Improving pharmacy store performance

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Improving pharmacy store performance: the merits of over-the-counter drugs

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Abstract

Purpose – This study aims to increase understanding of the factors that affect retail pharmacy performance. This paper investigates how various product-, store-, customer- and competitor characteristics affect over-the-counter (OTC) drug sales and thus store performance.

Design/methodology/approach – This paper specifies and estimates a hierarchical model comprising scanner-based information, as well as individual-level data from a customer survey.

Findings – Results indicate that the drivers of retail pharmacy performance in OTC categories are different from those identified in traditional retailing research.

Originality/value – This is the first study that determines which factors impact the sales of OTC drugs in pharmacies.

Keywords Health care, Retailers, Regression analysis, Pharmaceuticals

Paper type Research paper

1. Introduction

In several European countries, the retail pharmacy sector is going through turbulent times. The intensified competitive climate and prevalence of third-party reimbursement schemes, along with changes in customer purchasing patterns, impose great challenges onto traditional retail pharmacies (Bryant, 2010). Recent deregulation efforts have led to a shift in the composition of the sector's participants. Not only has the number of alternative retail pharmacy outlets, such as mail-order pharmacies and new online pharmacy sites increased, but new entrants and vendors from outside the industry (e.g. drugstores) have also been attracted (Taylor *et al.*, 2004). As an example, we mention some developments in Norway and Iceland. In both countries, new policies have altered the competitive structure of the pharmacy market and led to increases in the number of pharmacy outlets and the formation of nationwide pharmacy chains through horizontal and/or vertical integration (Almarsdóttir *et al.*, 2000; Anell and Hjelmgren, 2002). Similar changes in market structure and competition are expected or have been witnessed in other European countries that followed the Scandinavian example (Vogler *et al.*, 2012).

Another development in this sector is that the rising health-care costs have spurred governments and health insurers to take measures to stem this growth, and a series of reforms has been put forward. Factors that affect these health costs are changing demographics such as growing populations which implies more medical care, more aging people and more opportunities to give medical treatments to people. The rapid proliferation of drugs that were switched from prescription to over-the-counter (OTC)[1] status is to a certain extent seen as a reaction to expanding health-care costs because

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parts of the cost burden is transferred from third party payers to consumers (Creyer *et al.*, 2001). In addition, some European governments (and insurers) have modified the reimbursement conditions for pharmaceuticals, a measure designed to create more competition and, at the same time, enable cost containment. Since 2006, The Netherlands, for example, has introduced a number of new reimbursement agreements, which came to be known as "preference policy", allowing health insurers to reimburse only the cheaper (or cheapest generic) product in a category instead of the more expensive branded equivalent. These new practices have important consequences for pharmacy retailers. With the erosion of their price negotiation power and the remuneration for prescriptions, they lose a substantial part of their revenues. Such reforms will further cause traditional pharmacy retailers to experience a growing tension between professional and commercial interests. On the one hand, pharmacies have the objective to provide unbiased expert advice on medicines and treatment options (WHO, 2010), but, on the other hand, they are commercial institutions with a responsibility to secure their viability. In response to the increasing threat of dwindling income sources, retail pharmacies are forced to generate revenues out of other businesses to stay competitive (McGee *et al.*, 2000).

The development of professional marketing competences is crucial to gain a competitive advantage compared to other pharmacies as well as other outlets that sell OTC products. The above developments indicate the need for retail pharmacies to change their current business model and develop a more commercial view to resist the financial and competitive pressure. Retail pharmacies no longer position themselves as health-care providers but must also respond to an environment in which consumers demand easy access to a variety of medicines and pharmaceutical advice (Taylor *et al.*, 2004). OTC products may provide a basis for improving pharmacy performance and help pharmacies differentiate themselves from their competitors (Schmidt and Pioch, 2004). Non-prescription medicines offer a common therapy choice for many people, and they are gaining importance in the retail health-care industry. It is our objective to study how improving OTC category sales can contribute to pharmacy store performance.

Some indications suggest that the OTC market behaves like a regular consumer goods market rather than the market for prescription drugs: The patient (not the physician) is the primary decision maker in selecting the OTC product. Furthermore, OTC products usually are not covered by health insurance, so the patient pays the full price for them, so that price likely influences consumers' product choice decisions. Although it seems tempting to propose that retail factors that have proven successful in the consumer goods market may be important factors in the retail pharmacy market there is virtually no empirical evidence to justify this in the retail pharmacy context. Considering the role pharmacies now play in the health-care value chain, such a thorough investigation is highly relevant and required (Manchanda *et al.*, 2005; Stremersch and van Dyck, 2009).

We perform a study in the Dutch pharmacy market in which we identify crucial factors that explain differences in pharmacy performance. We empirically examine which important product-, store-, customer- and competitor characteristics enhance OTC category sales and store performance. Thus, we aim to advance understanding of marketing activities that determine sales performance in the pharmacy sector, and elucidate whether marketing instruments and retail performance drivers are as effective for OTC drugs as they are for consumer goods. By adding subjective indicators (i.e.

customer perceptions) next to objective market and store characteristics we seek to offer insights into their relative importance and their effectiveness as performance drivers. By focusing on OTC products, a product category of growing importance but not widely researched, we also complement the literature on marketing for pharmaceuticals.

We make several key contributions. First, we find that, unlike findings in many studies on marketing effectiveness of retailers, OTC assortment and promotions are crucial determinants of pharmacy performance. Second, our empirical findings show that location factors that are critical for traditional retailers may be less significant for retail pharmacies. Third, we identify specific location factors that drive OTC category sales for the pharmacies in our study. Fourth, we demonstrate that the combination of scanner-based and consumer-level data enables us to link important variables in this market. Fifth, we show that the multilevel data analysis method developed elsewhere in literature is an appropriate method to determine the effects of various store performance drivers. The model provides a tractable way of capturing the impact of factors that belong to different levels of aggregation, such as store- and category-related factors.

The results of our study thus can help retail pharmacies cope with the ramifications of a deregulated health-care market and determine how to address it using marketing strategies.

In the next section of this article, we provide a summary of relevant literature which relates to two main domains of interest: research in the field of OTC products and drivers of store performance. We then describe our data and present our modeling framework. After we discuss the findings, we conclude with some implications and limitations of our study.

2. Literature on marketing for OTC pharmaceuticals

The market for self-medication is marked by intense competition and high pay-offs, largely due to recent deregulation efforts that have facilitated transitions from prescription to OTC drugs and the many new entrants in the market. Manufacturers compete heavily for market share through intense promotions, allocating promotional budgets of $50-100 million to many OTC products (Harrington and Shepherd, 2002). Unlike prescription medicines, OTC products can be promoted directly to consumers in most countries[2]. These market developments also increase the complexities of OTC drug therapies and consumers' decision-making processes, and product selection becomes more and more difficult (ISMP, 2007). Hong *et al.* (2005) find that 50 per cent of consumers are willing to pay a price premium to receive pharmacist advice about OTC drugs.

Notwithstanding that some characteristics of the OTC market are similar to characteristics of consumer goods markets, consumer research emphasizes that OTC drugs generally are perceived as medications rather than regular consumer goods (Taylor *et al.*, 2004). Thus, for OTC products as compared to consumer goods, different factors may be important for consumers' decision-making. Until now, only a small body of research has explicitly addressed OTC product decisions in a marketing context. We discuss the relevant studies below.

First, medical products are experience goods that have intangible product characteristics (Narayanan *et al.*, 2005), as well as inherent risks (Bissell *et al.*, 2000). Unlike ethical drugs, which are prescribed by a physician, OTC drug consumers must rely on their own judgment. These consumers likely perceive some risk in

self-diagnosing with regard to determining their most suitable treatment. Although OTC products often are available in other retail sites, many patients seeking an OTC solution to their health problems may prefer to receive guidance from a health-care provider (i.e. pharmacist) to reduce their perceived post-purchase risk (Grewal *et al.*, 2007).

Second, evaluating a drug's effectiveness is fairly difficult. The effects of a drug vary from patient to patient and when taken in combination with other medicines or at certain times (Katz, 2007). Because the effect of a drug on health conditions can be learned only through use, prior experience with and knowledge about the product play significant roles in purchase decisions (Akçura *et al.*, 2004; Gönül, 1999). While the quality of most (fast moving) consumer goods can be relatively easily ascertained beforehand or shortly after purchase this is rarely the case for drugs. Often the quality with regard to efficacy and safety is not readily observable and can only be determined after considerable time. Because of the difficulty to obtain such information about the drug's quality, patients are quite reluctant to switch once they have found a drug that works for them (Gönül, 1999).

Third, Gönül (1999) shows that patients exhibit some price expectations for OTC drugs, but prior purchases of a brand, rather than price concerns, govern actual OTC drug purchases. The low price sensitivity of the demand for OTC drugs receives confirmation from Akçura *et al.* (2004). In particular, when other quality cues are missing, price acts as an important indicator of quality, and patients tend to choose more expensive drugs. Price promotions therefore may be inadequate to enhance sales performance, whereas other promotional tools (e.g. conspicuous displays, meaningful features) and non-price marketing instruments may be more impactful (Ling *et al.*, 2002).

3. Literature on drivers of store performance

Store performance can be assessed in several ways including retail patronage, store traffic, store profits or overall sales (Reinartz and Kumar, 1999). However, aggregated sales measures have been criticized for ignoring differences in sales of products in particular categories in an individual store, and therefore, the assessment at a more disaggregate level (e.g. category level) has been proposed as the basis for developing efficient strategies (Campo *et al.*, 2000; Grewal *et al.*, 1999).

Retail marketing literature contains numerous studies investigating determinants of retail patronage and store performance (Kumar and Karande, 2000; Pan and Zinkhan, 2006; Reinartz and Kumar, 1999). More recently, retailing research has increasingly focused on micromarketing and on those market and store characteristics that affect a store's sales performance (Campo *et al.*, 2000; Campo and Gijsbrechts, 2004; Hoch *et al.*, 1995; Montgomery, 1997). Amongst the most frequently cited factors are: marketing mix variables such as promotions and assortment; environmental characteristics, such as competition; and store variables such as size or image. Yet, the majority of studies, so far, concentrate on grocery or convenience stores. Table I provides an overview of studies that empirically analyze the impact of store-, customer- and competitor characteristics on (category) sales and store performance.

The factors that were investigated by the papers in Table I are the starting point for possible drivers of pharmacy performance that we study. We discuss the selected market and store outlet characteristics that we use in our empirical study below.

Table I.
Overview of studies considering the impact of store-, customer- and competitor characteristics on performance

	Context	Performance drivers: Market characteristics: Competition	Market characteristics: Socio-demographics	Store characteristics: Store location	Store characteristics: Store size	Store characteristics: Store image	Store characteristics: Marketing mix
Micro-marketing studies							
Hoch *et al.* (1995)	Store-level price elasticities; supermarket categories	Yes (mostly s/−; weak)	Yes (s)	Indirect (trade area characteristics)	Not considered	Not considered	Price
Montgomery (1997)	Store-level price elasticities; supermarket categories	Yes (mainly ns)	Yes (s/few)	Indirect (trade area characteristics)	Not considered	Not considered	Price
Grewal *et al.* (1999)	Efficiency (DEA); non-food (automobile parts)	Not considered	Not considered	Indirect (regions)	Yes	Not considered	Assortment planning
Campo *et al.* (2000)	Category attraction and space share; Supermarket categories	Yes (mixed effects)	Yes (s/few)	Indirect (trade area characteristics)	Yes (s/+)	Not considered	Shelf space
Gijsbrechts *et al.* (2003)	Store flyer effects on store traffic and sales; supermarkets	Yes (s/weak and mixed)	Yes (s)	Indirect (trade area characteristics)	Yes (mixed moderating effects)	Not considered	Feature promotions (flyer size (ns), discount (s/+), in-flyer cat. space (s/+)
Campo and Gijsbrechts (2004)	Category space allocation; super-, and hypermarkets	Yes (s/−; more pronounced for hypermarkets	Yes (s/more pronounced for supermarkets)	Indirect (trade area characteristics and store format)	Yes (s/+)	Not considered	Not considered
Retail environment & outlet location studies[a]							
Kumar and Karande (2000)	Grocery stores	Not considered	No. of households (s/+)	Indirect (regions)	Not considered	Not considered	Scrambled merchandising (s/+) Coupons (s/+)
Pan and Zinkhan (2006)	Meta-analytical review	Not considered	Yes (s/few)	Indirect (shopping convenience)	Not considered	Yes (s/+, for frequency of visit)	Assortment (s/+) Price (s/+)
Zhu and Singh (2009)	Discount stores	Yes (s/−)	Yes (s)	Yes (s)	Not considered	Not considered	Not considered
This study	OTC products, retail pharmacies	Yes	Yes	Yes	Implicitly	Yes	Assortment, Impulse categories, Promotions

Notes: s: Supported; ns: not supported; (−) negative effect; (+) positive effect, when applicable; [a] we acknowledge that there is a growing body of research that addresses outlet location decisions in the context of unobserved spatial demand and competition, applying spatial econometrics and structural models (Thomadsen, 2007; Duan and Mela, 2009). Here, we restrict ourselves to a selection of those studies that we consider as most important for our research

3.1 Market characteristics

3.1.1 Competition. Competition has been found to exert considerable influence on a store's performance (Campo *et al.*, 2000; Cleeren *et al.*, 2006). Yet, mixed results have emerged. While some studies confirm a negative effect of competition on store performance (Cleeren *et al.*, 2006; Hoch *et al.*, 1995), others suggest that the presence of more competing outlets may hint at higher economic potential in the respective area and thus positively affect sales performance (Campo *et al.*, 2000). In our empirical study, we will explicitly investigate this possible confound between competitive pressure and location factors.

In local marketing applications, stores that lie within a certain distance or within the trading area are considered competitors (Campo *et al.*, 2000; Hoch *et al.*, 1995; Montgomery, 1997). Distance measures, such as the (average) distance to the nearest competitors or the number of market players are often used to assess the level of competition (Hoch *et al.*, 1995; Montgomery, 1997). Van Dijk *et al.* (2004) suggest using store choice data or managerial expertise to specify competition and, in this way, not falsely exclude relevant competitors because of arbitrarily defined distance measures.

3.1.2 Store location in the trade area. The location of a retail outlet is considered as an important determinant of success and a potential source of market power. It is well documented that consumers consider different criteria when assessing their total shopping cost, the effort to reach a store being one of those. Consequently, the location of a retail outlet is a vital determinant of success through its influence on consumer patronage (Arnold *et al.*, 1983; Kumar and Karande, 2000).

Davies (1972) identifies three types of influence of a retail outlet location. He distinguishes arterial accessibility, general accessibility and special accessibility of a retail location. Arterial accessibility relates to effort that is needed to reach a store from the major traffic arteries. Good arterial accessibility typically leads to retail configurations that have ribbon-like characteristics along the major axial roads. General accessibility refers to the most central position in an area, leading to nucleated centers of retail outlets (Craig *et al.*, 1984). Areas with good special accessibility consist of clusters of shops that are similar or complementary in their functional offerings, such as clusters of furniture shops or clusters of health facilities. In our empirical application, we include variables for each of the three types of retail location influence.

3.1.3 Socio-demographic control variables. Prior research documents the influence of socio-demographic characteristics, such as income, age or household size on a store's performance through their differential impact on purchasing power, buying behavior and store choice (Hoch *et al.*, 1995; Kumar and Karande, 2000; Reinartz and Kumar, 1999). People with higher income tend to confront higher opportunity costs for their time and often are more disposed to pay for convenience (Reinartz and Kumar, 1999). In contrast, elderly people and larger households may face more severe budget constraints and are therefore more price-conscious. In addition, elderly consumers have different needs and preferences toward products and services that will influence their store choice decisions (Moschis and Friend, 2008). They tend to prefer stores of known reliability, and where help is provided in choosing amongst products. Due to the limited mobility that elderly people often experience the ease of reaching a store as well as the distance to it will become more important reasons for patronizing a specific outlet (Moschis *et al.*, 2004).

3.2 Characteristics pertaining to the store outlet

The following are the characteristics pertaining to the store outlet:

3.2.1 Store size. Prior research reveals that the size of a store can help explain retail store performance, acting as an indicator of assortment availability, convenience or service level (Campo *et al.*, 2000; Campo and Gijsbrechts, 2004).

3.2.2 Image. Chain and store image affects retail patronage and thus category and store sales (Baker *et al.*, 2002). Image generally is based on consumers' evaluation of salient store attributes, such as the store's accessibility, its atmosphere, in-store service (e.g. information provided) and promotions (Kasulis and Lusch, 1981 and Martineau, 1958).

3.2.3 Assortment. Empirical results indicate that product assortment and its composition play a critical role in influencing retail patronage and customers' purchase probabilities for a specific option (Pan and Zinkhan, 2006), which, in turn, affects store/sales performance. Inherently related to assortment is variety. Studies point out that the inclusion of additional products can increase consumers' preferences for an assortment (Oppewal and Koelemeijer, 2005), whereas the failure to provide an expected assortment can invoke serious sales losses through customer defects (Borle *et al.*, 2005; Campo *et al.*, 2004). Prior studies suggest that the variety of an assortment is amongst the most important reasons for patronizing a certain store (Briesch *et al.*, 2009; Hoch *et al.*, 1999). It has been further shown that consumers tend to trade off convenience and importance of the assortment (Briesch *et al.*, 2009). By offering a greater variety, the retailer can enhance shopping convenience because customers can make purchases during a one-stop trip, thereby minimizing the costs involved in each shopping trip (e.g. travel time, effort). Furthermore, by tailoring their assortments to local needs rather than making national (chain)-level assortment decisions retailers are better able to serve the heterogeneous tastes of customer groups (Dhar *et al.*, 2001).

3.2.4 Impulse proneness. Impulse proneness can be considered as a category characteristic or a consumer trait. Here, we follow Narasimhan *et al.* (1996) and define impulse proneness as a category characteristic. The degree of impulsiveness that marks a category refers to the extent to which people purchase from that category without forethought. Purchases in impulse categories generally occur without advance planning (Narasimhan *et al.*, 1996), so the amount of impulse categories likely influences a store's sales volume. Ailawadi *et al.* (2006) propose that customers buy more when they recognize an impulse category on promotion, although they also admit that this effect may be small in drugstores, which customers usually visit to buy specific health and beauty products. A similar argument may apply to pharmacy outlets.

3.2.5 Promotions. Numerous studies have investigated the effects of promotions, such as features, displays or price cuts, on sales. An empirical generalization is that promotions result in substantial effects on short-term sales (Hanssens, 2009). Studies also show that price promotions, although highly effective in the short run, generate only weak, if any, impact on long-run brand and category demand (Ailawadi *et al.*, 2006; Nijs *et al.*, 2001). Moreover, short- and long-term promotional effectiveness on category demand lessens with non-price advertising (Nijs *et al.*, 2001).

Figure 1 presents the sales performance drivers that are selected for further empirical analysis. The vertical pillars group the performance drivers into market and store characteristics and the horizontal pillars indicate the hierarchical level on which they are measured.

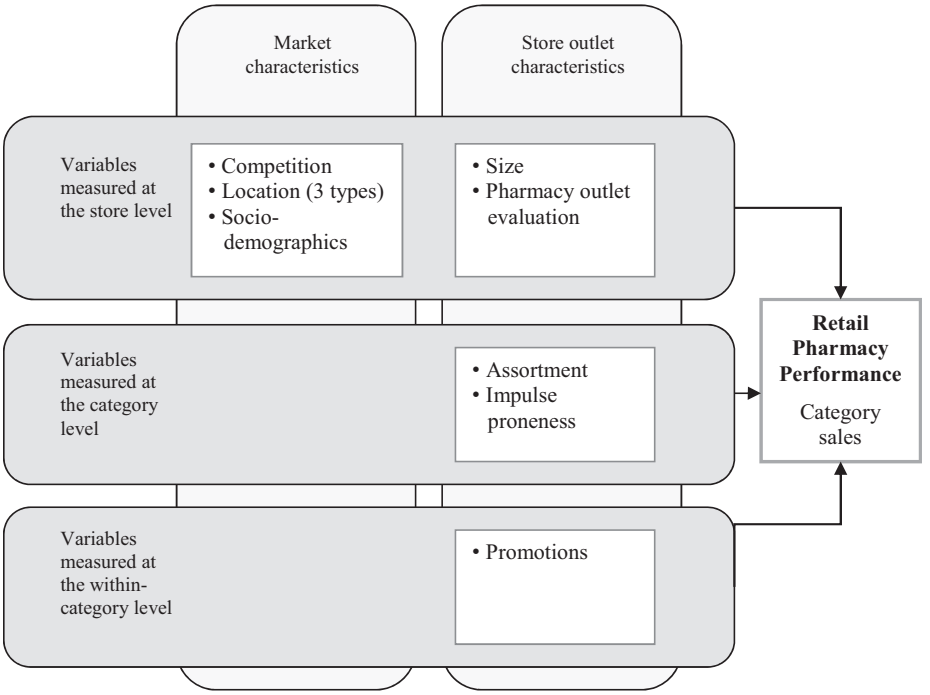

Figure 1.
Sales performance drivers

4. Data and measures

The data refer to 32 outlets of a Dutch retail pharmacy chain and include monthly category sales of three broad OTC product categories – skin care, vitamins and minerals and self-care[3] – over a period of two years (2007-2008). The categories were chosen in close cooperation with the retailer. According to the pharmacy chain they constitute the three largest categories of products sold over the counter, accounting for over 70 per cent of their total OTC turnover. We have information on the promotional activities and the number of competitors in the four-digit zip code area (i.e. drugstores and pharmacies outside this chain). We also obtained store-specific and assortment-related characteristics from the retailer for each outlet. In addition, socio-demographic characteristics observed at the four-digit zip code level originate from a Dutch supplier of household data. Finally, a large customer survey provided additional information about how pharmacy patrons perceived the assortment and other store-specific factors in the respective outlet.

Below, we first discuss the survey-based customer perception measures, and we then turn to the objective measures that are based on data that are provided by the stores and the supplier of household data. A summary of the variables and their measurement appears in Table II.

4.1 Customer perception measures

To assess customers' perceptions on the store outlet and their propensity to buy on impulse a survey was conducted amongst pharmacy customers in cooperation with the

Variables	Description
Dependent variable	
Sales	Sales performance, measured by (the logarithm of) the store's monthly category sales, divided by store size
Independent variables	
Store variables	
DistPharm	Distance to closest competing pharmacy (in km)
MinsToMainRoad	The number of car minutes from a pharmacy to the closest exit of main road
ShoppingArea	Indicator variable which specifies whether a pharmacy outlet is located in a shopping area (1) or not (0)
InvPopDensity	(Inverse of) population density (per km^2)[a]
GPClose	Location indicator specifying whether general practitioner is located within 150 meters of a pharmacy outlet (1) or not (0)
DistHospital	The distance to the closest hospital (in km)
HealthCareCenter	Indicator variable which specifies whether a pharmacy outlet is located in a health care center (1) or not (0)
StEval	General valuation of the pharmacy outlet and its marketing activities (based on certain established store image items)
MktgEval	
SeniorCitizens	Areas with mature adults and families without children[a]
Upper class	Areas with upper and upper middle class families[a]
NonDutch	Multiracial areas with low income households[a]
SingleHH	Areas with young adults and single households[a]
Category variables	
AddAssort	Number of subcategories in addition to the core category assortment, corrected by store size
Impulse	Proneness to impulse purchasing (defined as category characteristic)
Within-category variables	
Trend	(logarithmic) Time trend
Promo	Promotional activity undertaken in a certain month (dummy variable)
$Promo_{t-1}$	Lagged promotional activity undertaken in a certain month

Note: [a]Based on the four-digit zip code area

Table II.
Description of the dependent and independent variables

pharmacy chain. The survey attributes examined were decided upon by a screening of past store image and impulse buying studies, a pilot test and in agreement with the pharmacy chain. The individual pharmacy outlets distributed the questionnaires.

4.1.1 Store image assessment. Despite the widely accepted importance of store image in determining store patronage and hence sales performance, there is no unique conceptualization or operationalization, and its effect is still difficult to assess (Chowdhury *et al.*, 1998; Kasulis and Lusch, 1981). In all conceptualizations, the way how customers' perceive the store on different salient attributes (which are not limited to physical attributes but also involve psychological ones) is the dominant theme (McGoldrick, 2002). To assess store image, we borrowed several items that have been used by previous studies to capture the multifaceted construct of store image (Ailawadi and Keller, 2004; McGoldrick, 2002, p. 187ff). The items covered the attributes convenience, assortment of merchandise, in-store atmosphere, sales personnel and promotions. The items were formulated to fit the retail pharmacy context of the present study. We present the items in Appendix 1. We conducted an exploratory factor analysis of the eleven items used to assess store image. The analysis led to two extracted factors

that explain 59.4 per cent of the variance. One factor captures solely the promotion dimension while the remaining dimensions are represented in the other factor. Although store image literature subsumes these items into one construct, we keep the two factors solution and henceforth label them as store evaluation (*StEval*) and marketing evaluation (*MktgEval*), respectively. Reliability scores for both marketing and store evaluation surpass the threshold of 0.7 (0.85 and 0.89, respectively). We aggregate this data across customers to the pharmacy outlet level before including it in our subsequent analysis.

4.1.2 Impulse proneness assessment. Drawing on previous definitions, we regard *impulse* proneness as a category characteristic. The impulse proneness assessment used items from existing impulse buying measurement scales (Narasimhan *et al.*, 1996; Rook and Fisher, 1995). We obtained the related measurements from survey respondents who indicated their propensity to buy particular OTC categories on impulse. Category-specific averages are calculated and used for further analysis.

4.2 Measures based on objective store and household data

We use category-specific sales as our criterion variable to assess a store's sales performance.

To avoid the possible confound between *competition* and location factors (see Section 3), we include the distance to the nearest competing pharmacy (in kilometers) as a measure for competitive pressure, and include several location variables to measure the attractiveness of the area. Information on competing pharmacies was provided by the retailer, and we obtained the distances between the pharmacies using Google Maps.

The classification of locational influences by Davies (1972) guided us in the selection of location variables. As described in the previous section, he distinguishes three types of locational influence: arterial accessibility, general accessibility and special accessibility.

We operationalize arterial accessibility as the number of (car)-minutes to the closest exit of a main road, as indicated by Google Maps[4]. We include two variables to capture the two aspects of general accessibility:

(1) the centrality of the retail location is measured with an indicator variable, indicating whether the store is located in a shopping area; and

(2) we include the inverse of population density as a proxy for average travel distance.

We include the following variables to operationalize special accessibility in our specific retail pharmacy context:

- The first variable is an indicator variable, reflecting whether a General Practitioner is located within 150 m of the pharmacy outlet.
- The second variable measures the distance to the closest hospital (as indicated by Google Maps).
- The third variable indicates whether each pharmacy is located in a health-care center (this information was provided by the retailer).

The *size of the store* is measured by its square meters. The supplier of household data provided us with several socio-demographic variables, which turned out to be highly correlated. A principal component analysis that resulted in four factors (Appendix 2). We label these factors as "Senior Citizen", "Upper class", "Non-Dutch", and "Single households", and include these as control variables.

The chain offers a core assortment that is the same across all outlets. In addition, each store can individually supplement its core assortment. Therefore, we measure *additional assortment* as the number of individually added subcategories per product category (i.e. skin care, vitamins/minerals and self-care).

Promotions are category-specific but do not vary across outlets. We are not able to distinguish between price and feature promotions, and therefore, define a dummy variable, indicating whether a category was on promotion in a certain month. We also account for a post-promotional dip by incorporating the lagged promotional variable. Such a temporary decrease in sales can occur because consumers may accelerate their purchases and/or stockpile in response to a promotion and therefore refrain from later purchases (Van Heerde *et al.*, 2000). In line with previous findings (Macé and Neslin, 2004; Van Heerde *et al.*, 2004; Leeflang *et al.*, 2008), we consider a one-month lag period.

5. Methodology

5.1 Analytical procedure

In Figure 2, we illustrate the structure of the data we used in this study. As depicted in our conceptual model in Figure 1, categories (in our case, the units of analysis) are nested within stores. We collected repeated measures on the units of analysis over time. The unit of analysis that we use is monthly unit sales at a specific category level, which is the lowest level of aggregation in this study. This hierarchy is also visible in the data structure (Figure 2). To adequately take account of the multilevel data structure, we use a hierarchical linear modeling (HLM) framework (Raudenbush and Bryk, 2002).

Before estimating the proposed model, we apply a logarithmic transformation to category sales, our dependent variable. Given that store size may depend on sales (Van Dijk *et al.*, 2004), we may be confronted with endogeneity problems. To account for potential endogeneity of the store size variable, we first divide the (store) sales by store size and then take the logarithm of this variable. We transform the additional assortment variable in the same way.

The model features three levels of analysis. At Level 1, the dependent variable, category sales is determined by a time trend, the promotion variable at occasion t and

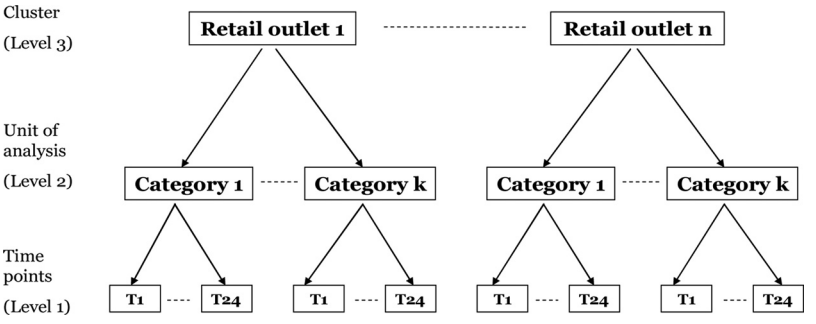

Figure 2.
Data structure used for the Hierarchical Linear Model

the lagged promotion variable, and a summer and a fall dummy that accommodate seasonality. Thus, the Level 1 model is:

$$\widetilde{\text{Sales}}_{ijt} = \pi_{0ij} + \pi_{1ij} \times \text{Trend}_t + \alpha_2 \times \text{Promo}_{it} + \alpha_3 \times \text{Promo}_{i,t-1} + \alpha_4 \times \text{Summer}_t + \alpha_5 \times \text{Fall}_t + e_{ijt}, \quad (1)$$

where, $\widetilde{\text{Sales}}_{ijt}$ = adjusted category sales, that is the log-transformed category i sales per square meter at the store j in month t; π_{0ij}= an intercept, Trend_t = a logarithmic time trend; $\text{Promo}_{it} = 1$ if category i was promoted in month t and 0 otherwise; $\text{Summer}_t = 1$ ($\text{Fall}_t = 1$) if month t is a summer (fall) month and 0 otherwise. The error term e_{ijt} is assumed to be normally distributed with mean 0 and variance σ^2. We allow for store- and category-specific trends to account for changes in omitted variables which have potential effects on sales but could not be measured explicitly. Examples are size and income of the population in the trade area of store j.

At Level 2, the store- and category-specific intercept π_{0ij} and trend slope π_{1ij} can be modeled as follows:

$$\begin{aligned} \pi_{0ij} &= \beta_{0j} + \beta_1 \times \widetilde{\text{AddAssort}}_{ij} + \beta_2 \times \text{Impulse}_{ij} + r_{0ij} \\ \pi_{1ij} &= \gamma_1 + r_{1ij}, \end{aligned} \quad (2)$$

where $\widetilde{\text{AddAssort}}_{ij}$ = adjusted additional assortment in category i of store j, that is, the number of additional assortments in category i divided by size of store j; and Impulse_{ij} = impulse proneness in store j with respect to category i. The random effect of the intercept r_{0ij} is assumed to be normally distributed over categories (within outlets), with expected value 0 and $\text{var}(r_{0ij}) = \tau_0^2$. By including r_{1ij}, we specify a randomly varying trend that acknowledges that within stores, categories' growth trajectories are not fixed across categories, but differ in terms of sales performance. However, the random trend is not predicted by category or store variables. The random effect associated with the trend coefficient r_{1ij} is assumed to follow a normal distribution, with mean zero and constant variance, $\text{var}(r_{1ij}) = \tau_1^2$.

Finally, at Level 3, the variation in category sales across pharmacy outlets is given by:

$$\begin{aligned} \beta_{0j} = {} & \delta_0 + \delta_1 \times \text{DistPharm}_j + \delta_2 \times \text{MinsToMainRoad}_j + \delta_3 \times \text{ShoppingArea}_j \\ & + \delta_4 \times \text{InvPopDensity}_j + \delta_5 \times \text{GPClose}_j + \delta_6 \times \text{DistHospital}_j \\ & + \delta_7 \times \text{HealthCareCenter}_j + \delta_8 \times \text{StEval}_j + \delta_9 \times \text{MktgEval}_j \\ & + \delta_{10} \times \text{SeniorCitizens}_j + \delta_{11} \times \text{Upper class}_j + \delta_{12} \times \text{NonDutch}_j \\ & + \delta_{13} \times \text{SingleHH}_j + u_{00j}, \end{aligned} \quad (3)$$

where DistPharm_j is the distance to the closest competing pharmacy in kilometers for pharmacy j; MinsToMainRoad_j is the number of car minutes from pharmacy j to the closest exit of a main road (roads labeled with an "A"); $\text{ShoppingArea}_j = 1$ if pharmacy j is located in a shopping area, 0 otherwise; InvPopDensity_j is the inverse of population density in the zip-code area of pharmacy j; $\text{GPClose}_j = 1$ if a General Practitioner is located within 150 m of pharmacy j, 0 otherwise; DistHospital_j is the distance in kilometers from pharmacy j to the closest hospital; $\text{HealthCareCenter}_j = 1$ if pharmacy

j is located in a health-care center, 0 otherwise; StEval_j and MktgEval_j are valuations of store image factors and marketing activities, respectively, for pharmacy j; and SeniorCitizens_j (Factor 1), Upper class_j (Factor 2), NonDutch_j (Factor 3) and SingleHH_j (Factor 4) are socio-demographic control variables. The random effect associated with the intercept for outlet j, u_{00j}, has a normal distribution with mean 0 and $\text{var}(u_{00j}) = \varphi^2$. In equations (1 and 2), we model α_2, α_3, α_4, α_5, β_1, β_2 and γ_1 as fixed coefficients. Likelihood ratio test indicate the insignificance of random store-specific *slope* coefficients.

By substituting equations (2 and 3) into equation (1), we obtain the full model:

$$\begin{aligned}\widehat{\text{Sales}}_{ijt} = {} & \delta_0 + \delta_1 \times \text{DistPharm}_j + \delta_2 \times \text{MinsToMainRoad}_j \\ & + \delta_3 \times \text{ShoppingArea}_j + \delta_4 \times \text{InvPopDensity}_j + \delta_5 \times \text{GPClose}_j \\ & + \delta_6 \times \text{DistHospital}_j + \delta_7 \times \text{HealthCareCenter}_j + \delta_8 \times \text{StEval}_j \\ & + \delta_9 \times \text{MktgEval}_j + \delta_{10} \times \text{SeniorCitizens}_j + \delta_{11} \times \text{Upper class}_j \\ & + \delta_{12} \times \text{NonDutch}_j + \delta_{13} \times \text{SingleHH}_j + \beta_1 \times \widehat{\text{AddAssort}}_{ij} \\ & + \beta_2 \times \text{Impulse}_{ij} + \gamma_1 \times \text{Trend}_t + \alpha_2 \times \text{Promo}_{it} + \alpha_3 \times \text{Promo}_{i,t-1} \\ & + \alpha_4 \times \text{Summer}_t + \alpha_5 \times \text{Fall}_t + u_{00j} + r_{0ij} + r_{1ij} \times \text{Trend}_t + e_{ijt}.\end{aligned}$$

6. Results

By using an iterative procedure to maximize the likelihood, our multilevel model approach can simultaneously estimate parameters residing at different levels[5].

The results of the hierarchical linear model specification proposed in equations (1–3) are shown in Table III.

6.1 Level 3 effects

The distance to the closest pharmacy variable is significant ($p = 0.002$), and the negative coefficient suggests that sales performance is higher for stores with nearby competing pharmacies. As discussed before, this result may stem from the fact that areas with higher economic potential also attract competitors. A similar result has been obtained by Campo *et al.* (2000) and Hunneman (2011). Hence, the decision to open stores in areas with much traffic is a successful strategy in terms of OTC-sales. Location is a core element of retail store choice decisions and often cited as significantly and positively relating to store performance. We find no significant effect for "Minutes to main road", our measure for arterial accessibility. Concerning General accessibility, we find a positive and significant effect (at a significance level of 10 per cent) for "Shopping area", indicating that sales performance is higher for stores located in a shopping area. The inverse of the population density as a proxy for average travel distance is not significant. Two of the three variables that measure special accessibility are significant (at a significance level of 10 per cent), indicating that sales performance increases with the distance between the pharmacy and the closest hospital, and with the presence of a health-care center in the immediate surroundings of the pharmacy. The results further reveal that marketing evaluation and store evaluation are not significant. These findings contrast with existing findings that affirm the crucial role of image on retail performance. Finally, two of the demographic control variables are significant, indicating that pharmacies that serve more senior citizens and single households perform better.

Independent variables	Dependent variable: ln (Sales/store size) Parameter estimates[a] (SE)	*p*-value	Effect size r[b] (absolute)
Intercept	0.99 (1.07)	0.357	0.09
Level 3: Store characteristics			
Distance to comp. pharmacy	−0.45 (0.14)***	0.002	0.31
Minutes to main road	0.03 (0.02)	0.133	0.15
Shopping area	0.41 (0.23)*	0.069	0.18
InvPopDensity	0.22 (0.15)	0.141	0.15
GPClose	−0.26 (0.24)	0.272	0.11
Distance to hospital	0.06 (0.03)*	0.058	0.19
Healthcare center	0.63 (0.29)**	0.035	0.21
StEval	−0.22 (0.27)	0.413	0.08
MktgEval	−0.36 (0.41)	0.383	0.09
SeniorCitizens	0.30 (0.11)**	0.011	0.26
Upper class	0.09 (0.09)	0.304	0.11
NonDutch	−0.04 (0.12)	0.741	0.03
SingleHH	0.26 (0.10)**	0.010	0.26
Level 2: Category characteristics			
AddAssort	12.47 (3.54)***	0.001	0.34
Impulse	0.72 (0.42)*	0.091	0.17
Level 1: Within-category characteristics			
Trend	0.07 (0.03)***	0.007	0.27
Promo	0.09 (0.01)***	0.000	0.14
Promot−1	−0.03 (0.01)***	0.029	0.05
Summer dummy	−0.04 (0.01)***	0.003	0.07
Fall dummy	−0.09 (0.01)***	0.000	0.14

Notes: *$p < 0.1$; **$p < 0.05$; ***$p < 0.001$; [a]individual parameters are unstandardized, with standard errors in parentheses; [b]the (absolute) effect size r is computed as $r = \left[t^2/(t^2 + df)\right]^{0.5}$

Table III. Estimated parameters of the hierarchical linear model

6.2 Level 2 effects

The effects of additional assortment and impulse proneness are significant and in line with corresponding outcomes in the literature. The number of added assortment items is highly significant and positively affects sales performance. We have to keep in mind that the effect of additional assortment on sales cannot be generalized, given that we measure this variable as the number of added subcategories within the three product categories that we consider. These added subcategories are specific for the OTC-case that we study here. Furthermore, we observe a significant (at a 10 per cent significance level), positive influence of impulse proneness on category sales. The more customers engage in unplanned category purchases, the more beneficial it is for the (category) sales performance of the outlet.

6.3 Level 1 effects

The trend parameter indicates that the store sales increase over time. This might be due to factors as the increasing size, income or age of the population in the trade area of the store and increasing health concerns. Promotions have a significant and positive effect

on (category) sales performance. The significant negative coefficient for the promotion variable at lag 1 implies a post promotion dip, reducing (category) sales in the period following the promotion. This temporary sales decrease after the promotion may result from purchase acceleration (van Heerde *et al.*, 2000), such that consumers decide to make a category purchase during the promotion period that they otherwise would have made in the future. We have to take in mind that the effects of promotions are the net effects on sales, i.e. net of competitive promotions. Given that we do not have data about competitive marketing efforts, we are not able to distinguish own from competitive effects of promotions. We know, however, from other studies that these competitive effects are modest in size as compared to the own effects (Sethuraman *et al.*, 1999). The Summer and Fall dummies are both highly significant and negative, indicating that category sales are lower during these seasons compared to winter and spring[6].

6.4 Importance of performance drivers

We are interested in factors with significant impacts on category sales performance, as well as in the magnitude of their effects. To assess the importance of the performance drivers we follow Steenkamp *et al.* (1999) and compute effect sizes on the basis of the t-values of the parameter estimates and the degrees of freedom, $r = [t^2/(t^2 + df)]^{0.5}$. The effect sizes are provided in Column 3 of Table III. The effect size of the added assortment variable is the largest of all variables (0.34), which together with the outcome for the impulse buying variable, underlines the key role of category characteristics. This suggests that strategic planning about the assortment (i.e. category management) offers a promising method to increase sales performance.

The large absolute effect sizes of the competition variable and the location variables jointly indicate that the economic potential of the trade area strongly affects sales performance of pharmacies. This is confirmed by the large absolute effects sizes of two socio demographic variables.

The effects of the promotion variables are weaker, with a joint net effect of 0.19. Still, promotional activities are not negligible instruments for improving category sales. The effect size of promotions at lag one is rather small, implying a fairly modest sales post promotion dip.

6.5 Robustness checks

To examine whether multicollinearity may affect our model, we assessed the variance inflation factors (VIF). The results indicated a potential multicollinearity problem between distance to closest pharmacy variable and the inverse of the population density (VIF values of 6 and 7, respectively). To investigate whether this could explain the insignificance of the coefficient of the inverse of the population density, we reran the model without distance to closest pharmacy, but this did not improve the model's Bayesian Information Criterion (BIC). Thus, we maintain the results of Table III. We further checked for non-normality and heteroskedasticity; but this did not lead to any changes in our estimation procedure. We also checked for first-order autocorrelation within each of the 96 categories analyzed. We found evidence of autocorrelation in only ten categories. We reran the model where we adjusted the variables in the 11 categories using the generalized least squares (GLS) correction described by Leeflang *et al.* (2015, Section 6.2.2). Because the outcomes lead to the same substantive conclusions, we decide not to adjust the measures of our model. We performed several additional analyses. We

included interaction terms, modified the measurement marketing evaluation factor, etc. These analyses did not change the results that are represented in Table III substantively. Hence, our results are quite robust[7].

7. Discussion

Our study reveals that marketing mix factors (i.e. assortment, location and promotions) are essential determinants of retail pharmacies' ability to generate category sales increases and improve their performance.

More specifically, in our application, additions to a (core) assortment have a notable positive impact on category sales performance. We thus confirm the central role of retailer's product assortment decisions (for a summary, see Mantrala *et al.*, 2009).

Our findings further demonstrate that offering (sub)categories within existing categories that tend to provoke impulse buying provide opportunities for pharmacies to increase their sales and thus constitute a potential additional revenue source. Many OTC products are bought at the pharmacy outlet when customers are visiting these outlets to collect their ordered prescribed drugs. A classical UK study has shown that only 57 per cent of all OTC purchases are entirely preplanned; in 23 per cent of the cases, the customer anticipates a need, but the actual purchase decision is made in the store; and the remaining 20 per cent of purchases are induced by influences in the store (McGoldrick, 1982). Although differences exist across OTC categories, the outcomes underline the value of selective merchandising stimuli, including displays and other in-store influences, for pharmacy outlets.

In general terms, our conclusion that location is an important driver for store performance is in line with other retail studies (Pan and Zinkhan, 2006). However, if we investigate the location effect further, and compare the relative contribution of three location influences that were identified by Davies (1972), we find that the most commonly studied location variables (the arterial and the general location variables) affect pharmacy OTC sales at best marginally, while the much less studied special location variables have a much stronger effect.

Hence, our outcomes do not provide strong support for the relevance of arterial and general location factors that earlier studies identified as important sales drivers, mainly in the context of grocery retailers and convenience goods (Table I). One explanation for our contrasting finding is that for medical products, which invoke a high level of personal involvement, other factors, related to special location influences, determine store choice. Prior literature confirms that for important product categories or product categories that are perceived as risky, customers often prefer specialty stores (Dash *et al.*, 1976). Another study has found that knowledgeable pharmacy personnel, rather than convenience, is the main criterion for choosing a pharmacy (Franic *et al.*, 2008). The presence of health-care providers that write prescriptions for prescription-only medications (such as dentists, General Practitioners or midwives in a health-care center) in the immediate vicinity of the pharmacy is likely to generate traffic to the pharmacy, thereby increasing OTC sales. The reason that this argument does not hold for hospitals is that a prescription from a hospital specialist is more likely to be filled in a pharmacy hospital because these pharmacies often stock a larger range of medications, including more specialized and investigational drugs (medications that are under study, but have not yet been approved), than would be economically feasible for a retail pharmacy outlet.

Our conclusion that customers' store perceptions has no significant influence on pharmacy sales performance also deviates from findings of earlier retail studies (Baker *et al.*, 2002). A possible explanation could be "forced loyalty". In many rural areas, there is only one pharmacy outlet. Hence, elderly or less mobile people often have no other choice than to visit this outlet. Customer experiences in the pre- and post-purchase phases go beyond the store's environmental elements to include social elements (e.g. others' influence) and the purpose of the shopping trip (Verhoef *et al.*, 2009). Because OTC products are experience (or even credence) goods, these latter elements likely dominate, which might explain the insignificance of customers' store perceptions. An alternative explanation may be that customers who visit a pharmacy are driven by utilitarian rather than hedonic values. Accordingly, pharmacy patrons' intentions to purchase OTC products will be more strongly affected by the expertise of the pharmacy staff than by store image cues (Guido *et al.*, 2011).

Finally, unlike in the prescription drug market, promotions to consumers are permitted for OTC drugs, and in our application, they affect category sales performance positively. Promotions increase the visibility of the outlet's (promoted) products and services and of the outlet itself and in that way provide an opportunity for pharmacies to become more attractive to existing and potential customers. In line with our earlier conclusion that categories with higher impulse buying proneness perform better, this finding implies that promotional stimuli offer opportunities for pharmacies to enhance (short-term) category sales performance.

8. Limitations and further research

Our study suffers some limitations that provide opportunities for ongoing research. First, we look at only one chain in one country. Pharmacy markets and the corresponding regulations differ across countries; therefore, it would be interesting to test our model in other countries. However, our results provide a basis for understanding how to deal with the effects the changing health-care markets will have on retail pharmacies in most countries. Second, we use a general promotion variable, such that we cannot disentangle which activities – price discounts, features and displays – are most effective for enhancing category sales. However, we expect that price discounts for OTC products provide strong incentives to visit the store and/or to adjust in-store buying behavior (Gijsbrechts *et al.*, 2003). The finding that promotional activities have a significant effect on performance already is a surprising insight for many retail pharmacists. Third, similar to for example Van Heerde *et al.* (2004) and Leeflang *et al.* (2008), we also have not been able to distinguish own from competitive marketing effects because we have no data on competitive marketing activities. Fourth, we had limited control over the distribution of the survey due to the indirect dissemination of the questionnaires, and questionnaires were handed exclusively to existing pharmacy customers. This may introduce a potential selection bias. However, if this effect exits, it will hold true for all respondents and hence affect the outcomes of our analysis regarding differences between stores to only a small extent. Finally, we note that the deregulation of the health-care market in The Netherlands is not yet complete. Our study offers a first attempt to provide insights on the specific issues of a deregulated pharmacy market, but, clearly, more research is needed to capture other potentially relevant performance drivers. Ongoing exploration of additional variables, such as those related to customer relationship management, also could generate more valuable insights.

Deregulation is a common phenomenon in many countries and across industries (e.g. energy, telecommunication), and it would be interesting to analyze how consumers and firms react to deregulated markets over time.

Notes

1. Over-the-counter (OTC) products comprise medicinal and health-care products that are available to consumers without a prescription, so no physician consultation is needed. The EU legislation defines a medicinal product or drug as any substance or combination of substances presented for treatment or prevention of disease in humans, or which may be administered to humans with a view to restoring, correcting or modifying physiological functions. Supplements such as vitamins and certain cosmetics fall within that definition.
2. In the USA and New Zealand, direct-to-consumer advertising is also allowed for prescription drugs.
3. The self-care category comprises products such as pain relievers, cold and cough products and so on.
4. We thank an anonymous reviewer for this suggestion.
5. According to Hox (2002), maximum likelihood estimation is the most common method for estimating HLM.
6. We also estimated a version of the model with a spring dummy included, but its coefficient turned out not to be significant.
7. These results can be obtained from the authors on request.

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Appendix 1

Description	Store evaluation Factor 1 StEval	Factor 2 MktgEval
1. How satisfied are you with the accessibility of the pharmacy?	0.559	−0.030
2. The in-store information influences my purchase decisions	0.623	0.083
3. The in-store information is informative	0.759	0.124
4. The pharmacy has a pleasant atmosphere	0.780	0.198
5. I can easily find the products I am looking for	0.707	0.219
6. The assortment of the pharmacy offers much variety	0.605	0.221
7. In general. I am very satisfied with the personnel of the pharmacy	0.700	0.215
8. In general. I am very satisfied with the service the pharmacy provides	0.721	0.237
9. How do you evaluate the pharmacy's seasonal brochure?	0.171	0.867
10. How do you evaluate the pharmacy's direct mailings?	0.176	0.891
11. How do you evaluate the pharmacy's promotional offers?	0.174	0.891
Cumulative % of variance explained	35.02	58.65
Reliability (α)	0.85	0.89

Table AI. Measurement items of store image and impulse proneness

Notes: Item 1 is rated on a five-point scale ranging from very unsatisfied (= 1) to very satisfied (= 5); Items 2-8 are rated on a five-point scale ranging from completely disagree (= 1) to completely agree (= 5); Items 9-11 are rated on a scale from 1 to 10 (1 = very negative; 10 = very positive); all items are translated from Dutch; the underlined figures indicate which items are included in the factors

Attributes for the pharmacy outlet evaluation with regard to selling over-the counter medication was based on established scales. Items 1-5 and 9-11 were adopted and adjusted to our context from previous store-image research (Chowdhury *et al.*, 1998; Westbrook, 1981; McGoldrick, 2002). The assortment item (6) was borrowed from Broniarczyk *et al.* (1998), the service items (7, 8) from Parasuraman *et al.* (1985) (Table AII).

We consider a category-specific impulse proneness measure (cf. Narasimhan *et al.*, 1996). Both items regarding the impulse proneness of over-the-counter categories were adopted from Rook and Fisher (1995) and adjusted to our context.

Description	Impulse proneness
1. I sometimes buy a product of category X without having planned beforehand	
2. I carefully plan most of my purchases in category X(*)	

Table AII.

Notes: Items are rated on a five-point scale from completely disagree (1) to completely agree (5); (*) reverse coded

Appendix 2

Description	Factor 1 Senior citizen	Factor 2 Upper class	Factor 3 Non-Dutch	Factor 4 SingleHH
% of single people, < 35 years	−0.528	−0.422	0.315	0.617
% of single people, 35-55 years	−0.477	−0.330	0.555	0.319
% of single people, > 55 years	0.865	−0.190	−0.014	0.266
% of families without children	0.593	0.340	−0.639	0.115
% of families with children	−0.265	0.370	−0.014	−0.877
% of single households	−0.117	−0.529	0.425	0.701
% of two-person households	0.548	0.208	−0.643	0.135
% of three-person households	−0.148	−0.119	0.108	−0.875
% of households with four or more persons	−0.163	0.637	−0.210	−0.615
% of principal wage earner under 25 years of age	−0.603	−0.304	0.320	0.449
% of principal wage earner between 25 and 45 years of age	−0.873	−0.247	0.304	−0.132
% of principal wage earner between 45 and 65 years of age	0.547	0.664	−0.161	−0.161
% of principal wage earner above 65 years	0.852	−0.174	−0.347	0.150
% of Dutch origin	0.310	0.257	−0.865	−0.040
% of Western origin[a]	0.088	0.115	0.797	0.298
% of Non-western origin[b]	−0.383	−0.324	0.749	−0.056
% with (gross) income below €32,000 p.a.	−0.312	−0.830	0.172	0.296
% of those with (gross) income between €32,000 and 64,000 p.a.	0.595	0.577	−0.131	−0.362
% of those with (gross) income €80,000 p.a. and more	−0.198	0.827	−0.145	−0.004
Cumulative % of variance explained	25.95	46.12	66.22	85.01

Notes: [a]Western origin includes European countries, North America, Oceania, Indonesia and Japan; [b]non-western origin includes Turkey, Africa, Latin-America, and Asia (with the exception of Indonesia and Japan); the underlined figures indicate which items are included in the factors

Table AIII. Principal component analysis for socio-demographic variables

The variables in column 1 depict several socio-demographic characteristics of the population of each store's 4-digit zip code area. We conducted a principal component analysis which, based on the latent root criterion, resulted in a solution with four factors. These four factors explain 85 per cent of the total variation. Columns 2 to 5 show the factor loadings obtained after a VARIMAX rotation. Underlined values have the strongest relationship with the respective factor.

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