the shopper decision-making process, such as consideration and choice (Wedel and Pieters 2008a). This is regrettable, as visual attention is increasingly seen as more than just a gateway through which information enters the mind of the shopper. It reflects higher order cognitive processes and is closer to evaluation than intuitively thought (Rizzolatti et al. 1994; Wedel and Pieters 2006). Chandon et al. (2009) also stress the lack of knowledge about attention *and* evaluation patterns at the POP. As a reaction, the dissertation combines measures of attention with measures of evaluation at the POP in a comprehensive framework to achieve a better understanding of different levels of attention and their relation to evaluation levels.

The POP has been the focus of intense research activity. For instance, much is known about the effects of total category shelf space on sales (e.g., Bemmaor and Mouchoux 1991; Drèze et al. 1994). We know considerably less about the impact on sales of in-store factors that do not change total category shelf space (such as changing shelf positions or offering different information material). We also know precious little about whether higher visual attention mediates the effects of in-store and out-of-store factors on evaluation or whether they influence evaluation directly (Chandon et al. 2009; Chandon et al. 2007). Eye-tracking studies in marketing have shown the value of measuring visual attention and not focusing only on evaluation (Wedel and Pieters 2008b).

The field research approach has advantages when trying to examine shopper behavior in the store. However, up until quite recently, conducting fruitful field research with eye-tracking devices was very hard and very costly. The examination of shoppers' decision processes in the store requires dynamic real-time research methods to fully reach its potential. Eye tracking can be regarded as ideal for cognitive research of shopper attention, but is only of late capable of producing reliable data in field settings.

Not only does literature call for further research in the area, several developments in retail and marketing practice do so, too. The approach to POP marketing and to presenting and selling assortments has changed: From high levels of staff on shop floors assisting shoppers in purchasing decisions and actively selling merchandise, to thinly staffed shop-floors and shoppers who are often on their own in reaching their purchasing-decisions. Due to increasing competitive pressure (e.g., discounters, e-commerce), retailers strive to operate stores in a more cost-efficient way. Shopper-oriented assortment presentation hence becomes a critical element to support shopper decision-making despite lower staff levels.

Furthermore, the role of the POP as a marketing tool gets more important due to today's fragmentation of media channels. Whereas most retailers formerly considered investments in their stores a mere "cost of doing business", many now realize that the POP is a strategic asset and a great communication channel (Galante et al. 2011). The POP is the "last bastion of prime-time mass marketing" (Egol and Vollmer 2009) and a great place to grab the shopper at the critical moment of decision-making. Getting shoppers' attention in the first place is difficult in a world of clutter,

information overload, and media fragmentation (Blackwell et al. 2006; Chandon et al. 2002). One of the preeminent channels to still reach shoppers is the POP, due to its consistently wide reach. The function of the POP is twofold: It is an excellent vehicle for manufacturers to build brands in the long term because it's a good place to reach shoppers. But it is also the place where the greater part of shopping decisions takes place (Bell et al. 2010; POPAI 1997), rendering it a promising place for short-term sales stimulation (Galante et al. 2011). Consequently, manufacturers and retailers alike spend a bigger proportion of their advertising budgets on in-store marketing (Chandon et al. 2009; Inman et al. 2009).

The dissertation contributes to at least two of the areas for further research in eye-tracking, as identified by Wedel and Pieters (2008a) in their review of the eye-tracking literature: It applies the eye-tracking method to visual stimuli other than print advertising and it investigates the interplay between visual attention and evaluation (or "downstream effects," as they call it).

This dissertation distinguishes itself from, and adds to, existing research in several respects: It builds on a field experiment instead of a laboratory experiment, which yields more valid and comprehensive data about shoppers' attention patterns in reality. It provides a very granular measurement of the attention stages. It models attention and evaluation in an integrated framework with in-store and out-of-store factors. Finally, it enhances our understanding of the drivers of choice satisfaction by also including the role of attention as a potential determinant.

1.2 Research Goals and Structure of the Dissertation

This quasi-cumulative dissertation is based on several manuscripts of the co-authors Toni Schmidt, Martin Fassnacht, and Jürgen Pannek.

One could put the main chapters of this dissertation into two buckets: The first would contain chapters 2, 3, and 4, which deal with questions of attention and evaluation at the POP, so to speak the earlier and central parts of in-store decision-making that take place while the shopper is at the POP. The other bucket would contain chapter 5, which is concerned with a later, ex-post stage of the decision-making process, as it deals with questions of choice satisfaction.

Chapters 2 and 3 try to find out what drives attention and evaluation at the POP in a high-involvement product category. Together, these two chapters paint a comprehensive picture of the drivers of attention and evaluation for our example product category. Specifically, chapter 2 covers the main effects that in-store and out-of-store factors can have on attention and evaluation, by means of several logistic and conditional regression analyses. Another central contribution of chapter 2 is a mediation analysis, where attention is treated as a mediator, that unearths whether in-store and out-of-store factors influence evaluation directly, or rather indirectly through the route of increased attention. Its research questions are:

Which in-store and which out-of-store factors have a significant effect on the different levels of attention? Which in-store and which out-of-store factors have a significant effect on the different levels of evaluation? Are the effects of in-store and out-of-store factors on evaluation mediated by increased attention or do they influence evaluation directly?

Chapter 3 extends the model of chapter 2. It includes a comprehensive analysis of interaction and moderation effects. It thus complements the findings of the previous chapter and deepens our understanding of in-store decision-making by providing insights into how different factors interact (which is of great interest in a real in-store setting, in which it usually is "all about the mix") and by what moderators their effects on attention or evaluation might be altered. Chapter 3 tackles the following research question:

Do interaction or moderation effects play a significant role in the relationship of in-store and out-of-store factors with attention and evaluation?

Chapter 4 sheds light on whether shoppers' likelihood to choose their favorite brand is different if they pay more attention to information material at the POP. This is a gauge as to how influential visual merchandising can or cannot be in a high-involvement product choice, which is potentially more driven by preconceptions of shoppers' vis-à-vis a low-involvement product choice. If the degree of attention paid to visual merchandising at the POP has the potential to change the choice likelihood of a brand significantly, it would be an indicator for its overall importance in in-store decision-making. The chapter seeks to answer the following research question:

Does a higher degree of attention paid to information material at the POP during the decision-making process reduce the probability that a shopper chooses her favorite brand?

Compared to the previous three chapters, chapter 5 covers a later stage in the decision-making process of shoppers. Actually, it covers the phase after the decision has already been made: it deals with the determinants of choice satisfaction and thus the question of what makes a choice a subjectively successful one for a shopper. This is a logical extension to the research of the chapters 2, 3, and 4: These have shown what can drive a choice. Chapter 5 deals with what can lead to satisfaction with that very choice. For that, it incorporates several potential determinants of choice satisfaction, including the degree of visual attention at the POP. The goal here is to answer the research question:

Do anticipated regret, perceived search costs, assortment attractiveness, and the degree of attention paid to products, to information material, and to price information at the POP have a significant influence on choice satisfaction?

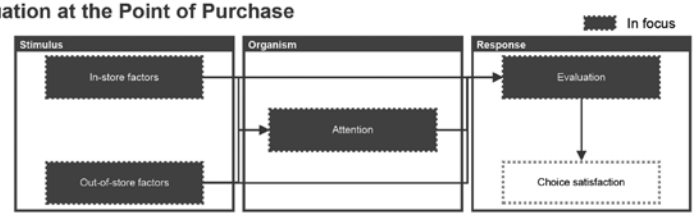
The last chapter offers overarching concluding thoughts. Specific conclusions are placed within the previous chapters, but this last part of the dissertation tries to give a brief, but comprehensive perspective regarding "what this all means".

Figure 1 provides an overview of the research project and the structure of the dissertation.

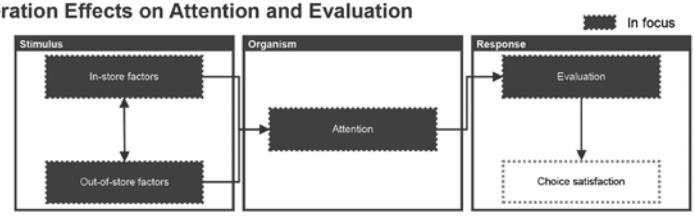
Figure 1: Overview of the Research Project.

Chapter 1: Introduction

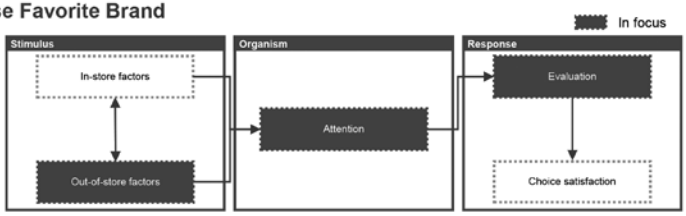
Chapter 2: Main Effects of In-Store and Out-of-Store Factors on Attention and Evaluation at the Point of Purchase



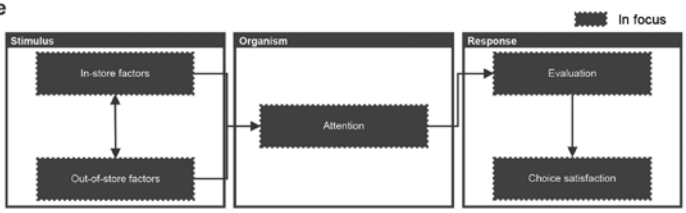
Chapter 3: The Impact of In- and Out-of-Store Factors' Interaction and Moderation Effects on Attention and Evaluation



Chapter 4: Degree of Attention at the Point of Purchase and Likelihood to Choose Favorite Brand



Chapter 5: Determinants of Choice Satisfaction in a High-Involvement Product Choice



Chapter 6: Concluding Thoughts

2 Main Effects of In-Store and Out-of-Store Factors on Attention and Evaluation at the Point of Purchase[1]

2.1 Introduction

This chapter provides insights on the drivers of attention and evaluation at the point of purchase (POP) in a high-involvement product choice. It thereby hopes to add to research on consumer behaviour, shopper marketing and retailing. Its focus lies (1) on studying main effects of a broad set of in-store and out-of-store factors on separate levels of attention and evaluation and (2) on the scrutiny of attention's role as a mediator.

We would like to introduce two important terms for the chapter upfront, because they give the reader a good idea about the study setup and about the applicability of its findings: POP and high-involvement. First, "high-involvement". Being set up as a choice task, our study needed an example product category in which the choice could be made. We chose a category that the experts of the partnering retailer and we considered high-involvement for many shoppers during the product choice: cordless screwdrivers. Usually, this product is not bought very often, i.e., it is not a habitual choice, and, as many products of this category carry a three-digit price tag (in EUR or USD), it is also typically not a cheap item for most shoppers. Moreover, cordless screwdrivers come in many specifications; hence, choosing one normally requires some consideration and effort from shoppers.

Second, "POP", the point of purchase. It is the place where a consumer carries out her shopping decision, but also where the major part of shopping decisions still takes place (Bell et al. 2011; POPAI 1997). There are different types of points of purchases – virtual, like a website, as well as real, like a store or a mall. We performed our study in a real, brick and mortar store of a leading German DIY retailer. The relevance of the POP in marketing is increasing (Chandon et al. 2009; Egol and Vollmer 2009). Managers and researchers seek to better understand how shoppers make their decisions in

1 Based on the manuscript of Schmidt/Fassnacht/Pannek (2014).

the store. Or as Shankar et al. put it: "Given the high degree of decision-making in the store, there is considerable upside in doing a better job of marketing at the point of purchase" (Shankar et al. 2011, p. S31).

To do a better job of marketing at the POP, having a more comprehensive picture of how shoppers spend their limited attention while they are in the store and make decisions would help. Attention can play an important role in in-store decision-making. Plus, "much of what retailers do seeks to attract attention (…)" (Puccinelli et al. 2009, p. 20).

However, attracting attention that does not lead to preference is only partially helpful. Thus, both managers and researchers will profit from a good grasp of the link between the different stages of attention and of the downstream effects that are closer to the actual sale: consideration and choice, which we will subsume under "evaluation" henceforth.

But what drives attention and evaluation in the store? Two classes of factors are said to influence a shopper at the POP: in-store and out-of-store factors (Chandon 2007; Wedel and Pieters 2006).

So, to add to a better understanding of in-store decision-making, one needs to research how in-store and out-of-store factors influence attention and evaluation, and how attention is linked to evaluation. Starting from this basic insight, and as mentioned in Chapter 1.2, we formulated the following questions to guide our research:

- *Which in-store and which out-of-store factors have a significant effect on attention?*
- *Which in-store and which out-of-store factors have a significant effect on evaluation?*
- *Are the effects of in-store and out-of-store factors on evaluation mediated by increased attention or do they influence evaluation directly?*

To answer these, we conducted an eye-tracking experiment in two physical stores of a leading German DIY-retailer. The task for the 117 participants was to choose a cordless screwdriver.

In the field study, we included the following variables: *evaluation*, i.e. the later stages in the decision-making process (consideration and actual choice). *Attention*, i.e. the prior information search stages in the decision-making process (from express fixation to testing of products). *In-store factors*, i.e. factors that impact shoppers in the store through visual perception – we

included the main-marketing levers of the DIY retailer in the screwdriver category and two product attributes. And *out-of-store factors*, i.e. factors that exercise their influence on shopper behaviour through memory activation – we included a product-specific factor, a shopper-specific factor, and a shopper- and product-specific factor.

The study rests on empirical work that differs from most studies heretofore published: It builds on a field exe-tracking experiment instead of a laboratory experiment. It physically exposes shoppers to a high-involvement and multi-faceted example product category (cordless screwdrivers) instead of showing pictures of the respective shelves. It includes product attributes in the analysis and therefore gains new insights on how this class of factors influences shoppers' attention and evaluation.

In the next part, we will introduce our conceptual framework, present relevant findings in the extant literature on each of its elements, and put forth our predictions regarding the relationship between out-of-store and in-store factors and attention and evaluation. Then, we describe the methodology, procedure, and design of our field experiment. In the ensuing section, we will highlight the most important descriptive statistics, regression results, and results of the mediation analysis. The final part discusses the implications of our findings for researchers and managers and outlines limitations and the need for further research.

2.2 Background of the Study

As we have pointed out in chapter 1, there is much previous research about decision-making at the POP, for instance through the analysis of sales data. However, we still know very little about the role in-store attention plays in decision-making processes. The majority of existing eye-tracking studies have been conducted in the context of print advertisements and not in-store decision-making (Wedel and Pieters 2008a). Of the few studies researching in-store decision-making, most were set in a laboratory using pictures of shelves (Chandon et al. 2007; Russo and Leclerc 1994). Furthermore, these studies focused on low-involvement products and analysed relations at the brand and not the product level (e.g., Chandon et al. 2009; Van der Lans et al. 2008).

We have learned from several studies that decision behaviour is highly contingent on the choice task (e.g., Payne 1982; Payne et al. 1993; Tversky and Kahneman 1981). For Payne et al. (1993, p. 6), the question in decision-making research can therefore not be "what is *the* cognitive process", but rather "when are different processes likely to be used". This suggests that results of in-store decision-making research will always be tied to the research context, especially the example product category. To add new insights to the existing body of research, we chose an example category (cordless screwdrivers) together with the partnering retailer that is one of the important categories for the retailer in terms of sales, that is unique in eye-tracking field research so far, and that should yield new insights due to its high-involvement product characteristics (non-habitual choice, relatively high price, many different product attributed to compare). The awareness that different choice contexts give rise to different decision-making processes raises the question of the transferability of our study results, of course. Arguably, these should be applicable to high-involvement product choices. However, there are a huge variety of such product choices: Choosing a specific car, jewellery or watch, or even a new health insurance are probably all high-involvement product choices for most people. Yet, the decision processes applied most probably vary greatly. We expect that our findings are most relevant for physical, utilitarian high-involvement products being bought in brick and mortar stores without extensive assistance by store personnel.

There is a rich body of research in environmental psychology dealing with store atmospherics, a term coined by Kotler (1973), and their effects on shopping behaviour. As summarized by Turley and Milliman (2000), numerous studies had already shown by then that retail atmospherics of many sorts (e.g., music, lighting, design) can influence shopping behaviour. According to them, "shelf space" studies, such as the one this chapter is about, should also be considered to deal with store atmospherics, because placement of merchandise on the shelf, for instance, can be regarded an atmospheric cue. And although research in this stream has deepened our understanding of the influence of store atmospherics on shoppers significantly since then, Dennis et al. (2010, p. 205) indicate that "the mechanisms by which people perceive stimuli and convert those perceptions into actions are still not fully understood", hinting at a need for further research in this area.

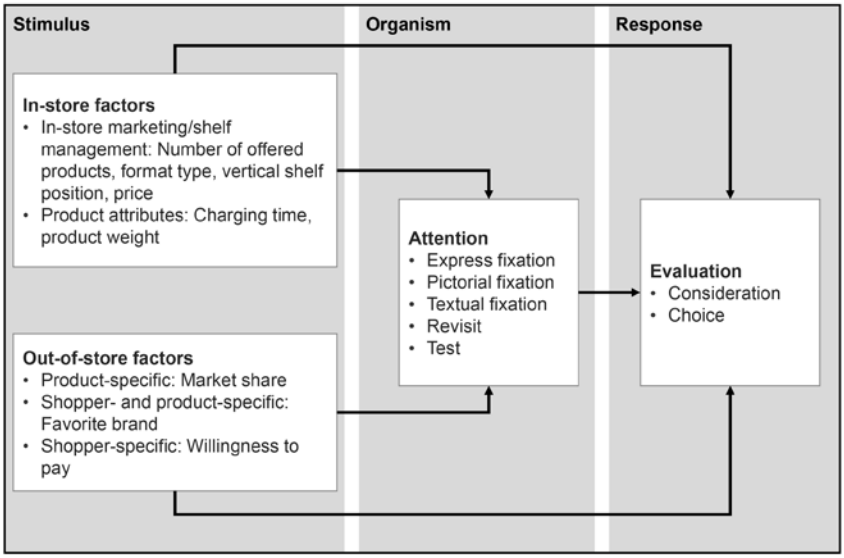
Both Dennis et al. (2010) and Jacoby (2002) point to the fact that the encountered environment is usually perceived as a "package" of stimuli. This theoretically calls for comprehensive research models, while in reality "most studies on retail atmospherics involve a single manipulation" (Michon et al. 2005, p. 580). Ours is no exception, unfortunately, as the only experimental manipulation is that of vertical shelf position. However, as the chapter's primary focus is on a broad set of measured stimuli of in-store attention and evaluation and on attention's role as a mediator, we hope this is mitigated by its contributions in these areas.

The environmental psychology research stream often draws on the stimulus-organism-response (S-O-R) model, introduced by Mehrabian and Russell (1974) and shown to be useful and relevant in retailing research by Donovan and Rossiter (1982) and Donovan et al. (1994). We will also employ the S-O-R model as our basic conceptual framework.

2.3 The Conceptual Framework

Figure 2 shows the conceptual framework for our research. We have adapted a framework developed and established by Chandon et al. (2009) for eye-tracking research. It is clearly an adaptation of the well-known Stimulus (in-store and out-of-store factors), Organism (attention), and Response (evaluation) (or S-O-R) model, and it fulfils the criteria that Donovan and Rossiter (1982, p. 36) have postulated: "An adequate S-O-R model has the following requisites: a stimulus taxonomy, a set of intervening or mediating variables, and a taxonomy of responses". Turley and Milliman (2000, p. 208) pointed out in their summary of atmospheric effects on shopper behaviour that the field "has a strong need for additional theory development". They specifically call for a "macro" level theory that would help explain how shoppers perceive the entire set of cues in a store. The field of in-store eye-tracking studies in science is still rather new, and to the authors knowledge, no better theoretical framework exists today than the adaptation of S-O-R we apply. An indication of that is that the landmark in-store eye-tracking study of Chandon et. al (2009) also still draws on S-O-R.

Figure 2: Conceptual Framework of Attention and Evaluation at the POP, adapted from Chandon et al. (2009).



According to the S-O-R paradigm, observable shopper behavior is a result of the interaction of observable stimuli and not observable psychological processes within the shopper. The S-O-R framework promotes the view that "in higher organisms, mental processes in addition to physiological mechanisms translate a stimulus into behavior. […] Mediating mechanisms are what determines how an organism responds to a stimulus" (MacKinnon 2008, p. 2). Precisely how these mediating mechanisms work is usually hard to gauge: Investigating them often is hampered by measurement problems of the organism stage, because this stage usually is not directly observable but is mostly a "black box" for researchers (Fairchild and MacKinnon 2008; MacKinnon 2008; MacKinnon and Fairchild 2009). But, as Duchowski (2007) points out, an understanding of these unobservable mechanisms internal to the shopper should be highly interesting for marketers as it would allow them to tailor the information they provide more precisely to what shoppers actually require for their decisions. In the past, researchers were mostly obligated to rely on merely indirect measurements of the organism stage (for instance by verbalization through study subjects) to gain

an understanding of shoppers' internal processes. The great promise of the eye-tracking method is that it renders directly observable a vital part of the organism stage in our context – visual attention at the POP (Pieters and Wedel 2008). This allows to overcome part of the measurement problem usually encountered and to later perform a mediation analysis to investigate the mediating role of attention on a solid data basis.

Stimuli in our context are those factors that impact a shopper's decision-making process at the physical POP (in-store and out-of-store factors). Attention (or Organism) refers to the visual attention a shopper pays while completing the choice task. And evaluation (or Response) describes whether a shopper considered or chose a product or not. Here, we only briefly sketched the different elements of our framework, as the following parts of the chapter, in which we develop the hypotheses, will describe them more thoroughly: they present each variable of the research model and highlight the respective state of the art in marketing and eye-tracking literature. Table 1 provides an overview of the variables and their definition.

Table 1: Overview and Definitions of Variables in Chapter 2

	Attention Variables		**In-Store Factors**
Express fixation$_{ij}$	1 if subject i fixated on product j < 100ms, 0 if otherwise	Number of offered products$_{i}$	1/2 if for subject i 22 products on shelf, -1/2 if 16 products on shelf
Pictorial fixation$_{ij}$	1 if subject i fixated on product j 100 ms – 300ms, 0 if otherwise	Format type$_{i}$	1/2 if for subject i test format setup, -1/2 if standard setup
Textual fixation$_{ij}$	1 if subject i fixated on product j > 300ms, 0 if otherwise	Vertical shelf position$_{ij}$	1/2 if for subject i product j on upper row, -1/2 if on lower row
Revisit$_{ij}$	1 if subject i revisited product j after fixating on other products, 0 if otherwise	Price$_{j}$	Z-score of price of product j
		Charging time$_{j}$	Z-score of charging time of product j
Test$_{ij}$	1 if subject i took product j from shelf for testing, 0 if otherwise	Weight$_{j}$	Z-score of weight of product j

ATTENTION$_{ij}$	Ordered categorical variable that indicates whether product j received no fixation (0), express fixation (1), pictorial fixation (2), textual fixation (3), revisit (4) or test (5) by subject i	**Out-of-Store Factors**	
		Market share$_{ij}$	1/2 if high market share product, -1/2 if low market share product
		Favorite brand$_{ij}$	1/2 if for subject i brand of product j is favorite brand, -1/2 otherwise
	Evaluation Variables	Willingness to pay$_i$	Z-score of reservation price of subject i
Consideration$_{ij}$	1 if subject i product considered product j for purchase, 0 if otherwise		
Choice$_{ij}$	1 if subject i chose product j, 0 if otherwise		
EVALUATION$_{ij}$	Ordered categorical variable that indicates whether product j was neither considered nor chosen (0), considered but not chosen (1), or considered and chosen (2) by subject i		

2.3.1 In-Store Factors and their Influence on Attention and Evaluation

We first derive the hypotheses concerning the first group of stimuli: in-store factors. Among them, we distinguish two in-store factors types: In-store factors related to in-store marketing and those related to product attributes.

In-store factors related to in-store marketing. These stimuli are mainly under the control of retailers. We included all the main in-store marketing levers of retailers in our example product category, cordless screwdrivers, at the shelf level: number of offered products, format type, vertical shelf position, and price. Different facing sizes (e.g., two or three adjacent items of one SKU on the shelf, as is common in grocery retailing) do not exist in this category in the shelf setup of our partnering retailer. There is only one demo screwdriver per SKU provided at the POP.

Start with the *number of offered products*: This variable varies between the two different store types in which the experiment was conducted.

The literature offers no indication regarding its impact on attention in a comparable case. In terms of its influence on evaluation, two conflicting opinions can be found in the literature. The more traditional logic would be that a higher number of options should satisfy a broader set of needs, hence hinting at a positive relationship (Broniarczyk et al. 1998; Kahn and Wansink 2004). The other stream of research argues that too much choice leaves the shopper overwhelmed, leading to a negative relationship (Diehl and Poynor 2010; Fasolo et al. 2009; White and Hoffrage 2009). Given these differing opinions, we do not hypothesize an effect between number of products offered and attention or evaluation.

Two different shelf *format types* were tested in the experiment: the retailer's standard shelf setup and a test shelf setup. The test format distinguishes itself from the standard format in two ways: Firstly, we revised the clustering logic of the products. These are clustered into three groups (basic, professional, professional plus), but in the standard format the logic by which the products ended up in their cluster seemed hard to discern for the non-professional shopper, and within each cluster, there were huge price spans between the cheapest and the most expensive product. The new clustering in the test format offered clearer indications of the use intended for the products in each cluster (e.g., "to mount furniture and for small screws" versus "for building a garden hut or car port") and reduced the price heterogeneity within each cluster. Secondly, product cards and information boards atop the shelf were redesigned and made more consistent. Although we did not measure attention towards information material but only to the products themselves, we still predict a positive relation between the revised test format and attention: Shoppers should feel better educated by the less technical, more end user-friendly information material, and thus scrutinize the products more closely. Further downstream the decision-making process, shoppers could also be more confident to make a choice. Thus, we predict a positive relationship between the test format type and both attention and evaluation.

H_1: The test format positively impacts attention and evaluation.

Vertical shelf position was manipulated experimentally. Research suggests that not all shelf positions are equal in terms of attention drawn and evaluation received (Chandon et al. 2007; Drèze et al. 1994; Valenzuela 2009).

Few studies have dealt with the impact of shelf position on attention. Chandon and colleagues' (2007, 2009) results suggest that putting brands on the top shelf has a positive impact on all levels of attention and on evaluation compared to brands in a bottom location. They find that attention increases for a (vertical) center position, compared to a bottom position; evaluation, however, does not. Chandon et al. (2009) hypothesize that the superior performance of the top row in terms of evaluation might be attributable to quality inferences by the shopper. Diekmann and Schiessl (2011) claim that a position at or slightly below eye-level is best for grabbing attention. Other studies did not look at attention, but focused predominantly on evaluation. In a prominent study, Drèze, Hoch, and Purk (1994) find vertical shelf position to be very influential, with the best location being near the eye or hand level of the shopper. Valenzuela et al. (2013) find that a higher shelf-space position is associated by shoppers with better product quality, so to speak a "higher is better" heuristic. In our experiment, the lower row position is between hand and eye level for most people and the higher row above eye-level. We expect the lower to perform better in terms of attention and also in terms of evaluation, and thus expect the "convenience" aspect of having the products in direct sight and reach to trump the "higher-is-better" heuristic in our case.

H_2: The products positioned in the lower row (between hand and eye level) will draw more attention and get better evaluation than those in the higher row.

The relationship between *price* and attention and evaluation is hard to predict, as all price information is potentially relevant (Chandon et al. 2009). Therefore, we would not expect a connection between shelf price level and attention. As for evaluation, we expect the more expensive products to be considered and chosen less often than the cheaper ones, although price information could also of course be seen as a proxy for quality (Bornemann and Homburg 2011).

H_{3a}: Product prices do not influence the level of attention towards the products.
H_{3b}: Higher product prices worsen evaluation.

Product attributes. Yoon (2013, p. 697) has demonstrated that for utilitarian involvement products (a category cordless screwdrivers belong to), shoppers "prefer rational (product-oriented) experiences such as searching for product-specific information", and that they "focus on intrinsic

attributes". This indicates that product attributes could be an important driver in the choice of a cordless screwdriver, and that better characteristics in a product attribute should enhance attention to and evaluation of the product. Manufacturers (and retailers in the case of a private label) control this type of in-store factors. We included two product attributes that are relevant for shopper decisions in that category according to experts from the partnering retailer: *charging time* and *product weight*. For both attributes, better performance (i.e., shorter charging time and less product weight) should enhance attention and evaluation. The impact on attention should appear only from the textual fixation stages onwards, as the participants can hardly take in information on attribute performance with express or pictorial fixations.

H_{4a}: Shorter charging time increases attention from the textual fixation stage onwards.

H_{4b}: Shorter charging time improves evaluation.

H_{5a}: Less product weight increases attention from the textual fixation stage onwards.

H_{5b}: Less product weight improves evaluation.

2.3.2 Out-of-Store Factors and their Influence on Attention and Evaluation

Out-of-store factors, the second group of stimuli, subsume the predisposition of the shopper before entering the store (e.g., prior knowledge about a product category or previous experience with a brand). They influence attention and evaluation through memory activation and are often influenced more strongly by manufacturers. Literature suggests that out-of-store factors drive the bigger part of variance in evaluation (Bell et al. 2011; Chandon et al. 2009; Inman et al. 2009). We have included an out-of-store factor that varies across products (*market share*), one that varies across shoppers (*willingness to pay*), and one that varies across products and shoppers (*favorite brand*).

High *market-share* products are often more prominent in the interested shopper's mind than low market-share products, because these are often also the products that more communication spending is attributed to. Being more easily accessible in memory, higher market-share products should thus

receive more attention from the outset, that we expect to carry through to better evaluation levels, as high market share might also be regarded as a proxy for quality.

H_6: Products with a higher market share get more attention and better evaluation.

With regard to brands, shoppers can either know a brand or not. And often, from their set of known brands, shoppers have one brand that is their *favorite brand* for a specific product category. Of the participants in our study, little over half had a favorite brand of cordless screwdrivers. Bronnenberg et al. (2012, p. 2472) point out that "consumers appear to have high willingness to pay for particular brands, even when the alternatives are objectively similar". They further consider brands a source of long-term competitive advantage. Few would contest that brands, then, should have an influence on how shoppers make decisions at the POP. We predict that participants pay closer attention to products manufactured by their favorite brand compared to products from other brands – their preferences would thus positively influence their attention. We expect a similar positive influence of favorite brand on product evaluation.

H_7: Products from a shopper's favorite brand get more attention and better evaluation.

Willingness to pay should have a positive influence both on attention and evaluation. A shopper with a higher willingness to pay will find more products that are within her reservation price to look at and compare, and will further have more options eligible for consideration or choice, rendering it more probable that some product is considered or chosen.

H_8: Shoppers with a higher willingness to pay, pay more attention to products and evaluate them more favorably.

2.3.3 The Organism and Response Stages: Attention and Evaluation at the POP

Attention. We define attention as a variable that corresponds to shoppers' *perception* of products on a shelf in a store. It is measured via eye tracking, thus allowing us to get hard data on processes going on in the formerly unobservable *organism* stage of the S-O-R framework. As Chandon et al. (2009, p. 2) point out, "few studies have examined visual attention, and

some studies actually use recall as a proxy for attention" (e.g., Raghubir and Valenzuela 2006). They later find that recall is rather a level of evaluation than of attention. Using recall as a proxy for attention therefore does not seem to be a viable alternative to tracking eye movements.

The modern eye-tracking equipment of the market research agency we worked with is able to discern three different fixation durations (express, pictorial, textual) and thus enabled us to measure attention via fixation length in an unusually granular way. In addition to fixation length, we also include whether a participant examined a product again after having turned to other products in the meantime. We call that a revisit. Furthermore, as our experiment was set at real shelves and with an example product category that shoppers often want to test before purchase, we included testing of a product as the most intense form of attention. So, in sum, we distinguish between five different attention levels: express fixation, pictorial fixation, textual fixation, revisit, and test. For comparison: Chandon and colleagues (2009) report two different attention levels, noting (at least one fixation) and re-examination (at least two fixations). Our finer distinction between degrees of attention should result in an even deeper understanding of attention at the POP.

The exact definitions of each attention level are as follows: *express fixations* are fixations that last less than 100 milliseconds. These are short glimpses that mostly help the shopper to orientate herself in front of the shelf. *Pictorial fixations* are fixations lasting between 100 and 300 milliseconds, allowing the shopper to perceive pictures. *Textual fixations* are fixations that last longer than 300 milliseconds. They enable the shopper to process written information. *Revisits* constitute the next higher attention level. In a revisit, the shopper returns her gaze to a product previously fixated on. *Test* is the highest degree of attention a product can receive. It means a subject actually takes a product from a shelf to test it, for example, to check its handling or to inspect its attributes more closely.

The levels of attention are almost completely nested, i.e., a pictorial fixation is normally preceded by an express fixation, a textual fixation is normally preceded by a pictorial fixation, and so on. Nesting also holds for the two higher attention stages, revisit and test.

Evaluation. Evaluation is a variable that subsumes the higher order stages of in-store decision-making. It is often broken down into the sub-parts recall, consideration, and choice (Alba et al. 1991; Chandon et al. 2009).

We differentiate between the evaluation levels *consideration* and *choice*. *Consideration* is the step in the decision-making process in our context after the test-stage. We will later show in the descriptive statistics section that it is closely related to *choice*, which corroborates that treating consideration as an evaluation stage is appropriate in our sample. We did not include recall because most study participants only recalled on the brand and not the product level. As the level of our analysis is the product, we were unable to include the recall stage. The evaluation levels are also nested: products chosen are part of the consideration set beforehand.

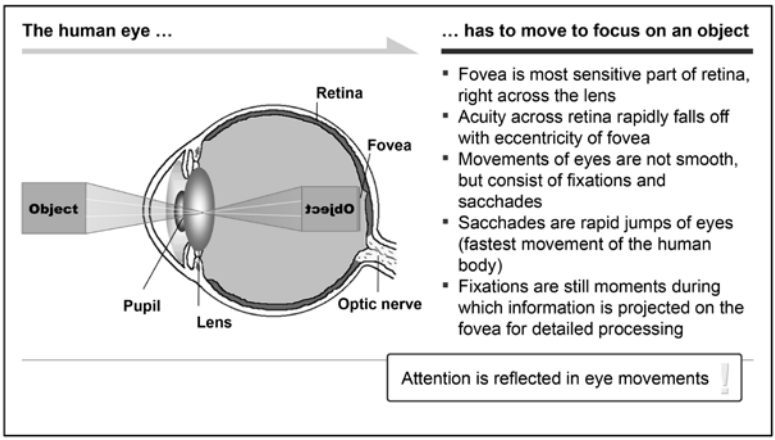
Data on *consideration* and *choice* were gathered as follows: After the experiment, participants were asked to name the products they considered for purchase in their decision-making process. Participants took the chosen product to the cashier where we noted which product was chosen and created the choice variable accordingly.

2.4 Eye-Tracking Experiment

2.4.1 Measuring Visual Attention with Eye Tracking

In the following paragraphs we outline why eye tracking is widely accepted as a way to measure visual attention and introduce the eye-tracking tool used in the experiment. For a quick overview, please see Figure 3.

Figure 3: The Human Eye and Visual Scene Perception (Wedel and Pieters 2006; Duchowski 2007).



Eye movements are closely tied to visual information intake (Wedel and Pieters 2006). Visual information intake accounts for the largest part of shopper information acquisition – according to estimates, around 10 million bits per second (out of a total of 11 million bits per second of information sent to the brain) is attributable to the optical channel (Häusel 2010).

The eye-tracking methodology takes advantage of several characteristics of how humans acquire visual information that are broadly agreed upon throughout the literature (Duchowski 2007; Rayner 1998; Wedel and Pieters 2006): Humans need to move their eyes to be able to closely examine a particular section of their visual field. Only about eight percent of the visual field is projected on the fovea (the part of the eye with the highest visual acuity that sits opposite the lens). Visual resolution drops off sharply in the periphery of the fovea, and hence does not enable people to extract detailed information from an object they look at "from the corner of the eyes" – contrary to a commonly held belief.

People also often (wrongly) perceive their eye movements to be smooth. Our eye movements consist mostly of still moments (fixations), during which we acquire visual information about the object fixated upon, and of ballistic jumps (saccades, the fastest movement of the human body) between the fixations. Saccades are usually incited by peripheral vision and typically last around 20–100 milliseconds. During saccades, no useful visual information is acquired. For that, humans need to fixate upon an object. Most fixations last between 200–500 milliseconds. During fixations, the eyes remain relatively still and allow closer examination of what we are looking at. Chandon et al. (2009, p. 3) point out that "in natural complex scenes, such as supermarket shelves, eye fixations are necessary for object identification, and therefore their location is a good indicator of visual attention." That surely also holds for a DIY retail setting that is no less or even more complex than a supermarket environment.

We do not only learn about shopper attention through the location of their fixations, but also through the length and number of these fixations (Henderson and Hollingworth 1999). Longer and/or more fixations on an object are necessary to acquire more detailed information about it and hence represent a higher degree of attention (Chandon et al. 2007).

As mentioned, eye-tracking studies conducted in the real world at the POP and not in a lab are still very rare to this day, which is probably due

mainly to technical reasons: "Until recently, the commercial use of eye-tracking devices was cumbersome, time consuming, and expensive" (Wedel and Pieters 2008a, p. 123). The latest generation of eye-tracking devices has made great strides in terms of precision, but also in terms of unobtrusiveness and convenience for the study participants (Day 2010). Our eye-tracking data were acquired in collaboration with a leading market research agency using the modern, head-mounted eye-tracking device "Mobile Eye" from Applied Science Laboratories (see Figure 4). "Eye Vision" data processing software was used to decode the eye-tracking data. The device is a pair of glasses with two installed infrared cameras and a gadget that sends acquired data wirelessly to a database. Every 40 milliseconds information about the focal point of the participant is collected. A person needs to focus on a point at least twice for the device to count it as a fixation. The minimum length of a fixation to be measured is therefore 80 milliseconds. If a participant focuses on a point for longer than that, the system measures the increased duration of the fixation accordingly. This latest-generation eye-tracking device allows study participants to move freely in the store, which enabled us to conduct our study in real stores, providing a very realistic setting for the study participants and complying with what Kingston et al. (2003) call for: to take a look at the real world.

Figure 4: Exemplary Shopper Wearing the "Mobile Eye" Eye-Tracking Device.

2.4.2 Design

Shoppers about to buy a cordless screwdriver often spend a significant amount of time on the decision (median task time in the experiment was

6 minutes and 2 seconds) and are motivated to learn more about their potential product choice, which is characteristic for a high-involvement state (Zaichkowsky 1985). Participants in the experiment could access and compare the products and their specific attributes. We set up our study as a 2x2 factorial between-subjects design.
The experiment took place in two stores of a DIY retailer (which had a different number of offered products in the category - 16 vs. 22 SKUs). Two different shelf setups were tested in each store: The retailer's standard shelf setup (control) and a test setup that randomly varied the vertical placement of the products on the shelf (treatment).

2.4.3 Process

Full-time employees of the partnering market-research agency recruited the study participants and conducted all steps of the experiment (interviewing, calibration of eye-tracking device). Participants were recruited in the two stores where the experiment was carried out. These two stores were typical outlets of the partnering retailer with average customer frequencies.

Shoppers entering these stores were asked whether they were concretely planning on purchasing a cordless screwdriver in the near future – this was the criterion for a shopper to be able to participate in the experiment. If they did and were willing to take part in the experiment, we asked them to come back the following week for the experiment. They received a EUR 30 voucher from the retailer for participation.

Both recruitment activities and the experiment itself were carried out on all weekdays (Monday to Saturday). In total, activities in each store lasted three weeks: One week for recruiting the control group, one week for the experiment with the control group and for recruiting the treatment group, and one week for the experiment with the treatment group.

Before the eye-tracking experiment took place, the interviewer welcomed the participants at the store entrance, conducted a pre-store questionnaire-based interview to extract the out-of-store factors of each subject and familiarized them with the eye-tracking device. The participants were instructed to go in the store to the cordless screwdriver shelf, choose their preferred item, and take it to the cashier – just as they would do in a real purchase situation. Please note, however, that they did not have to purchase the

product. After that, the interviewer performed a post-store interview to learn about the consideration set and about socio-demographic data.

2.4.4 Sample

We recruited shoppers in the store of the partnering retailer with an interest in cordless screwdrivers and an intention to purchase one in the coming 12 months, to take the experimental purchase as close to a real decision situation as possible and to ensure a certain level of prior information and proximity to the category. These were "normal" end-consumers and not professional users (e.g., craftsmen) – the partnering retailer has a clear focus on non-professionals. Of the 117 shoppers participating in the experiment, 60 per cent were male and 40 per cent female. The participants were between 20 and 69 years old, with an average age of 43 years. The participants were randomly assigned to their groups. Each of the four groups had about the same number of subjects.

2.4.5 Product Category

We chose the utilitarian high-involvement product category cordless screwdrivers for our experiment. As mentioned above, we considered a product choice in this category to evoke involvement in many shoppers, as cordless screwdrivers are typically not bought habitually, are relatively expensive, and can be compared across many different attributes. The rationale, then, was that shoppers go through a quite extensive decision-making process when making buying decisions in such a product category. This was desirable for the study, so we could observe a rich, relatively long decision-making process via eye-tracking.

Figure 5 shows one of the shelves tested in the experiment. On the top half of the shelf are demo-products that shoppers can closely inspect and test. In the bottom are the respective products in cartons for purchase (not included in the analysis, as shoppers focused on the test products to make their decision). That reaffirms why we could not test for the effect of different facing sizes in our study: Among the test products, only one screwdriver per product type is displayed. The test products are presented in two rows, the lower between hand and eye level for most participants, the higher somewhat above eye level.

Figure 5: Example of a Shelf Tested in the Experiment.

2.4.6 Measurement of Independent Variables

In-store factors are either controlled in the experiment or predetermined by the example products or the partnering retailer. *Vertical shelf position*, *number of offered products* and *format type are* varied experimentally. *Price*, *charging time*, and *product weight* remained constant for all experimental groups. *Charging time* and *product weight* are given by each products specification, while for *price,* we left the standard shelf price of our partnering retailer unchanged.

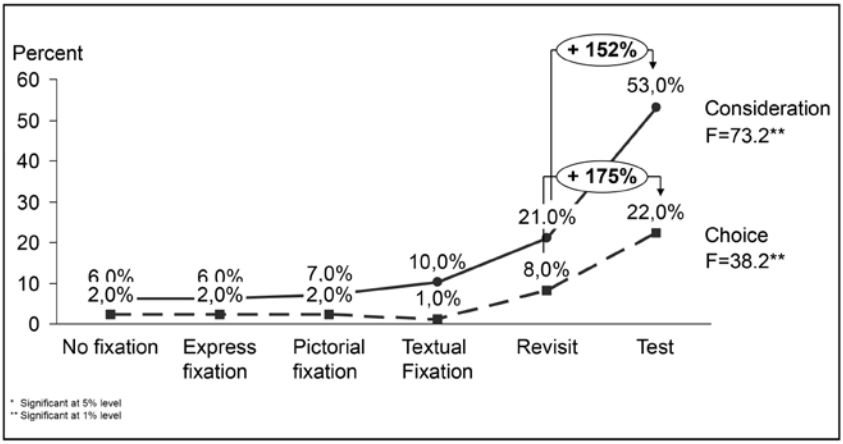
Out-of-store factors are extracted from the pre-store survey (with the exception of the variable *market share*, which was approximated by the sales share of the product in the example category of the partnering retailer, which is the market leader in Germany). Participants stated their *favorite brand* (if they had one) and their *willingness to pay*.

2.5 Results

Participants spent on average almost 7 minutes (408 seconds) to complete the choice task in the store. The maximum task time was more than 20 minutes (1229 seconds), the minimum task time half a minute (28 seconds), the median task time was about 6 minutes (362 seconds).

81% of products received an *express fixation* (fixation length < 100 ms) and 78% of products a *pictorial fixation* (100 ms – 300 ms). However, higher levels of attention are paid to considerably less products by shoppers: only 45% of products received a *textual fixation* (> 300 ms), 28% were *revisited* (more than 1 fixation on product), and shoppers took only 8% of products off the shelf for *testing*. This indicates that participants' search behavior follows a rational pattern: Higher attention was allocated more sparsely than lower attention. Higher attention was also more regularly allocated to products that received a better evaluation downstream. Figure 6 highlights that relationship: The likelihood of a product that received at most a *pictorial fixation* to end up in the *consideration* set was only 7%. However, of products taken off the shelf for *testing*, 53% were later *considered* and 22% *chosen*. Figure 6 further shows that the truly large step towards positive evaluation is that between *revisit* and *test*, which increases the likelihood of being *considered* by 152% and to be *chosen* by 175%.

Figure 6: Higher Attention Levels Increase the Likelihood of Consideration and Choice.



Testing cannot be treated as an evaluation level rather than an attention level, however, as the correlations between attention and evaluation levels show (see Table 2): We observed a very strong correlation between *choice*

and *consideration*, and a much weaker correlation between *consideration* and *test*. Correlations between *consideration* and lower levels of attention are even weaker (though still significant), indicating that data on fixations are in fact no substitute for data on consideration or choice and vice versa.

Table 2: Positive Correlation between Attention and Evaluation Levels

		Attention					Evaluation	
		Express fixation	Pictorial fixation	Textual fixation	Revisit	Test	Consid-eration	Choice
Attention	Express fixation[1]	1.00						
	Pictorial fixation[2]	.52**	1.00					
	Textual fixation[3]	.27**	.36**	1.00				
	Revisit	.23**	.31**	.68**	1.00			
	Test	.14**	.16**	.33**	.46**	1.00		
Evalua-tion	Consideration	.12**	.12**	.24**	.30**	.34**	1.00	
	Choice	.07**	.07**	.15**	.23**	.25**	.55**	1.00

1 Express fixation < 100 ms
2 Pictorial fixation 100 - 300 ms
3 Textual fixation > 300 ms

* Significant at 5% level
** Significant at 1% level

It seems that, as expected, higher attention levels go hand in hand with better evaluation. Nevertheless, the positive correlations between evaluation and attention levels have yet to illuminate what causes attention and evaluation in the first place. We still need to elicit which factors were responsible for the higher attention and the better evaluation. To get a better understanding of this relationship, the next section presents the findings from a set of regressions with attention and evaluation levels as dependent variables and in- and out-of-store factors as independent variables.

2.5.1 Hypothesis Testing through Regression Analysis

To ascertain the individual effects of in-store and out-of-store factors on attention and evaluation levels, we conducted random-effects logistic regressions. We chose that method for two reasons (Hox 2010): First, calculating logistic regressions was called for because the dependent variables of the regressions are binary categorical – attention and evaluation

levels are 0/1 coded. Second, the method needed to take into account that our data have a repeated measures structure. This was achieved through inclusion of random effects into the regressions. The data show repeated measured characteristics because every participant could look at multiple products. Fixation patterns in one participant have a higher likelihood of being correlated than fixation patterns between participants. To obtain reliable parameter estimates and standard errors, it was therefore necessary to separate the effects within participants from the between effects that are not mainly participant-induced. We controlled for individual heterogeneity by specifying the model as a panel model, with participants as the panel variable.

We specified the different stages of attention and evaluation as dependent variables and the in- and out-of-store factors as independent variables. In sum, six binary random-effects logistic regressions were calculated: one each for the attention levels "express fixation," "pictorial fixation," "textual fixation," "revisit," and "test," and for the evaluation level "consideration." For the other evaluation level "choice," we estimated a conditional logistic regression as the study participants were bound to choose but one product, whereas they could guide their attention and consideration to several products (Verbeek 2008). No coefficients can be estimated for shopper-specific factors that are constant across products per participant (number of products, format type, willingness to pay). We believe that the separate analysis of the different fixation levels, revisit, test, consideration, and choice will yield important insights on the effects of in-store and out-of-store factors on a detailed set of behaviors. Table 3 summarizes the unstandardized coefficient estimates and standard errors of the regressions.