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Enhancing Guest Sensory Experiences and Behavior through Internet of Things (Iot)-Enabled Personalization in Premium Hospitality in Uganda

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Abstract:

This study explores the intersection of sensory marketing and Internet of Things (IoT) technology in selected 3 premium hotels in Uganda including Serena Hotel Kampala, Protea Hotel by Marriot Kampala, and Sheraton Hotel Kampala. We explored how IoT-enabled sensory experiences impact hotel guests' emotional states, overall satisfaction, and well-being, as well as their subsequent behavior. Additionally, we investigated whether gender plays a role in shaping these effects. The research design consisted of two phases: an exploratory phase involving in-depth interviews with hotel managers to gather qualitative insights, followed by a confirmatory phase involving an online survey of 357 hotel guests to validate the findings and gather quantitative data. The findings revealed that different senses influenced various aspects of guests' experiences: smell, hearing, and sight affected emotions, while touch, hearing, and sight impacted overall satisfaction. Smell and taste contributed to guests' well-being, with smell having a more significant impact on women's well-being and likelihood of returning compared to men. The Internet of Things (IoT) technology can be leveraged to craft personalized, multi-sensory experiences for hotel guests. For instance, hotels can utilize IoT to create distinctive and dynamic atmospheres in their rooms and suites, tailoring the ambiance to enhance guest satisfaction and comfort. This research focused on 3 premium hotels in Uganda, but future studies could investigate whether the results apply to other regions, cultures, and hotel segments, such as comparing high-end and budget hotels to determine if the findings are universally applicable.

Keywords: Internet of Things (IoT), premium hospitality, sensory experiences, emotional value, affective experience, gender, guest experience, personalization

Introduction

The global hotel industry has undergone a significant transformation driven by technological advancements and the impact of Information Communication Technology (ICT). Notably, the increasing demand for digital engagement has profoundly impacted guest experiences, as guests increasingly expect online interactions through various digital platforms (Agapito, D., et al. (2014). The provision of cutting-edge, high-tech services has become essential for ensuring customer satisfaction and is linked to enhanced hotel performance (Ahmed, I., et al. (2019). This shift towards technology-driven hospitality is expected to intensify in the future, with growing importance placed on digital innovation (Akhtar, P., et al. (2018).

The adoption of Internet of Things (IoT) technology and smart devices is accelerating, with significant applications emerging in hospitality, healthcare, urban infrastructure, and residential settings (Aluri, A., et al. (2019). The smart home market is projected to reach $141 billion by 2023, indicating rapid growth (Beldona, S., et al. (2018). IoT is revolutionizing marketing strategies by providing businesses with a comprehensive understanding of customer needs and behaviors across various platforms, devices, products, and services (Gupta et al., 2020). To stay ahead, service industry businesses must anticipate emerging trends and integrate essential smart technologies into their offerings, enabling them to prepare for future consumer interactions with IoT and maintain a competitive advantage.

Tung, V. W. S., et al. (2017) posited that the Internet of Things (IoT) is characterized by physical objects connected to cloud-based intelligence, enabling real-time interactions between objects and between objects and individuals. Marketers face the challenge of understanding not only how individual devices function and are used but also the complex experiences that emerge from customer interactions with IoT devices (Mercan, B., et al., 2021). Technology is crucial in creating memorable customer experiences, such as through gamification mechanics (Obrist, M., et al., 2017), which can lead to increased customer engagement (Plailly, J., et al. (2012). Radde, S., et al. (2017) defined the digital guest experience as the personal perception and interaction with digital services provided during a hotel stay, encompassing all direct and indirect digital touchpoints encountered by guests.

Experiences supported by digital technology can engage the same sensory channels - sight, sound, smell, touch, and taste - that are crucial in designing physical spaces for hospitality. The concept of intentionally crafting multi-sensory experiences in hospitality settings, known as "atmospherics," was first introduced by Kotler (1973). Building on this idea, Bitner (1992) coined the term "servicescape" to describe the influence of physical environments on consumer behavior in service-based industries. The field of sensory marketing in hospitality environments gained significant traction in the early 2000s (Spence et al., 2014).

Buhalis and Leung (2018) highlighted the need for further research into the multisensory experiences enabled by IoT and Human-Computer Interaction (HCI). IoT technology allows hotel guests to experience their stay in innovative ways through various sensory stimuli (Buhalis and Leung, 2018). This study aimed to bridge the

gap between traditional sensory marketing and the application of new digital technologies in the hotel industry. We investigated two main aspects: firstly, how IoT devices in premium hotels engage the five senses to influence guest emotions, well-being, and behavior; and secondly, how gender affects the impact of IoT-driven sensory stimuli on emotions, well-being, and behavioral intentions. Our findings can inform managers of premium hotels in developing effective multisensory marketing strategies.

We focused our research on premium hotels because they are more likely to have the financial resources to invest in IoT technology integration. Moreover, prominent global premium hotel chains are more inclined to adopt IoT devices due to their greater resources and economies of scale. This is consistent with the findings of Pantano and Vannucci (2019), who observed that larger retail companies tend to invest more heavily in digital technologies compared to smaller ones.

Leveraging Digital Technology in Hotel Operations

Hotels utilize two distinct categories of Information Communication Technology (ICT): firstly, support-centered technologies, which operate behind the scenes to optimize hotel operations, such as property management systems, and secondly, customer-centered technologies, which guests interact with directly as part of their service experience, like in-room entertainment (Murphy and Rottet, 2009). The latter category has been extensively studied, particularly in the context of ICT adoption in information search (Law et al., 2020). For instance, Jeong and Shin (2020) investigated the connection between smart tourism destinations and tourists' overall experience and likelihood of returning.

The Internet of Things (IoT) is a recent ICT innovation that has transformed the tourism and hospitality industries by integrating connected devices and platforms into hospitality services (Hoffman and Novak, 2017; Porter and Heppelmann, 2014). In the hotel sector, IoT devices have been leveraged to craft immersive, multi-sensory experiences that impact guests' emotional states and overall outcomes (Lemon and Verhoef, 2016).

Stylos, N., et al. (2021) introduced the concept of the Affective Internet of Things (AIoT), where smart devices are equipped with artificial emotions and personality, enabling them to share emotions within a network. This paradigm facilitates emotional exchanges between objects and between objects and humans. For instance, beacon technology in hotels can detect guest activity, track responses to promotional offers, and send personalized push messages. Moreover, hotel managers can use connected smartphone apps to monitor the hotel's overall emotional atmosphere and take action to enhance guest well-being.

IoT can also tailor services to guests' emotional states, such as using smart wearables to detect elevated heart rates and suggest relaxing music through the concierge tablet. Wearable and environmental IoT sensors can track guests' emotional states, enabling hotels to implement personalized service strategies (Grewal et al., 2020).

Sensory-Enabling Technologies in Hotels: Creating Memorable Guest Experiences

The concept of sensory marketing, which involves crafting multi-sensory experiences in services capes, has been a cornerstone of marketing strategies (Hultén, 2015; Krishna, 2013). According to Krishna (2013, p. 5), sensory marketing engages consumers' senses, influencing their perceptions, judgments, and behaviors. Lee et al. (2019) highlighted the significance of multisensory experiences in hotels, demonstrating their moderating role in shaping customer satisfaction. Lo (2020) identified three levels of hotel services - actual, augmented, and experiential - each with distinct design focuses and emotional impacts on guests. Foster and McLelland (2015) showed that themed services capes can enhance shopping enjoyment, brand attitudes, and loyalty. The integration of IoT-supported multisensory services can elevate guest experiences. The connection between sensory marketing and Human-Computer Interaction (HCI) has been advanced through Sensory-Enabling Technologies (SETs), which facilitate the presentation of augmented sensory stimuli to guests (Obrist et al., 2017). SETs encompass various devices; including smartphones, touch screens, and emerging technologies like virtual reality, augmented reality, and digital interfaces simulating taste and smell (Petit et al., 2019). For example, hotels can utilize virtual reality headsets to offer immersive experiences, such as virtual golf course tours, enhanced with sensory stimuli like scent, temperature, sound, and wind (Ranasinghe et al., 2018). Upscale hotels are ideal settings for creating SET-enabled guest experiences using IoT devices.

Research has established that hotel guest experiences are shaped by a combination of sensory stimuli that evoke emotional and cognitive responses (Kim and Perdue, 2023). Studies have shown that sensory elements like music and lighting can create atmospherics that significantly impact customer evaluations and hotel choices (Kim and Perdue, 2023). According to Gestalt psychology, customers form a holistic impression of their environment before focusing on specific details (Alderson, 1952; Hultén, 2018). To ensure positive evaluations, sensory perceptions across multiple senses must be congruent (Helmefalk and Hultén, 2017; Spence et al., 2019). Lin (2020) found that hotel guests' emotional responses depend on the congruence between sensory attributes like color and music in specific settings. In this study, we define guest experiences in premium hotels as emotional and affective responses to the stimulation of the five senses through IoT devices. We measure emotional value as enjoyment, playfulness, and pleasure, and affective experience as emotional and hedonic feelings (Hoffman and Novak, 2019). Based on this framework, we propose the following hypotheses:

H1. Stimulation of (a) touch, (b) smell, (c) hearing, (d) sight, and (e) taste through IoT devices will positively impact emotional value.

H2. Stimulation of (a) touch, (b) smell, (c) hearing, (d) sight, and (e) taste through IoT devices will positively influence affective experience.

Eudaimonic Experiences

Spence, C., et al. (2017) distinguished between hedonism and eudaimonism, two concepts related to individual well-being. Hedonism focuses on happiness and satisfaction, while eudaimonism involves realizing

one's potential and finding meaning in life. Eudaimonia is about personal growth, self-realization, and pursuing excellence (Waterman et al., 2010). In social psychology, eudaimonia refers to fulfilling intrinsic motives (Huta and Waterman, 2014). Rahmani et al. (2018) argued that eudaimonia leads to hedonia. Hotels can help guests achieve eudaimonia by using IoT devices to create personalized experiences, such as adjusting room atmosphere based on physical and mental states. We examine eudaimonism separately from hedonism, as it encompasses important intrinsic goals for premium hotel guests. Thus, we hypothesize:

H3. IoT devices stimulating (a) touch, (b) smell, (c) hearing, (d) sight, and (e) taste will positively impact eudaimonism.

Emotions and Behavioral Intentions

Research shows that emotions in service encounters predict behavioral intentions (Loureiro et al., 2023). In hospitality, behavioral intention includes repurchase, positive word-of-mouth, and recommendations (Loureiro et al., 2023). Positive emotions increase customer satisfaction, loyalty, and positive word-of-mouth (Jang and Namkung, 2019). Therefore, we assume:

H4. Emotional value positively impacts behavioral intentions.

H5. Affective experience positively impacts behavioral intentions.

H6. Eudaimonism positively impacts behavioral intentions.

Gender-Based differences in Hotel Industry

Research has identified gender-based differences in consumer behavior in the hotel industry. For instance, men value convenience, while women prioritize data security in fingerprint technology for room access (Kim and Bernhard, 2019). Hotels should consider gender preferences when offering fitness equipment to enhance their wellness reputation (DeFrank et al., 2020). Gender differences also exist in emotional responses to wine tasting (Mora et al., 2018) and sensory stimuli. Men prefer masculine-colored hotel rooms, while women appreciate both masculine and feminine colors (Bogicevic et al., 2018). Women are more sensitive to scents (Brand and Millot, 2001) and require more tactile inputs when assessing products (Citrin et al., 2023). Music in retail stores influences consumer behavior differently based on gender (Andersson et al., 2022). Despite the importance of emotional and affective reactions in defining customers' behavioral intentions, few studies have examined gender differences in hotel experiences. Therefore, we propose:

H7. The five senses have a greater impact on (a) emotional value, (b) affective experience, and (c) eudaimonism in women compared to men.

H8. The effects of (a) emotional value, (b) affective experience, and (c) eudaimonism on behavioral intentions are greater for women than men.

Our research model, based on the S-O-R paradigm (Mehrabian and Russell, 1974), suggests that sensory cues from IoT devices (Stimuli) influence guest emotions, affective experience, and eudaimonism (Organism) and impact behavioral intentions (Response).

Research Methodology

Building on previous research in tourism and hospitality marketing, which advocates for a mixed-method approach to gain a deeper understanding of the research phenomenon and to provide more robust evidence (Lee and Hallak, 2020), this study employed a mixed-method design. This approach combined qualitative semi-structured interviews to gather insights from hotel managers on the potential application of IoT in premium hotels, with quantitative surveys of hotel guests to empirically validate the research model and test the associated hypotheses.

We identified potential respondents based on two key criteria: hotel managers with at least five years of experience in premium hotels and a willingness to share their insights on new technologies and IoT. We contacted managers in 3 selected premium hotels in Uganda including; Serena Hotel Kampala, Protea Hotel by Marriot Kampala as well as Sheraton Hotel Kampala, but initially faced challenges finding available managers who met our criteria. To address this, we leveraged the managers' professional networks to expand our sample until we reached saturation. Our final sample consisted of 14 interviews, each lasting 20-30 minutes, with a diverse group of 9 female and 5 male managers. The age distribution was 14% under 34 and 86% between 35-54, with 57% having over 7 years of experience in hotel management.

We developed an interview guide to explore hotel managers' views on IoT adoption in the hotel industry, including their assessment of the benefits, drawbacks, opportunities, and challenges of digitalization in premium hotels facilitated by IoT devices. To ensure clarity and effectiveness, we pilot-tested the guide with two hotel managers, refining certain questions based on their feedback. The interviews were then transcribed for in-depth analysis.

Following the interviews, we performed content analysis using selective thematic codes (Arsel, 2017). The results revealed that most hotel managers believed IoT adoption could enhance guest experiences. They emphasized the importance of differentiation in a competitive market, citing examples like: "The customer experience is a challenge for hoteliers; we need to surprise customers" and "Connected watches enable quick staff response, delighting customers." Managers saw IoT devices as a means to distinguish their hotel, attract and retain customers, and gain a competitive edge.

Secondly, managers were convinced that guests' technological skills would affect the implementation of IoT devices in hotels, deeming it necessary to test the various connected objects carefully before putting them at the guests' disposal. Indeed, the perceived ease of use of IoT devices has influenced guest experience (Libai et al., 2020). Nevertheless, managers believed that the use of IoT devices creates considerable convenience and has great time-saving potential for both hoteliers and guests.

However, managers emphasized that human interaction remains essential for customers. They noted that staff are necessary to explain device functions, such as at check-in, and that personal touch is crucial for a satisfying customer experience. While technology advances, replacing human receptionists with robots is not yet feasible due to various factors, including customer and employee acceptance, government regulations, and technological limitations (McCartney and McCartney, 2020). Instead, hotels should offer customers the option to choose between self-check-in and personal assistance from a live receptionist, ensuring a balance between technology and human interaction.

Hotel managers envisioned a future where hotel rooms are equipped with 'smart' devices, such as intelligent light bulbs, speakers, and other connected objects. These devices would allow guests to control room ambiance, access information, order room service, and even check out. Managers saw this as an emerging trend in luxury hotels, citing examples like connected TVs that enable guests to book restaurant tables, view menus, and access spa offers. They also suggested that TVs could be used for phone calls, concierge services, and customized requests. Overall, managers believed that connected devices would enable premium hotels to meet customer needs and create unforgettable experiences.

We gathered data through an online questionnaire, using a filtering question to ensure respondents had stayed in any of the 3 premium hotels under study within the last two years. Those who answered 'No' were redirected to socio-demographic questions and exited the questionnaire. We also asked about IoT device ownership to focus on familiar respondents. Established scales were adapted to measure our model's variables: Emotional Value (EV) with six items from Choe and Kim (2018), Affective Experience (AE) with four items from Pijls et al. (2019), Behavioral Intentions (BI) with six items from Jani and Han (2019), and Eudaimonism with 12 items from Waterman et al. (2020). The five senses were evaluated using adapted scales from Peck and Wiggins (2020) and Webb and Peck (2018): Touch (4 items), Taste (3 items), Smell (4 items), Hearing (4 items), and Sight (3 items). All items used a five-point Likert scale, ranging from '1 = Strongly disagree' to '5 = Strongly agree'.

Following the application of our filters, a total of 357 questionnaires (47% of the initial 757 respondents) were deemed suitable for data analysis. Notably, 47% of these respondents had a frequent history of staying in any of the selected 3 premium hotels (at least once a year) and were also active users of IoT and smart devices. The respondent pool had an average age of 35, with a balanced gender distribution of 53% females and 47% males.

The correlation matrix coefficients were below 0.8, indicating no multicollinearity issues (Field, 2019). The composite reliability coefficients exceeded 0.8, demonstrating high construct reliability. The average variance extracted (AVE) values surpassed 0.5, with no instances of AVE being lower than the squared correlation, confirming satisfactory convergent and discriminant validity for all constructs (Hair et al., 2019). Furthermore, the model fit indices met the recommended standards (Hair et al., 2017): $\chi^2/df = 2.74$ ($p < 0.001$), CFI = 0.93, and RMSEA = 0.04, indicating a good overall fit of the measurement model to the data.

Table 1: Mean, standardized deviations, and correlation matrix

Variable	Mean	Std Dev	CR[a]	EV	AE	BI	EUD	Touch	Smell	Sight	Hearing
Emotional value (EV)	3.61	.97	.94	1							
Affective experience (AE)	3.55	.91	.89	.72**	1						
Behavioral intentions (BI)	3.40	.95	.94	.72**	.72**	1					
Eudaimonism (EUD)	3.57	.56	.85	.49**	.51**	.54**	1				
Touch	3.69	.80	.80	.59**	.61**	.56**	.42**	1			
Smell	3.67	.86	.80	.68**	.65**	.64**	.42**	.68**	1		
Sight	3.81	.89	.88	.72**	.69**	.64**	.40**	.69**	.69**	1	
Hearing	3.83	.88	.90	.61**	.62**	.58**	.37**	.59**	.57**	.72**	1
Taste	3.83	.85	.80	.54**	.51**	.49**	.36**	.59**	.57**	.63**	.52**

Note: [a]Composite reliability; **Correlation is significant at the 0.01 level (2-tailed).

Empirical Results

The study employed structural equation modeling using AMOS Version 24 to test the hypotheses. The results showed a good fit of the proposed model to the data (RMSEA = .04, TLI = .91, CFI = .93; χ^2/df = 2.88, $p < .001$). The hypothesis tests revealed that:

- Smell positively influenced emotional value and eudaimonism, supporting H1b and H3b.

- Smell had no effect on affective experience, not supporting H2b.

- Hearing and sight had significant effects on emotional value and affective experience, supporting H1c, H2c, H1d, and H2d, but not on eudaimonism.

- Touch had a significant effect on affective experience, supporting H2a, but not on emotional value or eudaimonism.

- Taste positively influenced eudaimonism, supporting H3e, but not emotional value or affective experience.

- Emotional value did not significantly affect behavioral intentions, not supporting H4.

- Affective experience and eudaimonism positively influenced behavioral intentions, supporting H5 and H6.

Table 2: Results of hypothesis tests

	Estimate	S.E.	t-value	p-value	Hypothesis
H1a. Touch □ EV	.09	.06	1.58	.11	Rejected
H1b. Smell □ EV	.38	.05	7.61	***	Supported
H1c. Hearing □ EV	.13	.05	2.46	.01	Supported
H1d. Sight □ EV	.50	.06	8.29	***	Supported
H1e. Taste □ EV	.09	.05	1.76	.07	Rejected
H2a. Touch □ AE	.12	.03	3.28	.01	Supported
H2b. Smell □ AE	-.05	.03	-.14	.88	Rejected
H2c. Hearing □ AE	.12	.03	3.81	***	Supported
H2d. Sight □ AE	.11	.04	2.66	.01	Supported
H2e. Taste □ AE	-.03	.03	-.95	.34	Rejected
H3a. Touch □ Eudaimo	.05	.02	1.86	.06	Rejected
H3b. Smell □ Eudaimo	.07	.03	2.33	.02	Supported
H3c. Hearing □ Eudaimo	-.07	.01	-.42	.67	Rejected
H3d. Sight □ Eudaimo	.07	.01	.45	.64	Rejected
H3e. Taste □ Eudaimo	.06	.03	2.04	.04	Supported
H4. EV □ BI	.06	.14	.43	.66	Rejected
H5. AE □ BI	.83	.18	4.53	***	Supported
H6. Eudaimo □ BI	.43	.21	2.00	.04	Supported

A multi-group analysis was conducted to examine the moderating effect of gender on the significant paths of the model, following Kline (2005). The results, presented in Table 3, showed that:

- The relationships between eudaimonism and sense of smell, and eudaimonism and behavioral intentions, were significant for women ($t = 2.63$, $p < .01$; $t = 2.34$, $p < .01$) but not for men ($t = 0.56$, $p > .05$; $t = 0.52$, $p > .05$), partially supporting H7c and not supporting H8c.

- Gender did not moderate the relationships between smell and emotional value ($\chi 2\Delta = 2.07$, $p > .05$), hearing and emotional value ($\chi 2\Delta = 0.04$, $p > .05$), sight and emotional value ($\chi 2\Delta = 0.01$, $p > .05$), touch and affective experience ($\chi 2\Delta = 0.02$, $p > .05$), hearing and affective experience ($\chi 2\Delta = 0.04$, $p > .05$), sight and affective experience ($\chi 2\Delta = 0.01$, $p > .05$), taste and eudaimonism ($\chi 2\Delta = 0.13$, $p > .05$), and affective experience and behavioral intentions ($\chi 2\Delta = 0.02$, $p > .05$), not supporting H7a, H7b, H8a, and H8b.

Table 3: Moderating effect of gender

	Male (N = 167)		Female (N = 190)		Chi Square
	std.	*t-value*	*std.*	*t-value*	Difference Δ
Smell → EV	.31	5.04**	.53	6.78**	2.07
Hearing → EV	.15	2.20*	.12	2.27*	.04
Sight → EV	.43	5.84**	.58	6.10**	.01
Touch → AE	.24	2.35*	.11	2.28*	.02
Hearing → AE	.13	2.72**	.25	2.56**	.04
Sight → AE	.26	2.81**	.17	2.25*	.01
Smell → Eudaimo	.01	.56	.20	2.63**	7.58**
Taste → Eudaimo	.13	2.55*	.28	2.35*	.13
AE → BI	.13	2.29*	.17	2.33*	.02
Eudaimo → BI	.05	.52	.59	2.34*	7.41**

*** Sig. at p □ .01; * Sig. at p □ .05*

Discussion

This study aimed to explore how IoT in premium hotels can stimulate the five senses, influencing guests' emotions, affective experiences, eudaimonism, and behavior, while examining gender's moderating effects.

The results confirmed that smell, hearing, and sight positively impact guest emotions, aligning with Lo (2019) and Jang and Namkung (2019), who found that experiential offerings enhance customer satisfaction and loyalty.

Additionally, touch, hearing, and sight positively influenced affective experiences, supporting Lee et al. (2019) and Lemon and Verhoef (2018), who highlighted the importance of multisensory experiences in hotels. Smell and taste were found to impact eudaimonism, consistent with Obrist et al. (2017) and Spence et al. (2017), who noted the complexity of chemical senses and their potential for influencing emotions and memories.

The connection between smell, taste, and memory (Plailly et al., 2012) was also supported. Furthermore, affective experiences and eudaimonism influenced guest behavior, corroborating Kim and Perdue (2013).

Practical implications and conclusions

Premium hotel managers should engage guests by incorporating cues from all five senses, ensuring congruence and harmony in hotel spaces (Helmefalk & Hultén, 2017). Sensory overload should be avoided (Richard & Chebat, 2016).

Hotels can create sensory-informed themes, like different rooms and suites, and tailor experiences to individual preferences. Seamless connections across pre-stay, stay, and post-stay phases are crucial (García et al., 2018).

Hotels can collect data on guests' sensory preferences, like touch, smell, hearing, sight, and taste, to provide personalized services. Big data plays a key role in this process (Mariani, 2019; Stylos et al., 2021).

Hotels can co-create customized sensory experiences with guests, using context awareness and hyper-personalization (Mercan et al., 2021). For example, hotels can use music preferences and room context to create personalized playlists.

Our findings suggest hotels can use scent strategically, considering gender differences, to enhance eudaimonism and behavioral intentions. IoT adoption can help hotels attract customers post-COVID-19, offering opportunities for paradigm shifts in tourism (Zenker & Kock, 2020).

Hotels can use voice-enabled services, scent, and Artificial Intelligence to create positive emotional experiences and ensure cleanliness.

The findings highlighted the significance of stimulating all five senses, as per the Gestalt principle (Helmefalk and Hultén, 2017). Finally, the study revealed that smell had a greater impact on eudaimonism and behavioral intentions among women than men, supporting Brand and Millot (2001), who found women to be more sensitive to scents.

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