

Title: The Effects of Scent on Consumer Behaviour

Short title: The Effects of Scent

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The Effects of Scent on Consumer Behaviour

Abstract

This paper presents a systematic review of extant research on the effects of scent on consumer behaviour for readers of the International Journal of Consumer Studies. Although many articles have been published on this topic in recent years, there is a need for a comprehensive summary of up-to-date findings in this area of research. A systematic literature review is conducted with selected ABS-ranked journals in the fields of marketing and psychology, covering the period between 1980 and 2015. Thematic areas include the impact of scent on consumers' cognitive and affective responses, attitudes and perceptions, as well as memory and behaviours. Relevant mediators and moderators of the effects of scent on these variables include affect, cognition, awareness and individual or environmental stimuli. Gaps for future research are identified and include the role of consumer awareness of scent and its influence on behaviour. Although this paper provides a systematic review of the literature within the fields of psychology and marketing, it acknowledges that a large body of research regarding human responses to odours exists within other disciplinary fields such as neuroscience. The potential for, as well as the ethical caveats of, using scent stimuli for marketing purposes are also considered. Although a few literature reviews in the area of scent have been published (Schab, 1991; Davies *et al.*, 2003), this paper makes a significant contribution to the consumer behaviour literature given its systematic article selection and review process, encompassing the most up-to-date research and focusing on all key thematic areas related to scent and consumption.

Keywords

Consumer behaviour; scent; sense of smell; sensory marketing; systematic literature review.

The Effects of Scent on Consumer Behaviour

1. Introduction

Marketing communications are usually designed to appeal primarily to consumers' senses of vision and hearing. Yet, consumers' decision-making processes are also influenced by other sensory information. Marketers understand that auditory and visual influences alone can be insufficient to persuade consumers and that increased persuasiveness can be achieved by targeting the senses of touch, taste and smell (Milotic, 2003; Lwin and Morrin, 2012). The marketing strategy of appealing to all five senses is referred to as sensory or experiential marketing (Hultén *et al.*, 2009). This approach to marketing is especially relevant in the services industries, which offer goods with high experiential and credence properties, although the evaluation of which is often difficult before consumption takes place. For this reason, service businesses are investing in enhancing their physical environment, or atmospherics, as it is believed that the perception of the environment can be transferred to the perception of the service itself (Ellen and Bone, 1998).

Scent is a very important aspect of sensory marketing and is considered to be one of the key elements of the service's physical environment (Hultén *et al.*, 2009). The effectiveness of ambient scent (also referred to as atmospheric odour or olfactory cue) in influencing consumer behaviour has received support from academic research. However, the ambiguity regarding the effectiveness of scent calls for a review of the extant literature in this field of research. Although some reviews in the area of scent have already been published (Davies *et al.*, 2003), they suffer shortcomings such as a focus on one particular type of response to odour such as memory (i.e. Schab, 1991), while others fail to state the criteria used for article selection in their reviews and are not up-to-date (i.e., Davies *et al.* 2003).

Therefore, this paper aims to address such shortcomings by conducting a systematic literature review on the effects of odour on consumer behaviour for readers of the International Journal of Consumer Studies, in order to map out future research directions and discuss potential managerial implications in this area of marketing. More

specifically, the objectives of this paper are: to explore the key thematic areas and findings of the selected literature on scent in the fields of marketing and psychology; to discuss the potential mediating and moderating variables on the effects of scent on consumer behaviour; to explore and evaluate the methodologies used in the selected studies; and finally to identify gaps in the literature and provide suggestions for future research. This paper adds to the extant literature and existing literature reviews in the field in that it covers all effects of scent, clarifies the criteria used to select journal articles for the systematic review and uses updated resources to build on the literature reviews done over a decade ago.

The first section of the paper provides some background information on the research area by exploring the concept of sensory marketing. The following sections present the methodology used for this literature review, as well as the main findings and implications.

2. Background to Sensory Marketing Research

The application of multisensory appeals in marketing has received significant research attention, as sensory cues influence consumer decision making processes by creating mental associations that strengthen the recall of brands and products. Multisensory appeals also provide multiple options for creating and modifying quality perceptions, as one sense may cue quality perceptions more strongly than others (Hultén *et al.*, 2009).

Of all the senses, the sense of touch is the least researched area, with only limited support regarding its persuasive nature in sensory marketing (Peck and Childers, 2005). Vision has received the most attention from consumer researchers and examples of visual appeals include design of brands, products, packaging and interior (Hultén *et al.*, 2009), colours (Bellizzi *et al.*, 1983) and lighting (Golden and Zimmerman, 1986). A number of studies have also explored how auditory cues influence consumer behaviour. Music was found to influence mood (Bruner, 1990), to condition consumer responses to products (Gorn, 1982; Macinnis and Park, 1991), and to increase consumption and time spent in store (Milliman, 1982). In contrast, research on integration of the sense of taste in sensory marketing has not been as extensive, focusing mainly on how in-store

sampling of products can influence consumer choice (Nowlis and Shiv, 2005), and on how the perception of taste is subject to bias (Hoyer and Brown, 1990).

The application of olfactory cues in sensory marketing is an under-researched area in comparison to vision and hearing, but more widely researched than taste and touch. However, the increasing amount of published research in this area highlights the need to review and summarise some of the findings, which is the main objective of this paper. The following section describes the methodology used.

3. Systematic Literature Review Methodology

A literature review was used to examine existing studies on scent in the area of sensory marketing. Following Leonidou and Leonidou's (2011) guidelines for systematic literature reviews, article selection was based on three criteria: quality (articles published in peer-reviewed journals, graded 3 and 4 stars in the ABS Academic Journal Quality Guide 2010, in the fields of psychology and marketing); time period (1980 to 2015); and variables under study (effects of scent on human affect, cognition and/or behaviour). The literature search focused on papers published in the fields of marketing and psychology, as these are the main disciplines publishing research on the effects of scent on consumer behaviour. The search was conducted using electronic databases including ProQuest, EBSCO, ISI and Ovid. Keywords used to retrieve articles included "scent", "odour (odor)", "smell", "olfactory cues", "environmental fragrance", "environmental cues", "atmospherics" and "environmental stimuli". A total of 45 articles from 18 journals were selected as a result (table 1).

[Table 1 here]

Out of all articles, five focused on atmospherics, with scent mentioned as one of the environmental cues but not investigated separately; six were literature reviews of previous studies on odours; and 35 included primary research. Only 9% of articles were published during the 1980s and more than 56% since the year 2000, which reveals an increased interest in the field. A bibliographical analysis procedure (Leonidou and Leonidou, 2011) was adopted, where selected papers were coded according to the

variables that are impacted by the sense of smell. The review findings are presented in the next section.

4. Literature Review Results

The systematic review showed that ambient scents are addressed in the literature as being part of the overall atmospherics within the service environment. Atmospherics is concerned with how environmental cues affect the behaviours of consumers by appealing to their senses. Several studies of atmospherics refer to scent (i.e. Bitner, 1992; Turley and Milliman, 2000; Baker *et al.*, 2002; Walsh *et al.*, 2011), but none of them investigate scent in much depth. Other studies that focus primarily on scent reveal that odour has an impact on consumers' affective, behavioural and cognitive responses. Nonetheless, to fully understand the significance of scents in the service environment each effect has to be explored in more detail (table 2).

[Table 2 here]

Table 2 summarises the content of this systematic literature review in that the effects of scent on consumer behaviour as well as the mediating and moderating variables in such relationships are addressed. The main thematic areas are discussed below.

4.1. Key Thematic Areas

The analysis of the papers yielded five main thematic areas of research on the effects of scent including cognitive responses, affective responses, attitudes and perceptions, memory, and behavioural responses as detailed below.

4.1.1. Cognitive Responses

A few studies' results suggest that exposure to olfactory cues influences cognitive processes (table 3). Such exposure increases attention and results in greater elaboration effort in consumers' product considerations (Morrin and Ratneshwar, 2000; Krishna *et al.*, 2010).

[Table 3 here]

Mitchell *et al.* (1995) referred to this phenomenon as cognitive enrichment: when exposed to a scent that is perceived to be congruent with the product class, consumers tend to spend more time processing information and developing inferences, which in turn leads them to rely on their experiences to make a decision. In contrast, incongruent scents were found to act as cognitive interference, evoking irrelevant information in the consumer's memory and impeding decision-making (Mitchell *et al.*, 1995). In contrast, Bosmans (2006) suggests that it is enough for an ambient scent to be perceived as pleasant in order for it to enable positive cognitive reactions, and that congruence is an insignificant factor. However, a more recent study conducted by Olofsson *et al.* (2012) has found that congruence takes precedence over valence (pleasantness) in the cognitive processing of scents. Therefore, findings in this area seem somewhat inconclusive.

4.1.2. Affective Responses

Affective responses to odour have received more research attention than cognition (table 4). Affect is a general term used to describe the mix of moods and emotions, with two dimensions: pleasantness (or valence) and arousal (Feldman Barrett and Russell, 1998). According to Hirsch (1995), the smell is the sense most directly linked to emotions, as the centre of smell in the brain has a direct link to the brain part responsible for emotions. As a result, an affective response to odour can be generated before cognitive processes take place.

[Table 4 here]

Much research suggests that scents can alter the affective state of humans (Ehrlichman and Halpern, 1988; Baron, 1997; Lee *et al.*, 2011; Morrison *et al.*, 2011). In a study of emotion transfer between humans through smell, de Groot *et al.* (2013) found that happiness can indeed be transferred among humans by means of odours. Nevertheless, Ellen and Bone (1998) suggest that only negative effects on affect are

possible when the scent is incongruent with the product, whereas no positive effects have been observed with congruent scent. Morrin and Ratneshwar (2000; 2003) also found that mood and arousal levels of participants in scented and unscented conditions do not differ, which consequently reveals no relationship between scent and affect.

However, the latter findings were obtained through self-reported measures, which are problematic because changes in mood can be too subtle for consumers to reflect on them. This issue was raised in an experiment by Mitchell *et al.* (1995), where the participants reported a more positive mood by just believing that pleasant odour is present in the room. Though these findings seem to be in favour of an existing relationship between odour and affect, determining the actual effects of scent on the state of affect may be a complex task.

4.1.3. Attitudes and Perceptions

The potential for odours to change attitudes and perceptions is comparatively the most researched area in scent research as demonstrated through table 5.

[Table 5 here]

As shown in table 5, ambient scents have been found to bias the evaluations of the retail environment (Spangenberg *et al.*, 1996; Chebat and Michon, 2003; Madzharov *et al.*, 2015), products (Bone and Jantrania, 1992; Spangenberg *et al.*, 1996; Fiore *et al.*, 2000; Chebat and Michon, 2003) and their quality (Spangenberg *et al.*, 1996; Chebat and Michon, 2003). When paired with congruent music, ambient odours also help to achieve more positive overall evaluations of a shopping experience (Spangenberg *et al.*, 1996; Mattila and Wirtz, 2001; Morrison *et al.*, 2011). Further, scent congruency with product class (Bone and Jantrania, 1992; Bosmans, 2006) and gender (Spangenberg *et al.*, 2006) are found to enhance attitudes. When scents are perceived as incongruent with the product they have no effect on judgements, as consumers treat them as an extraneous influence on their judgements and try to correct for the influence (Bosmans, 2006). Thus, it seems that for attitude and perception shift to occur, a condition of scent congruency has to be met. The type of scent in a retail environment also impacts the experience: a

warm scent is associated with a denser social environment, resulting in a greater need for power, with the opposite effect resulting from cool scents. Indeed, a warm scent results in an increased preference for, and purchase of, premium and luxury brands (Madzharov *et al.*, 2015).

Additionally, number of studies suggest that scent is capable of affecting the ratings of people, impacting the likeability of faces (Li *et al.*, 2007), the attractiveness ratings of the opposite sex (Baron, 1981; Foster, 2008), as well as the ratings of job applicants (Baron, 1983). Pleasant odours can also alter perceptions, as Spangenberg *et al.* (1996) show that consumers perceived to have spent less time in store and found prices lower in the presence of pleasant ambient odour. Therefore, it is possible to infer that odour affects attitudes and perceptions, although such effects may be indirect as discussed later on in the paper.

4.1.4. Memory

Various studies have focused on the impact of scent on memory as illustrated through table 6. Although some studies focus exclusively on the memory of odours (Richardson and Zucco, 1989; Perkins and Cook, 1990; Annett, 1996; White and Treisman, 1997), much research centres on how scent can improve memory of other information.

[Table 6 here]

Indeed, several researchers suggest that odour can enrich the memory of specific information if the same odour is present during both the encoding and retrieval of such information (Ball *et al.*, 2010; Morrin *et al.*, 2011). Aggleton and Waskett (1999) suggest that ambient scent can help retrieve memories of real world experiences. In their experiment, they found that participants who were exposed to a particular scent of a museum and who visited such a museum (on average around 6 years before the experiment) retrieved much more information about its contents than participants in a non-scented condition. With regards to recall of product information, Morrin *et al.* (2011) argue that scented products may only have an advantage over similar but unscented products when the scent is present at retrieval. If this condition is not met, information

about scented and unscented products has the same chance of being retrieved (Morrin *et al.*, 2011). On the other hand, Morrin and Ratneshwar (2000; 2003) note that scent is only necessary at the encoding phase, as the same results were obtained when odour was present and not present at the retrieval phase. In their studies, the authors found that pleasant ambient scents enhance recognition and recall of familiar and unfamiliar brands (Morrin and Ratneshwar, 2000; 2003).

Other studies suggest that exposure to any pleasant ambient scent is enough for consumers to access information such as attitudes to product class or brands (Mitchell *et al.*, 1995), or to retrieve a larger number of happy memories than in non-scented conditions (Ehrlichman and Halpern, 1988). Therefore, in general it seems that odours facilitate formation and retrieval of memories. However, the evidence remains mixed in terms of the necessity of odour's presence at retrieval and encoding phases.

4.1.5. Behavioural Responses

A substantial body of research suggests that, within services settings, pleasant ambient scents are capable of influencing certain types of consumer behaviour. These behaviours are referred to as approach responses, or positive responses to the stimuli in the environment (Mehrabian and Russell, 1974). Studies summarised in table 7 have found a number of scent-induced approach responses, such as stronger intent to visit a store (Spangenberg *et al.*, 1996), spending more time in it (Spangenberg *et al.*, 1996; Morrin and Ratneshwar, 2003), seeking variety (Mitchell *et al.*, 1995), willingness to pay a higher price (Fiore *et al.*, 2000), and spending longer examining products (Vinitzky and Mazursky, 2011). Approach behaviours are also enhanced when ambient scent is combined with music which is considered arousing and congruent with the product (Mattila and Wirtz, 2001; Morrison *et al.*, 2011). Other researchers have found that exposure to scents can cause pro-social behaviours (Baron, 1997; Holland *et al.*, 2005).

[Table 7 here]

Additionally, one study has found that imagining what a food product smells like can also produce a behavioural response. Referred to as "smellizing" a given food

product, the effect of imagining the smell of food results in increased salivation, actual food consumption and self-reported desire to eat (Krishna *et al.*, 2014, p.18). Research has also found that consumers are likely to spend more money (Chebat and Michon, 2003; Spangenberg *et al.*, 2006; Vinitzky and Mazursky, 2011), and engage in impulsive buying (Mattila and Wirtz, 2001), when exposed to ambient scent. According to Chebat and Michon (2003), affective responses to scent lead to a more positive perception of an environment, which subsequently influences consumer spending. For instance, Hirsch (1995) found that ambient scent increased gambling rates, resulting in 45% more revenue being generated by slot machines in scented areas of casinos. The author explains the results as a product of olfactory-evoked recall, which takes place when scent evokes associations that enhance gambling mood.

Findings from the reviewed studies suggest that, in most cases, olfactory cues do not directly influence consumer behaviour. Although the evidence from published research is not definitive in terms of the impacts of olfactory cues on the five thematic areas identified, the review suggests that the apparent incongruences may be due to the existence of differing mediating and moderating variables (Baron and Kenny, 1986), which influence the various relationships. Such mediators and moderators are explored in the following section.

4.2. Relevant Mediating and Moderating Variables

The systematic literature review suggests that the primary impact of scent is on the affective state or cognitive processes of the consumer, which in turn mediates the effects in terms of consumer behaviour. In addition, research has shown that moderating variables such as awareness of scent and its perceived pleasantness can alter consumer responses to scent.

4.2.1. Affect

The literature on atmospherics considers mood as a mediating factor between environmental cues and behaviour. This is based on the stimulus-organism-response theory (Mehrabian and Russell, 1974), which argues that environmental cues influence affective responses, which are subsequently turned into approach or avoidance

behaviours. Examples of approach behaviours in this context include consumers spending more time in the outlet and purchasing more due to scent, whereas avoidance behaviours encompass the intention to leave the store and a range of negative attitudes also due to scent. A number of studies partially support the mediating role of affect between scent and attitude change, improved memory and behavioural responses (Ehrlichman and Halpern, 1988; Baron, 1997; Fiore *et al.*, 2000), and sometimes specify arousal as the mediator (Mattila and Wirtz, 2001). In terms of attitudes, pleasant scents create a more emotionally satisfying environment and lead products in such environments to be perceived more positively (Chebat and Michon, 2003). This is because attitude towards the store is sometimes regarded to be more important than attitude towards the merchandise itself when determining consumer choice (Spangenberg *et al.*, 1996). This, in turn, helps to explain the relevance of in-store scent.

Several studies claim that scent-induced behaviours are mediated by affect (Baron, 1997; Fiore *et al.*, 2000; Morrison *et al.*, 2011; Vinitzky and Mazursky, 2011). If on exposure to a scent consumers experience a shift of affect, they are likely to recall information encoded in a similar affective state (Ehrlichman and Halpern, 1988), or that provoked by a similar affective response (Aggleton and Waskett, 1999). Thus, odours are likely to evoke memories that are affectively congruent. Despite this evidence, other findings reject the theory of the mediating role of affect on perception and behaviour (Chebat and Michon, 2003). The partial support for the mediating role of affect and the contradictory evidence suggests that another mediating variable must be examined, that is, cognition.

4.2.2. Cognition

Several papers suggest that cognitive processes can mediate the effects of scent. Olfactory cues were found to increase attention, resulting in greater elaboration effort by consumers, as well as enhanced memory for products (Krishna *et al.*, 2010), and brands (Morrin and Ratneshwar, 2000). Cognitive effort and increased attention are necessary conditions for a more effective encoding of information and are enhanced when scent is perceived to be distinctive (Morrin and Ratneshwar, 2000, 2003; Ball *et al.*, 2010). Krishna *et al.* (2010) report that scents relating to specific products are more effective in improving

memory than ambient scents, as the former are perceived as more distinctive than the latter. Cognitive responses were also found to mediate the effects of scent on shaping attitudes and inducing behaviours (Fiore *et al.*, 2000; Vinitzky and Mazursky, 2011).

Odours are capable of influencing consumer attitudes by evoking associations in the memory of consumers (Ellen and Bone, 1998). Moreover, if the olfactory cue is considered to provide relevant product attribute information, it enhances consumer attitudes (Ellen and Bone, 1998). Overall, evidence suggests that both affect and cognition work as mediators of the effects of scent.

4.2.3. Awareness

Consumer awareness of the presence of scent and its potential influence can be a crucial moderating variable when determining relevant consumer response. The perception of odours is different from perception of other environmental cues, since scent can be processed without consumer awareness (Davies *et al.*, 2003). The sense of smell is exceptional because it is able to trigger an automatic response to stimuli before the consumer is aware of what is causing it (Hirsch, 1995). Scents which operate below the level of perception are referred to as covert or subliminal scents (Bradford and Desrochers, 2009), and their effectiveness is supported by several experimental findings as exhibited through table 8.

[Table 8 here]

Table 8 shows a study by Li *et al.* (2007), which found that only subliminal scents were capable of affecting likeability ratings of faces. The ratings were more positive on the exposure to a pleasant scent, but only when participants were not aware of its presence. Awareness was also found to moderate the impact of odours on evaluations of products (Bosmans, 2006), and people (Baron, 1983). Further, a number of studies indicated that the effects of scent on consumer behaviour were significant when consumers were not conscious of its presence. However, similar responses to odour were observed in studies where consumers were aware of the presence of scent, which suggests either a need for further research or that awareness of odour may not be such

an important variable after all. Nevertheless, an important distinction must be made when discussing consumer awareness of scent. Consumers may not be aware of the presence of the olfactory cue because it operates below the level of perception or at very low concentration. Even if consumers are able to detect the scent, they may still not be aware of its influential nature. When consumers are aware of the persuasive power of an environmental cue, they tend to apply defensive mechanisms towards it to correct for its extraneous influence (Bosmans, 2006). This was evident in Baron's (1983) study, where perfume biased the ratings of job applicants. However, more positive ratings were only obtained with female evaluators; male evaluators were more aware of perfume as a mechanism to bias their judgement and tried to correct for this influence by giving lower ratings. This means that participants seemed to defend themselves against environmental influences, but only if they were able to recognise and interpret them as persuasive. Therefore, it is possible that in the studies where consumers were conscious of scent, they were not actually aware of its persuasive nature. This is consistent with the theory of affect as information (Pham, 1998), which postulates that consumers draw conclusions based on the observations they have made on their feelings. Thus, if the mood change is tacitly caused by scent rather than the product, a consumer's judgement can be biased. However, when the 'driver' of the mood change becomes salient (i.e. when the scent is noticed), such biasing effects become weak or disappear (Pham, 1998).

Cues within the environment can also activate relevant concepts and associations in the mind, a process referred to as priming (Bargh, 2002). Priming can subconsciously activate the pursuit of a certain goal, without the individual being fully aware of what is causing their behaviour. A study by Holland *et al.* (2005) revealed that exposure to covert odour enhanced a given pro-social behaviour of participants, namely cleaning crumbs from a table. One explanation for this is that the smell of citrus cleaner subconsciously activated relevant knowledge structures associated with cleaning, subsequently influencing the cleaning behaviour (Holland *et al.*, 2005). Nevertheless, Bargh (2002) argues that non-conscious influences can only activate existing goals, not create new ones. As with affective biases, priming manipulation can diminish when scent and its influence become salient. Therefore, consumer awareness of scent has the potential to alter the consumer's initial response to that scent.

4.2.4. Factors related to Individual and Environmental Stimuli

Consumer responses to scent were found to vary depending on specific consumer and scent factors. With regards to consumer factors, gender (Spangenberg *et al.*, 2006) and scent preferences (Breckler and Fried, 1993) were identified as the most influential variables in determining the effects of scent on consumers. Furthermore, it was found that the relationship between imagining food smell and the associated behavioural responses (increased salivation, food consumption and reported desire to eat) depends on the consumer creating a vivid mental image of the scent of food (Krishna *et al.*, 2014).

With regards to scents, the perceived congruency of odour with product class (Bone and Jantrania, 1992; Mitchell *et al.*, 1995; Ellen and Bone, 1998; Fiore *et al.*, 2000; Bosmans, 2006), gender (Spangenberg *et al.*, 2006) and music in terms of arousing qualities (Mattila and Wirtz, 2001; Morrison *et al.*, 2011) were considered essential conditions for olfactory effects to occur. Another important attribute of scent is its intensity, as intensity determines the perceived pleasantness of odour, which is a key factor in positively influencing consumers (Fiore *et al.*, 2000). Spangenberg *et al.* (1996) found that the relationship between perceived pleasantness of scent and its intensity is negative for neutral scents, but follows an inverted U-shaped function for pleasant scents. Thus, the qualities of scent such as its congruency and perceived pleasantness, together with general consumer preferences of scent, act as moderating variables, which influence affective, cognitive and behavioural responses to scent.

4.3. Methodologies within the Reviewed Studies

A few final points must be made in relation to the methodologies used by the papers addressed in this systematic literature review, as a means to provide further insights into the results of such studies on consumer responses to scent. A summary of such methodologies is provided in table 9.

[Table 9 here]

As demonstrated above, it is evident that most experimental studies were conducted within laboratory environments and such studies account for two thirds of all research on the impact of scent on consumers. About 13% were non-empirical studies in the form of literature reviews. Only 14% of research entailed field studies and the first was done by Hirsch (1995). These facts suggest a strong preference for laboratory over field settings, possibly because field studies have intrinsic disadvantages related to consumer exposure to uncontrollable variables (i.e. exposure to unintended environmental cues), which can make it difficult for researchers to make definitive conclusions about the effects of scent on consumers. Nevertheless, one could question whether the responses to scent achieved within laboratory settings would occur within 'real-life', marketplace situations. Given that field studies are more resonant with the lived experiences of consumers, their use in future studies may shed some new light on this area of research.

Another important issue to consider is that the majority of studies reviewed here used similar experimental designs. The procedure in most cases involved a pre-test of scent, followed by the creation of several different environmental conditions where consumer responses to scent were tested. All of the primary studies used quantitative data collection measures, with questionnaires being used in 68% of all articles. Observation was rarely used in studies of scent, accounting for only 14%, and focused on monitoring consumers' behavioural responses to odours.

The points above raise several issues. Firstly, researchers seem to be over-reliant on experimental designs and usage of self-reported measures, which are problematic in such contexts where participants may not be able or willing to reflect on mood changes, for example. In fact, only a few studies within the area of consumer responses to odour used objective measures, such as collecting consumption data (i.e. Hirsch, 1995). Indeed, although self-reported measures are suitable for assessing the effects of scent on memory, investigation of other consumer responses to scent may require more objective measures as discussed below.

5. Conclusions

This systematic literature review explored the effects of an important aspect of sensory marketing (i.e. scent) on consumer behaviour. Exposure to scent was found to positively

influence attitudes towards service environments and enhance memory for brands, ultimately resulting in increased likelihood of purchase. The effects of scent on consumer behaviour were found to be mediated by other variables, such as affect and cognition, and moderated by consumer factors (gender and scent preferences), scent properties (intensity, pleasantness, congruence), and consumer awareness of scent and its influence. Although this paper provides a systematic review of the literature within the fields of marketing and psychology, it acknowledges that a large body of research regarding human responses to odours exists within other disciplinary fields such as neuroscience.

Nevertheless, this review has identified several gaps in the literature which can be addressed by future research. The first issue is the ambiguity of the mediating role of affect and cognitive processes in determining consumer responses to scent. Lack of clarity also exists with regards to how marketers can determine the perceived congruency of scent and a product if, for instance, the scent is emitted within an environment containing a variety of other products. With regards to moderating variables, it is important to further investigate whether and how consumer awareness of scent and its influence can alter consumer responses. Another issue concerns the consumer's ability to report the influences on their decisions, as self-reported measures can be subjective. Since self-reported measures were the most common data collection method within the reviewed studies, it is suggested that future research could employ different measures such as facial EMG and MRI. However, we acknowledge that such measures may also present their own limitations. Finally, future research could seek to investigate whether scents are as effective in influencing purchase decisions for high involvement goods and services as they are in influencing low involvement purchases.

5.1. Managerial Implications

Scent is an important part of atmospherics and has been widely used in retailing, restaurants and other service contexts (Morrin and Ratneshwar, 2003). The most common type of scent in these settings is ambient scent. An advantage of ambient scent over product scent is that it can influence consumer reactions to all the products within the service environment, which is especially useful for products that are difficult to scent

(Spangenberg *et al.*, 1996). Service providers and retail businesses can benefit from ambient scent when trying to enhance consumer attitudes towards the environment and products, and to create better recognition and recall of their brands, which ultimately should lead consumers to make resonant purchasing decisions. Small changes in the environment, such as adding low intensity odours, can also increase feelings of novelty and pleasantness among consumers (Spangenberg *et al.*, 1996), which in turn would encourage approach behaviours by consumers. The perceived pleasantness of odours can also induce affective reactions that could create positive perceptions of the service (Ellen and Bone, 1998). Therefore, well selected ambient scent can be a cost-effective way to create a competitive advantage for service providers.

However, this practise may have some ethical implications. Not being aware of the influential nature of scent may make consumers vulnerable to manipulation (Bradford and Desrochers, 2009). Since consumers cannot turn their sense of smell off and may not be aware of its influential nature in a retail setting, the use of scent can be seen as a form of subliminal nudging. According to EU law, subliminal advertising is prohibited in audio-visual media (Moens and Trone, 2010), so there is a need for ethical analyses and debates regarding the use of scent in service and retail marketing.

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Table 1: Selected journals and articles retrieved

Marketing			Psychology		
	Journal name	No. of articles		Journal name	No. of articles
Grade 4	Journal of Marketing	5	Grade 4	Psychological Bulletin	2
	Journal of Marketing Research	1		Journal of Applied Psychology	2
	Journal of Consumer Research	3		Journal of Personality and Social Psychology	1
	Journal of Retailing	2		Personality and Social Psychology Bulletin	3
	European Journal of Marketing	2		Psychological Science	4
Grade 3	Psychology and Marketing	3	Grade 4	Journal of Consumer Psychology	1
	Journal of Advertising	1	Grade 3	Journal of Psychology	2
	Journal of Business Research	7		British Journal of Psychology	4
	Marketing Letters	1			
	Journal of Marketing Management	1		Total	45

Table 2: Summary of the effects of scent on consumer and mediating/ moderating variables

Consumer Responses to Scent		Mediating Variables	Moderating Variables	
Attitudes	<ul style="list-style-type: none"> - More positive evaluations of the environment, products and their quality - Better overall evaluations of shopping experience - More positive ratings of people 	<ul style="list-style-type: none"> - Affect - Cognition 	Consumer	<ul style="list-style-type: none"> - Gender - Scent preferences - Awareness of scent and its influence
Perceptions	<ul style="list-style-type: none"> - Perception to have spent less time in store 		Scent	<ul style="list-style-type: none"> - Perceived pleasantness - Intensity - Congruence
Memory	<ul style="list-style-type: none"> - Enhances memory for products - Improved recall and recognition for familiar and unfamiliar brands - Cue to activate information - More happy memories retrieved - Context-dependent memory effects - Short-term memory and long-term memory 			
Behaviour	<ul style="list-style-type: none"> - More time spent in the environment - More money spent - Increased gambling rates - Pro-social behaviour - Impulsive buying more likely - More time examining products - More willing to pay a higher price - Desire to consume food 			

Table 3: Cognitive responses to scent

Authors	Approach	Findings
Krishna <i>et al.</i> (2010)	Laboratory experiment	Distinctive product scent attracts attention and results in greater elaboration effects.
Mitchell <i>et al.</i> (1995)	Laboratory experiment	Congruent odour influences consumer decision making processes (various information processing measures).
Morrin and Ratneshwar (2000)	Laboratory experiment	Presence of pleasant ambient scent influences the processing effort involved with unfamiliar brands.
Olofsson <i>et al.</i> (2012)	Laboratory experiment	Object evaluation (congruence) was faster and more accurate than valence evaluation (pleasantness). Responses were quicker for odours preceded by semantically matching, rather than nonmatching, word labels. However, results showed no evidence of interference from valence.

Table 4: Affective responses to scent

Authors	Approach	Findings
Baron (1997)	Field experiment	Much higher levels of positive affect were reported when participants were exposed to pleasant ambient scent.
Bosmans (2006)	Laboratory experiment	Ambient scents act as affective cues, providing information for product evaluation.
de Groot <i>et al.</i> (2013)	Laboratory experiment	A positive state (happiness) can be transferred by means of odours.
Ehrlichman and Halpern (1988)	Laboratory experiment	Odour can have an influence on mood that may work as a mediator to evoke affectively congruent memories.
Ellen and Bone (1998)	Laboratory experiment	Better fitting or no scent had no impact on consumer mood, but badly fitting scent negatively affected consumer mood.
Fiore <i>et al.</i> (2000)	Laboratory experiment	Scent had an effect on affective state that partly mediated the effect on attitudes towards products and approach behaviours.
Knasko <i>et al.</i> (1990)	Laboratory experiment	Suggestion of a pleasant ambient odour enhanced positive mood in participants.
Lee <i>et al.</i> (2011)	Field experiment	Exposure to soothing scent reduces the anxiety caused by stereotypes in the marketplace.
Morrin and Ratneshwar (2003)	Laboratory experiment	Mood and arousal were not impacted by sent, but this study was based on self-reported measures.
Morrin and Ratneshwar (2000)	Laboratory experiment	Ambient odours did not affect consumer mood or arousal.

Table 5: Effects of scent on attitudes and perceptions

Authors	Approach	Findings
Baron (1981)	Laboratory experiment	Exposure to pleasant scent affected social perception through increased attraction to opposite sex.
Baron (1983)	Laboratory experiment	Scent biased ratings of job applicants.
Bosmans (2006)	Laboratory experiment	Ambient scents had a strong influence on product evaluations. Congruence was a necessary condition.
Chebat and Michon (2003)	Field study	Scent indirectly influenced a more favourable perception of a shopping centre and product quality.
Ellen and Bone (1998)	Laboratory experiment	Unless congruent scent provides perceived relevant product information, it does not enhance attitudes.
Fiore <i>et al.</i> (2000)	Laboratory experiment	Attitudes towards product were enhanced by scent.
Foster (2010)	Laboratory experiment	Scent influenced attractiveness ratings of men by women.
Li <i>et al.</i> (2007)	Laboratory experiment	Scent affected likeability ratings of people even though it was operating at subconscious levels.
Madzharov <i>et al.</i> (2015)	Laboratory experiment	In a warm-scented and thus perceptually more socially dense environment, people experience a greater need for power, which manifests in increased preference for, and purchase of, premium products and brands. The opposite applies to cool-scented environments.
Mattila and Wirtz (2001)	Field study	When scent and music were congruent in terms of arousing qualities, more positive ratings of environment and shopping experience were achieved.
Morrison <i>et al.</i> (2011)	Field study	Overall evaluations of shopping experience were more positive when consumers were exposed to scent and music.

Spangenberg <i>et al.</i> (2005)	Field experiment	Evaluations were biased when scent was thematically congruent with music.
Spangenberg <i>et al.</i> (1996)	Laboratory experiment	Exposure to pleasant scent influenced more positive evaluations of store environment and, in general, of the merchandise and product quality. Perceptions of time spent in store were also biased.

Table 6: Effects of scent on memory

Authors	Approach	Findings
Ball <i>et al.</i> (2010)	Laboratory experiment	Some odours can produce reliable effects on environmental context-dependent memory.
Aggleton and Waskett (1999)	Field study	Odours were found to act as contextual retrieval cues for a real-world experience.
Ehrlichman and Halpern (1988)	Laboratory experiment	When exposed to pleasant scent, participants retrieved more happy memories than the ones under unpleasant odour condition.
Krishna <i>et al.</i> (2010)	Laboratory experiment	Product scent is more effective in enhancing product memory than ambient scent.
Mitchell <i>et al.</i> (1995)	Laboratory experiment	Ambient odours can help access information in the memory.
Morrin and Ratneshwar (2003)	Laboratory experiment	Ambient scent improved recall and recognition of familiar and unfamiliar brands.
Morrin and Ratneshwar (2000)	Laboratory experiment	Scent increased recall of unfamiliar brands.
Morrin <i>et al.</i> (2011)	Laboratory experiment	Scent can be effective in enhancing long-term product memory.
Perkins (1990)	Laboratory experiment	Olfactory memory can be suppressed by the encoding of visual and verbal information.
White and Treisman (1997)	Laboratory experiment	There is short-term memory for odours. However, short-term odour memory is more effective when odours are labelled verbally.

Table 7: Behavioural responses to scent

Authors	Approach	Findings
Baron (1997)	Field experiment	Exposure to pleasant ambient odour in a large shopping centre induced pro-social behaviours.
Chebat and Michon (2003)	Field study	Scent enhanced shopping centre perception, which enhanced mood, which in turn influenced consumer spending.
Fiore <i>et al.</i> (2000)	Laboratory experiment	Ambient scent was found to enhance approach behaviours, such as intention to buy the product and willingness to pay a higher price for it.
Hirsch (1995)	Field study	Ambient scent increased gambling rates at the casino by increasing slot machine revenue by 45% in scented condition.
Holland <i>et al.</i> (2005)	Laboratory experiment	An exposure to the subliminal scent of a cleaning product had a direct influence on the performance of a cleaning task (eating biscuit and removing crumbs).
Krishna <i>et al.</i> (2014)	Laboratory experiment	Imagined scent can enhance consumer response, but only when the consumer creates a vivid visual mental representation of the object emitting the odour.
Mattila and Wirtz (2001)	Field study	When scent and music were congruent in terms of arousing qualities, more approach behaviours were exhibited, such as impulsive buying.
Morrin and Ratneshwar (2003)	Laboratory experiment	Ambient scent encouraged approach behaviours such as consumers spending more time in the environment.
Morrison <i>et al.</i> (2011)	Field experiment	Ambient scent together with music created an affectively pleasing environment, which subsequently positively influenced approach behaviours such as time and money spent.
Spangenberg <i>et al.</i> (1996)	Laboratory experiment	Approach behaviour also positively influenced (i.e. stronger intent to visit the store under scented condition).

Vinitzky and Mazursky (2011)	Laboratory experiment	Ambient scent induced approach behaviours in online shopping: participants spent more time browsing, examined more brands, and spent more money than participants in the non-scented condition.
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Table 8: Consumer awareness of scent in primary studies

Awareness	Author	Main Areas Investigated	Comments regarding awareness of scent
Studies conducted with participants who were aware of the scent.	Baron (1981) Baron (1983) Foster (2010) Mattila and Wirtz (2001) Spangenberg <i>et al.</i> (2005)	Attitudes and Perceptions	N/A
	Baron (1997) Vinitzky and Mazursky (2011)	Behaviour	N/A
	Ellen and Bone (1998)	Attitudes and Perceptions	Smelling the ad was part of the task.
	Bone and Jantrania (1992)	Scent Variables	N/A
	Chebat and Michon (2003)	Behaviour	The study ensured that scent intensity reached the thresholds of perception, but participants were not questioned about it.
	Fiore (2000)	Behaviour	Participants asked to rate the appropriateness of the scent.
	Knasko <i>et al.</i> (1990)	Affect	No scent was actually present, but the findings suggest that participants were aware of the influence of scent.
	Mitchell <i>et al.</i> (1995)	Memory	Participants were asked to rate scents after experiment.
	Morrison <i>et al.</i> (2011)	Attitudes and Perceptions	Participants were asked to identify the aroma, therefore directing attention to its presence.

Studies conducted with participants who were both aware and unaware of the scent.	Bosmans (2006)	Attitudes and Perceptions	When the influence of scent is made salient to respondents, discounting of the influence occurs.
	Li <i>et al.</i> (2007)	Attitudes and Perceptions	Likeability ratings of faces were biased only when consumers did not perceive the presence of scent.
Studies with participants who were unaware of the scent.	Hirsch (1995)	Behaviour	Concentration of odour quite low; participants not questioned on awareness.
	Holland <i>et al.</i> (2005)	Behaviour	Only a few participants were aware of the scent, but none were aware of the potential influence of scent on their cognition and behaviour.
	Krishna <i>et al.</i> (2010)	Memory	Scent was not referred to during the test. Fewer than three participants reported noticing scent (low awareness).
	Morrin and Ratneshwar (2003)	Memory	Subjects were questioned regarding their scent awareness after the experiment. Not much scent was noticed and only one participant believed to be affected by it.
	Morrin and Ratneshwar (2000)	Memory	Most participants were not aware of the scent and scent intensity was quite low.
	Spangenberg <i>et al.</i> (1996)	Attitudes and Perceptions	None of the participants noticed the presence of scent during the experiments; scents were not mentioned.
	Spangenberg <i>et al.</i> (2006)	Consumer variables	Scent intensity mild in order to avoid the scent getting unpleasant. Participants were not aware of the scent.

Participant awareness either not relevant or not specified in the studies.	Ehrlichman and Halpern (1988) Perkins (1990) White and Treisman (1997) Aggleton and Waskett (1999) Ball <i>et al.</i> (2010) Morrin (2010) Lee <i>et al.</i> (2011)	N/A	N/A
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Table 9: Methodologies used in research on scent

	Research design	Total (n=41) %
Research environment	Field study	14%
	Laboratory experiment	72%
	Non-empirical	14%
Data collection method	Questionnaire	68%
	Observation	14%
	Structured Interview	5%
	Non-empirical	13%