

Subliminal Effects of Music in the Shopping Environment an Empirical Analysis of Consumer Preferences and Behavior

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Abstract: Music is a significant component of the shopping environment that can affect consumer behavior on both conscious and subconscious levels. The objective of this study is to examine the correlation between musical stimuli and consumer experience in retail food stores. An online questionnaire survey from various age groups and locations in Slovakia forms the foundation of the research.

Two hypotheses were developed based on the existing data. The first looks at how the level of the music and how sensitive a person is to noise affect how likely they are to leave the business early. The second one looks at how the chosen and perceived tempo of music match up and how it affects how much fun shopping is and how annoyed people are. The investigation included regression models that accounted for sociodemographic characteristics, including generation, settlement size, and cultural practices. The anticipated outcomes suggest that consumers with heightened noise sensitivity are more inclined to exit a store when the music volume is excessive. It is also thought that when the preferred and actual tempo of the music are the same, it makes the shopping experience seem better and less irritating.

The study enhances comprehension of the effects of auditory stimulation in a retail context and facilitates practical recommendations in sensory marketing, while also addressing subliminality and consumer variability.

Keywords: music, consumer behavior, sensory marketing, sublimination, shopping experience

JEL Classification: M31, M39

1 Introduction

Music in retail environments fulfils a considerably broader function than merely masking silence. It subtly influences customer's emotional states, movements, and the amount of time they remain in the store. Previous research has shown that auditory stimuli can shape not only people's moods but also their perception of taste and space (Spence & Shankar, 2010). Consequently, music should not be perceived as a decorative or secondary element, but rather as a meaningful component that contributes to consumer experience and behavior.

Both tempo and loudness have been found to significantly affect how customers behave while shopping. Slower music tends to make people move at a calmer pace and spend more time exploring products, whereas faster rhythms can increase the likelihood of impulsive decisions and quicker movements (Eroglu, Machleit, & Chebat, 2005; Verlegh, Krywuczky, & Kocaman, 2025; Sun, Chang, & Xu, 2023). In this sense, music can be used strategically to encourage different shopping patterns depending on the retailer's goals. Gentle, low-volume background music has even been associated with higher sales of healthier food options (Biswas, Lund, & Szócs, 2019). However, the musical style must align with the brand identity of the store, since an unsuitable match may produce discomfort or confusion among customers (Oakes & North, 2008).

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When music complements the brand image, consumers typically evaluate the environment more positively, which appears to be especially important in the fashion industry (Barmpageorgopoulou, 2023).

Nevertheless, auditory elements rarely work in isolation. Their effects become stronger when they are combined with other sensory cues, such as lighting or scent (Soars, 2009; Helme Falk, 2019; Butawski, 2024). Emotional responses also intensify when several senses are stimulated simultaneously (Viegas, 2022). The tonal characteristics of sound play a part as well: lower tones are often perceived as calming, whereas higher tones tend to increase alertness (Sekeroglu, 2025). Many of these effects occur without conscious awareness, meaning that people are often unable to explain why they feel a certain way (Peck & Childers, 2008; Kulkarni & Kolli, 2022). Still, background music quietly shapes the emotional experience of consumers. Adapting music to different times of the day or to specific customer segments can further enhance this connection (Lorre, 2017). Moreover, even in online shopping environments, background sounds have been shown to influence browsing behavior (Lehr, 2023).

Comparable effects can be observed beyond traditional retail settings. Music has been found to improve mood even during small, everyday shopping situations (Hedström, Höggqvist, & Piri, 2015). In service contexts, such as beauty salons, background music can enhance satisfaction and loyalty among clients (Fu, 2025). The most favorable outcomes generally occur when auditory, olfactory, and visual cues are harmonized (Lindblom, 2023). A pleasant sensory environment may also increase the likelihood of impulse purchases (Reza, 2025). On a broader level, thoughtfully designed soundscapes have the potential to reduce stress in crowded public spaces (Cui et al., 2025) and to influence how people perceive cities and public environments more generally (Vicente-Salar, Traveria, & Bueno, 2025).

2Methods

The research was conducted in the form of a quantitative questionnaire survey, the aim of which was to determine customer preferences regarding music volume and noise sensitivity, as well as music tempo during grocery shopping. The aim was to identify the dependencies between musical stimuli and consumer experience in grocery retail stores. The research was based on an online questionnaire survey of respondents of different age groups and locations in the Slovak Republic.

This study used a quantitative online survey conducted on a sample of $N = 2501$ participants (1235 men, which is 49% and 1266 women, which is 51%) from Slovakia. The research was conducted in eight regions: Bratislava, Trnava, Nitra, Trenčín, Banská Bystrica, Žilina, Prešov and Košice in various retail food stores. Data collection took place in January 2025 through the market research agency MN Force s. r. o.

The first investigated variable was the level of perceived sensitivity to loud music, and the second variable was music tempo. Two hypotheses were created from the existing data:

H1a: Higher music volume and increased noise sensitivity increase the likelihood that a consumer will leave the store early.

H1b: Customers who are more bothered by music in the store are more likely to leave the store earlier.

H2: A match between the preferred and perceived tempo of music increases the subjective experience of shopping pleasure and reduces the perception of music as a distraction.

The research included regression models that took into account sociodemographic characteristics including generation, size of residence, and cultural practices.

The following methods were used to analyze the data:

- Kruskal-Wallis test is a non-parametric test based on the order of values – applied to compare responses between several independent groups (noise sensitivity levels, music loudness perception and music interference level during shopping). The test allows to determine whether there is a statistically significant difference between the medians of the groups in the case of non-parametric data. And it was used in testing all three hypotheses.

- T-test with constant was used to compare the mean value of the respondents' responses regarding music loudness perception, noise sensitivity level and music interference level with a reference value of 20%. This test allows to verify whether the mean values of these variables differ statistically significantly from the established reference level and therefore contributed to the verification of hypotheses H1a and H1b.

The graphs and visualizations presented in this article were generated using the RStudio program (version 2023.09.1). All tests were performed with a 95% confidence level ($\alpha = 0.05$) using Microsoft Excel, XLSTAT (v2023.3.0) and the ChatGPT-4o language model for validation and interpretation of results.

The study was guided by the Code of Ethics of the Laboratory of Consumer Studies, FEM SPU in Nitra (2023). The authors' share in the preparation of the questionnaire and the implementation of the survey was as follows: Peter Vaško – 40%; Jakub Berčík – 20%; Patrik Jurčíšin – 15%; Tomáš Krahulec – 10%; Adrián Rajtár – 15%.

3 Research results

Hypothesis H1a was aimed at verifying whether increased music volume in a store and different customer sensitivity to noise affect the probability that a customer will leave the store early. Analysis of the percentage data presented in Table 1 and the graphical representation in Graph 1 shows a clear trend: the more sensitive the customer is to noise, the higher the probability that the music bothers him so much that he considers leaving early.

The highest proportion of respondents who stated that they would leave the store due to disturbing music is found in the “rather sensitive” group (9.00%), followed by the “very sensitive” group (6.96%). These two groups also show the highest values of subjective discomfort caused by music. In the group of respondents with low noise sensitivity (“not very sensitive”), the proportion of customers who would leave early is significantly lower (5.72%). The lowest values were recorded for customers who declared that they were not at all sensitive to noise (3.32%).

These values show that there is a clear connection between noise sensitivity and the tendency to leave the store due to loud or distracting music. As noise sensitivity increases, the proportion of customers who are bothered by music so much that they would leave the store also increases.

This relationship is also confirmed by the results of the Kruskal–Wallis test, which showed statistically significant differences between the groups studied ($H = 65.278$; $p < 0.05$). This means that noise sensitivity significantly influences customers' reactions to music volume and has a direct impact on their decision to stay in the store or leave it sooner.

Based on the analysis, it can therefore be stated that hypothesis H1a was confirmed. The findings clearly show that increased music volume can cause early departure, especially among customers with higher noise sensitivity.

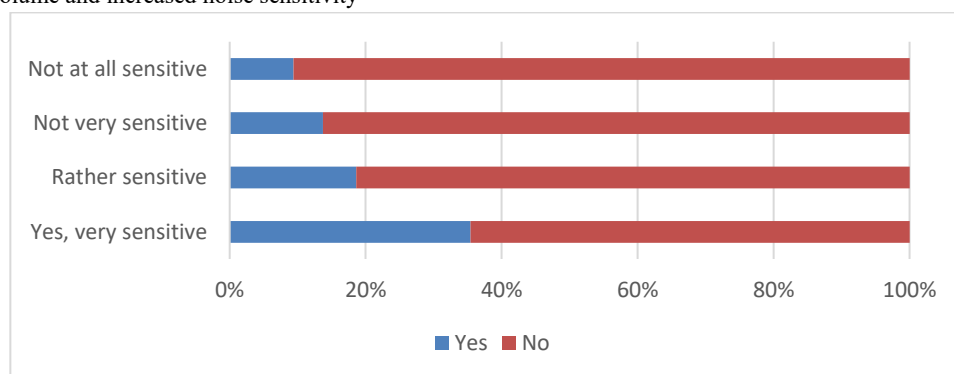
Table 1 Music volume and increased noise sensitivity

	Yes in %	No in %
Yes, very sensitive	6,96	10,67
Rather sensitive	9,00	31,15
Not very sensitive	5,72	23,03
Not at all sensitive	3,32	10,15

Source: Authors

The percentage representation is graphically shown in Figure 1.

Chart 1 Music volume and increased noise sensitivity



Source: Authors

Hypothesis H1b assumed that customers who are bothered by music in a store are more likely to leave the store earlier. Analysis of the data in Table 2 and the graphic representation in Graph 2 confirms that the level of music annoyance significantly affects customer behavior during shopping.

The highest proportion of “yes” answers, i.e. situations in which a customer would leave the store due to distracting music, is found in the groups of respondents who stated that music bothers them “always” (4.24%) or “very often” (5.08%). These groups also show the highest level of negative perception of music and are most prone to leaving early. A similar trend can be observed in the group that stated that music bothers them “often”, where 4.92% of respondents declared that they would leave the store earlier.

Conversely, as the level of distracting music decreases, the probability of leaving also decreases. In the group where music is only “sometimes” a distraction, 7.28% of respondents stated that they would leave early, but the dominant part of this group answered negatively (27.18%). The lowest tendency to leave was confirmed among customers who are “not bothered at all” by music, of whom only 3.56% stated that they would leave early, while as many as 31.02% declared that they did not perceive music as a distracting factor.

The statistical significance of these differences is confirmed by the Kruskal–Wallis test ($H = 303.21$; $p < 0.05$), which showed that there are statistically significant differences in the tendency to end the purchase early between groups of customers with different degrees of music distraction. This result shows that music distraction plays a significant role in the decision to stay in the store.

Based on the analyzed data, it can be stated that hypothesis H1b was confirmed. Customers who are often or always disturbed by music in the store are clearly more likely to leave the store early, while customers who do not perceive music as a distraction show a significantly lower probability of leaving early. These findings emphasize the importance of appropriate music selection in the retail environment and its impact on customer shopping behavior.

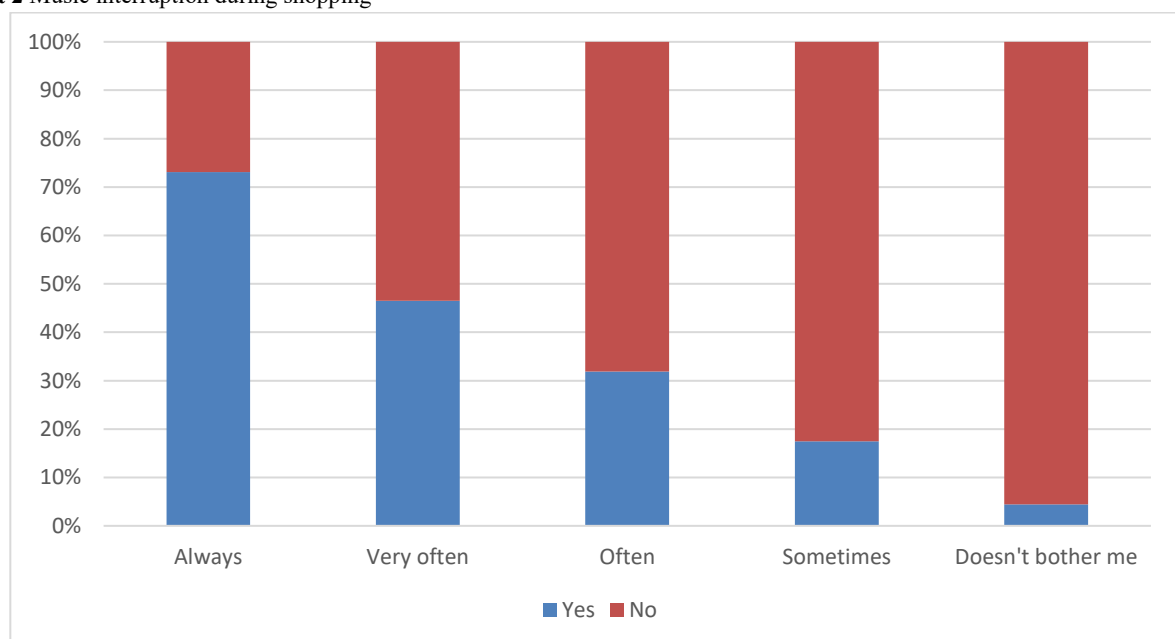
Table 2 Music Interference During Shopping

	Yes in %	No in %
Always	4,24	2,80
Very often	5,08	5,60
Often	4,92	8,32
Sometimes	7,28	27,18
Doesn't bother me	3,56	31,02

Source: Authors

The percentage representation is graphically shown in Chart 2.

Chart 2 Music interruption during shopping



Source: Authors

Hypothesis H2 assumed that the match between the preferred and perceived tempo of music increases the subjective experience of shopping pleasure and at the same time reduces the perception of music as a distracting element. Analysis of the data from Table 3 and the graphical representation in Graph 3 confirms that the tempo of music plays a significant role in how customers evaluate their shopping experience.

The most significant positive effect on shopping pleasure was recorded among respondents who prefer a faster, more energetic tempo of music. In this group, as many as 5.32% of respondents stated that music “always” makes their shopping more pleasant, and 7.60% stated that it makes their shopping more pleasant “sometimes”. These are the highest values among all tempo categories examined. These results indicate that the faster tempo of music is most in line with their preferences for this group of customers, which is reflected in the positive assessment of the shopping atmosphere.

Similarly, in the group of respondents who prefer a slower, calmer pace, there are also positive responses (8.29% “yes, always” and 22.91% “yes, sometimes”), but these values are scattered across different levels of satisfaction. The group with a neutral attitude towards the pace (“I don’t care”) shows a medium level of satisfaction, with 6.53% stating that music always makes shopping more enjoyable, and 20.55% stating that it sometimes makes shopping more enjoyable. This suggests that for this group, the pace does not play a key role, and the subjective experience is therefore more stable and less variable.

Lower values of the positive impact of music can be observed among respondents who prefer shopping without music. In this category, only 0.12% stated that music always makes shopping more enjoyable, and 1.95% that it sometimes makes it more enjoyable. Most respondents in this group perceived music neutrally or negatively, which confirms that for these customers music is more of a distracting element.

The results of the Kruskal–Wallis test ($H = 430.95$; $p < 0.05$) showed statistically significant differences between the studied groups, which confirms that the tempo of music affects the subjective experience of the shopping atmosphere. Customers are sensitive not only to the volume or genre of music, but also to its tempo, which significantly affects their emotional reaction to the store environment.

Based on these findings, it can be stated that hypothesis H2 was confirmed. The match between the preferred and perceived tempo of music increases the subjective experience of shopping pleasure, while the mismatch between the customer's preference and the tempo of music can lead to a neutral or less positive shopping experience. These results point to the importance of targeted musical stimulation in retail environments, which can be an effective tool for improving customer satisfaction and their overall shopping atmosphere.

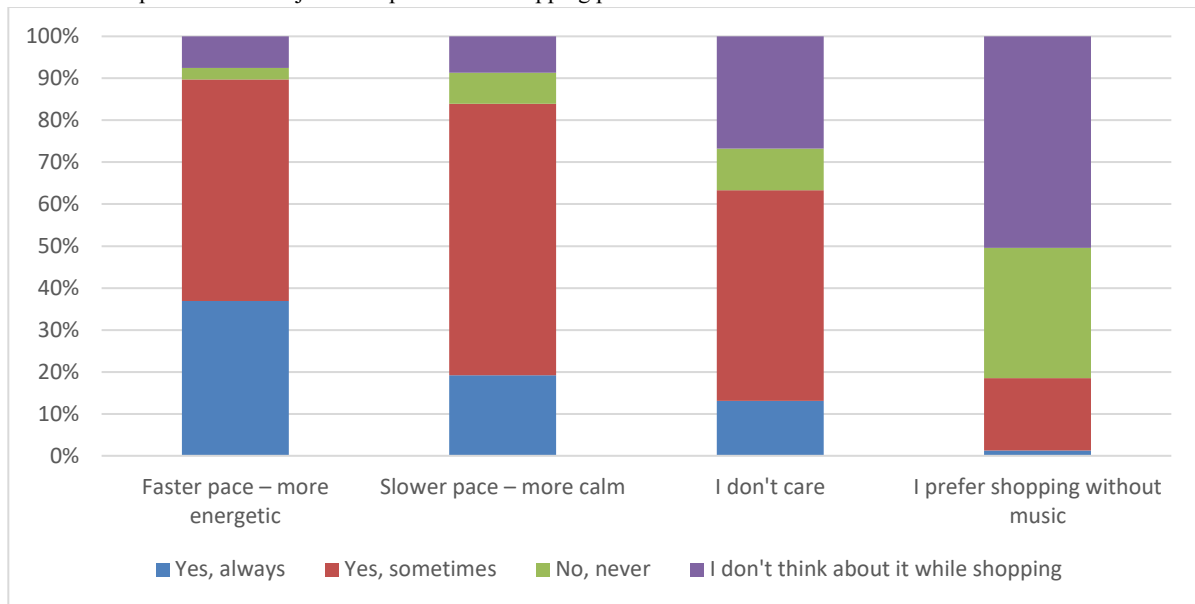
Table 3 Music tempo and subjective experience of shopping pleasure

	Faster tempo – more energetic in %	Slower pace – more peaceful in %	I don't care in %	I prefer shopping without music in %
Yes, always	5,32	8,29	6,53	0,12
Yes, sometimes	7,60	22,91	20,55	1,95
No, never	0,40	2,60	4,97	2,88
I don't think about it while shopping	1,08	3,08	10,96	4,68

Source: Authors

The percentage representation is graphically shown in Graph 3.

Chart 3 Music tempo increases subjective experience of shopping pleasure



Source: Authors

4 Conclusions

The research findings indicated that musical cues in retail settings significantly influence customer behavior and experiences while grocery shopping. Elevated music level and heightened noise sensitivity augment the probability of consumers departing the business prematurely, hence validating hypothesis H1a. Hypothesis H1b was validated, indicating that clients who are upset by music while shopping are more inclined to exit the store prior to finalizing their purchase.

The findings indicate that optimal music volume settings can have a positive impact on customer retention in the store and thus on their purchasing decisions. On the contrary, loud music or inappropriate background music may cause customers to be less satisfied and spend less time in the business. The second hypothesis was likewise validated: the subjective experience of shopping pleasure is increased and the impression of music as a distracting element is decreased when the desired and perceived tempos of the music coincide. This emphasizes the significance of music tempo as a tool for influencing the store's ambiance and fostering a satisfying shopping experience.

Overall, the results highlight the need for targeted and sensitive work with music in the retail environment. The right choice of volume and tempo of music, adapted to customer preferences, can contribute to increasing comfort, satisfaction and also to strengthening consumer loyalty.

The results provide recommendations for store managers who use music to promote sales. The volume of the music should be appropriate for the type of store and the number of customers, as too loud music can lead to customers leaving early. It is advisable to adapt the background music to the age and preferences of customers, as younger people usually tolerate higher volume and faster tempo. Faster tempos are more suitable in the morning, while slower ones are suitable in the afternoon, when customers shop more leisurely. Artificial intelligence can help automatically adapt music to customer behavior in real time. However, music should create a pleasant atmosphere and should not appear manipulative.

The research was confined to participants from the Slovak Republic, hence the findings may not be applicable to other cultural contexts.

The data were acquired by a questionnaire, therefore relying on the subjective reactions of the participants. The survey was conducted within a single time period, which may influence the perception of music across other seasons or contexts. Future research could include other countries, experimental measurements and comparisons of different types of stores.

We are currently conducting research in a Kaufland store, where we track the movement of shopping carts using a positioning system with tags. During shopping, a playlist created by us with a specifically designed genre, tempo and subliminal stimuli is played. The objective is to ascertain the impact of such music on consumer behavior and their impression of the environment. We collect data using a positioning system, questionnaires and EEG readings that capture reactions to musical stimuli. The data will assist us better understand the interaction between music, emotions and consumer behavior in a realistic context.

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