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The Effect of High, Partial, and Low Multisensory Congruity between Light and Scent on Consumer Evaluations and Approach Behavior

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Abstract: Ambient light is inherent in the store environment, making research on the interaction effects between light and other atmospheric cues crucial to understanding how the store environment can affect consumers. This study extends existing research on multisensory congruity effects between atmospheric cues by examining whether multiple sensory associations (i.e., warmth and brightness) of ambient cues (i.e., light and scent) must match to create positive effects on consumer evaluations and behavior or whether a match of only one sensory association is sufficient. Previous research operationalized multisensory congruity primarily via the match on one specific association; however, the results of our two studies show that matching ambient light and scent (compared to a mismatch between the stimuli or compared to only one ambient cue) only led to enhanced evaluations and approach behavior when these stimuli were matched on both their perceived association with a warm or cold temperature and with a dim or bright illuminance level. Our research supports the importance of perceiving the store environment holistically and suggests that the description and selection of an atmospheric cue to create positive congruity effects on consumer evaluations and behavior is quite complex.

Keywords: store atmospherics; multisensory congruity; ambient light; ambient scent; consumer evaluations

Citation: Doucé, L. The Effect of High, Partial, and Low Multisensory Congruity between Light and Scent on Consumer Evaluations and Approach Behavior. *Sustainability* **2022**, *14*, 5495. https://doi.org/10.3390/su14095495

Academic Editor: Flavio Boccia

Received: 31 March 2022
Accepted: 29 April 2022
Published: 3 May 2022

1. Introduction

Retailers increasingly use store atmospherics to create pleasant and immersive customer experiences and build sustainable customer relationships [1]. Previous research confirmed that atmospheric cues in the store environment such as scent [2], color [3], or music [4] can indeed affect consumer reactions (for an overview, see [5–8]). Additionally, since shopping is a holistic multisensory experience in which consumers are exposed to various atmospheric cues simultaneously, it is crucial to understand how these cues interact and how these combinations affect consumer behavior. Prior research confirmed the importance of multisensory interaction effects between atmospheric cues by finding that congruent cues lead to more positive consumer reactions than incongruent cues [9,10]. However, most multisensory congruity research focused on (1) the interaction of scent and music [10,11], (2) the impact of congruent versus incongruent cues [9,10,12], and (3) congruity effects on store-related (vs. product-related) consumer reactions (for an overview, see [9]) leading to gaps in the literature, which we will address in our research.

First, less is known about ambient lighting and the interaction of lighting with other atmospheric cues in retail environments [1]. This is quite surprising since ambient lighting is an inherent element of the retail environment, and lighting characteristics such as brightness and warmth can be adjusted relatively quickly and cost-efficiently. Second, congruity between atmospheric cues has mostly been operationalized in terms of the sharing of one specific characteristic or (semantic) association such as arousing quality [10,12], softness [9], or temperature [13,14]. For example, two atmospheric cues can be associated with either

a high or low temperature (warm vs. cool). If both cues are connected to the same temperature level (e.g., warm), these cues are seen as congruent. If one cue is associated with warmth and the other with coolness, the cues are labeled as incongruent. However, diverse sensory characteristics (e.g., brightness, lightness, softness, warmth) can be elicited by atmospheric cues (for an overview of concepts elicited by scents, see [15], and these multiple elicitations can influence the degree of congruity between atmospheric cues, resulting in high congruent cues (i.e., a fit on multiple associations), partial congruent cues (i.e., a fit on one association), and low congruent cues (i.e., no fit). To our knowledge, only one study investigated partial sensory congruity effects [13]. However, in this study, partial congruity was created via a fit between one (vs. two) sensory cue (s) and a product's primary function and not between the atmospheric cues themselves. Thus, research on partial multisensory congruity between atmospheric cues is lacking. Nevertheless, knowing whether or not partial multisensory congruity is sufficient for achieving positive effects on consumer reactions is valuable for retailers since ensuring congruity between atmospheric cues on multiple associations can be quite time and money consuming. Third, prior research on congruity effects primarily focused on emotional, cognitive, and behavioral reactions towards the store (for an overview, see [9]). Less research investigated the downstream effects of the store environment on product evaluations.

To bridge these outlined gaps, the aim of our research is (1) to examine the combined effects of ambient lighting and scent, (2) to investigate whether a partial fit between these atmospheric cues is sufficient to trigger favorable consumer responses, and (3) to understand the hierarchy of the effects by investigating the relationship between evaluations on the store level, evaluations on the product level, and approach behavior. This article contributes to the literature in several ways. First, we extend previous research on multisensory congruity by studying an unexamined combination of lighting and scent and investigating how store environment, store, and product evaluations are intertwined. Second, we further examine the concept of partial multisensory congruity, going beyond the focus on congruent vs. incongruent atmospheric cues via one shared characteristic or association. Our research provides empirical evidence for the positive effects of congruity between ambient lighting and scent on consumer evaluations and approach behavior, but only when these atmospheric cues fit on multiple associations (i.e., high congruity) and not on only one association (i.e., partial congruity). These results show that partial multisensory congruity is insufficient to ensure positive consumer reactions, making the retailer's choice of atmospheric cues even more crucial and effortful.

The literature review will first discuss relevant research exploring light and scent effects separately. Second, we will review research on multisensory interaction effects on consumer reactions. Third, we will elaborate on the relationship between store (environment) evaluations, product evaluations, and approach behavior.

2. Theoretical Background

2.1. Effect of Single Atmospheric Cues

The stimulus–organism–response (S–O–R) paradigm is often utilized to describe the effects of atmospheric cues on consumer behavior [16,17]. This paradigm states that atmospheric stimuli in the store environment (S) influence consumers' internal evaluations (O), which in turn lead to a positive or a negative behavioral response (R). Within this paradigm, previous research showed that various atmospheric elements can influence consumers' affective and cognitive responses toward the store [2], merchandise evaluations [18], number of items approached [19], impulse [20] and other reactions (for a review, see [5–8]).

The current study focuses on the interaction between overall light and ambient scent. Light has primarily been studied in the context of work environments and received less attention within consumer behavior research [1,21,22]. However, overall lighting in a retail setting can have a substantial impact on store image [23,24], perceived atmosphere [22,25], store evaluations [26], the number of products examined by customers [27], and food choice in restaurants [1]. For example, consumers evaluated a store with bright and cool lighting

as more pleasant and lively than that same store with soft and warm lighting [26]. On the other hand, when the store had soft and warm lighting, it was perceived as more upmarket than when it had bright and cool lighting. Moreover, brightness can decrease perceived coziness and increase perceived tenseness of a store environment [25], which is in line with the observation that fast-food restaurants focusing on quick and efficient eating tend to have bright lights, whereas fine-dining restaurants are more likely to have dim lights [24].

An ambient scent is "a scent that is not emanating from a particular object but is present in the environment" [18] (p. 67). An ambient scent diffused in a store environment can lead to positive affective, cognitive, and behavioral consumer reactions [6,7,18,28]. For example, a fresh and pleasant ambient scent led to enhanced pleasure, product evaluations, and intentions to visit an upscale clothing store [2]. However, a pleasant scent may not always be enough. Several scholars showed that the relationship between ambient scent and consumer responses can be moderated by the congruity between the scent and the other atmospheric cues present in the store [10,14,29,30]. This multisensory congruity is the main focus of this article.

2.2. Multisensory Atmospheric Congruity

As mentioned above, a shopping experience is a holistic experience in which a consumer is exposed to several atmospheric cues at the same time, and the reaction to one atmospheric cue is likely to change in the presence of other cues [7]. This means that the way consumers perceive an atmospheric element depends on the presence of other atmospheric cues. For example, bright and cold (i.e., bluish) light may indicate a discount image and thus might be an indication of cheap offerings [23]. However, in combination with a fresh mint scent, the scent might reframe the meaning of the light from signaling cheapness to signaling freshness or excitement. Therefore, it is essential to take into account the multisensory interactions between atmospheric cues.

Some research has been performed with respect to multisensory interaction effects. For example, when music and ambient scent were congruent in terms of their arousing quality (i.e., high/high or low/low [10]), consumers reacted more positively than when music and ambient scent were incongruent. People like congruity because it confirms their expectations. This confirmation triggers a positive affective reaction which can be transferred to the object under evaluation [31–33]. Congruity between atmospheric cues can be achieved in different ways. In addition to congruity in valence or arousal [10], atmospheric cues can also be congruent based on their semantic associations (e.g., warm/cool color/scent [13]); soft/hard music/flooring [9]; feminine/masculine scent/touch [14]; Christmas music/Christmas scent [30]). The positive effect of semantic congruity between atmospheric cues can be explained by the theory of conceptual fluency [34,35]. Atmospheric cues can obtain semantic meaning [14], and these semantic associations can lead to conceptual fluency because the associated concepts are more accessible in the consumer's mind. Conceptual fluency is a particular form of processing fluency, which indicates the experienced ease by which an external stimulus is processed [36]. When people can easily process an environment (i.e., the stimulus), they experience a positive affective state that can be attributed mistakenly to the environment or the products in the environment rather than to the processing ease [37]. Therefore, congruent atmospherics can lead to processing fluency and improved elaboration [38–40], which results in more positive consumer reactions. In contrast, incongruent cues can lead to processing disfluency because the associations activated by the cues do not match [40].

Previous research on multisensory congruity effects mainly focused on comparing existing versus non-existing congruity in terms of the sharing of one specific characteristic or semantic association (e.g., warmth, softness, arousal). However, diverse sensory characteristics (e.g., brightness, lightness, softness, warmth) can be associated with atmospheric cues. For example, scents are associated with softness (e.g., soft: peach/ hard: rosemary), temperature (e.g., warm: banana/ cool: rosemary), loudness (e.g., loud: cinnamon/ quiet: apricot), shape (e.g., angular: wood/ round: waterlily), and brightness (e.g., bright: lemon/

dim: coffee; [15]), resulting in one scent being associated with different characteristics. For instance, a lemon scent is associated with brightness, sturdiness, lightness (as opposed to darkness), and hardness. These multiple associations can influence the degree of congruity between atmospheric cues, resulting in a congruity continuum with high congruent cues (i.e., a fit on multiple associations), partial congruent cues (i.e., a fit on one association), and low congruent cues (i.e., no fit). The concept of partial sensory congruity has been recently introduced and investigated via a fit between one (vs. two) sensory cue(s) and a product's primary function. Specifically, results showed that a fit of only one sensory cue with a product's primary function is enough to lead to favorable product evaluations, but only if the matching sensory cue is on a product level and not on ambiance level [13]. For example, a blue cooling pack (i.e., fit between product color and product's primary cooling function) in the presence of a warm ambient scent or music (i.e., partial: fit on the product level, but not on ambiance level) was evaluated equally than that same blue cooling pack in the presence of a cool ambient scent or music (i.e., high: fit on product and ambiance level). On the other hand, a red cooling pack (i.e., no fit between product color and product's primary cooling function) in the presence of a cool ambient scent or music (i.e., partial: fit on ambiance level, but not on product level) led to less positive product evaluations compared to a blue cooling pack in the presence of a cool ambient scent or music (i.e., high: fit on product and ambiance level) or compared to blue cooling pack in the presence of a warm ambient scent or music (i.e., partial: fit on product level, but not on ambiance level).

In this previous research, partial sensory congruity was created via a fit between one (vs. two) (ambient or product-related) sensory cue (s) and the product's primary function. We extend this view on partial congruity and investigate whether partial congruity between the multiple elicited associations of different ambient cues is also sufficient to trigger positive consumer reactions. Contrary to previous research on partial sensory congruity [13], we expect only high congruent atmospheric cues to positively influence consumer evaluations because partial congruent atmospheric cues will also impair store environment processing fluency. Therefore, we propose the following:

H1. *High congruity between ambient light and scent (i.e., a fit on multiple associations) will have a positive effect on (a) evaluation of the store environment, (b) evaluation of the store, (c) evaluation of the products, and (d) approach behavior, compared to low congruity (i.e., no fit) and compared to the presence of only one atmospheric cue.*

H2. *High congruity between ambient light and scent (i.e., a fit on multiple associations) will have a positive effect on (a) evaluation of the store environment, (b) evaluation of the store, (c) evaluation of the products, and (d) approach behavior compared to partial congruity conditions (i.e., a fit on one association).*

Previous research examining multisensory atmospheric congruity mainly focused on store-related consumer responses (e.g., store evaluation; see [9] for an overview). As mentioned earlier, the S-O-R paradigm of environmental psychology is often used to describe the effect of atmospheric cues on consumer reactions. O stands for organism or the internal response of the consumers towards the atmospheric cues in the store environment and entails consumers' emotions (e.g., pleasure, arousal), cognitions (e.g., evaluations), and physiological states (e.g., blood pressure [31,41] that influence their behavior. The hierarchy of these internal responses (e.g., affect-cognition-behavior) has been extensively examined [42,43], also in a multisensory atmospheric congruity setting [44]. The present research aims to understand how the effect of multisensory congruity on evaluative reactions on store and product levels may be intertwined. In research examining single atmospheric cue effects, evaluations of the store environment mediated the effect of scent on product evaluations and approach behavior [45]. Consumers use the store environment as a peripheral cue or tangible evidence when assessing the quality of a store and its products [31,42]. Therefore, we expect that the effect of high congruity on approach behavior is mediated

by store environment evaluations, subsequently, store evaluations, and finally, product evaluations. Figure 1 shows the proposed serial mediation model.

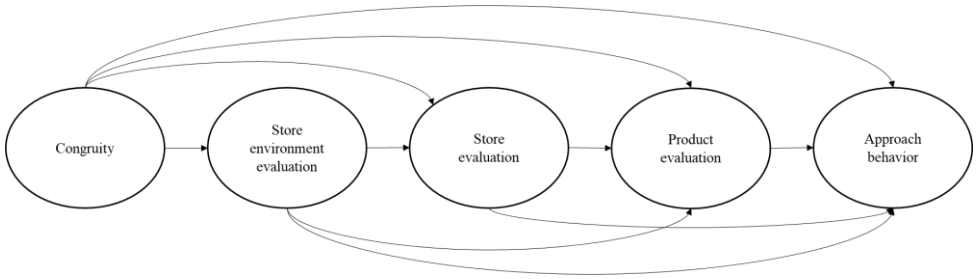

Figure 1. Proposed serial mediation model.

H3. *There is a serial mediation such that consumers will respond to high congruity with a more positive evaluation of the store environment, the store, and the products, which drives approach behavior.*

The aim of Study 1 is to verify whether congruity between ambient light and scent on multiple associations (i.e., high congruent cues) had a positive effect on evaluations and approach behavior compared to incongruity on multiple associations (i.e., low congruent cues). We chose to work with temperature and illuminance levels because earlier research found that light settings and scents can be associated with these sensory attributes. The aim of Study 2 is to examine the effects of partial congruity, verifying whether different associations should be taken into account when selecting atmospheric cues. An overview of the stimuli used in the two studies can be found in Appendix A.

3. Study 1

3.1. Design and Independent Variables

Study 1 took place in a physical simulated grocery store (approximately 614 square feet) constructed in a retail design research lab. The product categories present in the store included food, drinks, personal care, and home care. In this study, we operationalized high vs. low congruity through perceived (color) temperature and illuminance level. A 2 (warm, dim light versus cold, bright light) × 3 (no scent versus warm, dim scent versus cold, bright scent) full factorial between-subjects design was used.

Light. Light can be measured in correlated color temperature (Kelvin (K)). Correlated color temperature describes the ambiance that a lamp creates [26]. A lower color temperature (2700 K–3000 K) leans to more yellow light and is perceived as warm light, whereas a higher color temperature (4000 K–6500 K) leans to more bluish light and is perceived as cold light. Correlated color temperature is often associated with light illuminance (Lux [26]). Cold lighting is preferred with a higher illuminance level (i.e., bright lighting), whereas warm lighting is preferred with a lower illuminance level (i.e., dim lighting [26]). To establish high and low cue congruity, a warm, dim light setting (i.e., 3000 K and 415 lux) and a cold, bright light setting (i.e., 4000 K and 657 lux) were created. (The correlated color temperature of the different light settings used in this study was calculated from the spectral irradiance. The spectral irradiance was measured directly under a fixture in the room. A spectrometer (model QEPro of Ocean optics) with a cosine corrector was used. The illuminance was measured with an illuminance meter (model P-9710 of Gigahertz Optics). The illuminance values were measured in a rectangular grid with 40cm distance between the measurement points).

A pretest was performed to verify the perceived temperature and brightness of the light settings. Every respondent had to evaluate one light setting and one scent (the results of the scent pretest will be discussed below), making use of two 7-point semantic differentials (i.e., cold/warm and dim/bright). Light settings and scents were randomized. There were 54 participants (20 men and 34 women) aged between 18 and 60 years. Each light setting was evaluated by 27 participants (10 men and 17 women). The warm, dim

light setting (3000 K and 415 lux) was indeed perceived as warm (M = 5.33, SD = 1.11) and dim (M = 3.07, SD = 1.92), whereas the cold, bright light setting (4000 K and 657 lux) was indeed perceived as cold (M = 3.30, SD = 1.79) and bright (M = 6.15, SD = 1.17). Moreover, the warm, dim light and the cold, bright light significantly differed from each other in perceived temperature ($t(43.36) = 5.02$, $p < 0.001$) and perceived brightness ($t(42.90) = -7.11$, $p < 0.001$).

Scent. To create high congruent scent conditions, we selected scents associated with warmth (or coolness) and dimness (or brightness). Previous research showed that a mint scent is associated with coolness and brightness, whereas a coffee scent elicits warmth and dimness [15]. A pretest was conducted to check the perceived temperature and brightness. As mentioned above, every participant had to evaluate one light setting (the results of the light pretest are discussed above) and one scent, using two 7-point semantic differentials (i.e., cold/warm and dim/bright). Each scent was evaluated by 27 participants (coffee scent: 11 men and 16 women; mint scent: 9 men and 18 women). The coffee scent was indeed perceived as warm (M = 5.74, SD = 0.98) and dim (M = 3.19, SD = 1.69). The mint scent was indeed perceived as cold (M = 3.07, SD = 1.11) and bright (M = 5.07, SD = 1.52). Moreover, the coffee scent and the mint scent differed on perceived temperature ($t(52) = 9.36$, $p < 0.001$) and perceived brightness ($t(52) = -4.32$, $p < 0.001$).

In two additional separate pretests, the optimal intensity level of the coffee scent and the mint scent was determined. When a scent is too intense, people may correct their behavior because they become more aware that the scent, and not the store, is responsible for their responses [9,46]. Consequently, the ambient scent should not be salient. The scents were diffused in the retail design research lab, making use of an Aerostreamer 1000 fragrance appliance marketed by Scents, an olfactory marketing firm in Belgium. Based on the principle of warm evaporation (electrical), this appliance works by heating the liquid scent on a metal plate. Next, a fan distributes the scent. For each scent, about 15 respondents were asked two questions: "Did you notice something special in the room?" and, subsequently, "Now that we have mentioned the presence of a scent, do you detect the scent?" [2]. The first question verified whether respondents spontaneously mentioned scent-related elements, indicating that the scent was too salient. The optimal intensity level of the scents is achieved when respondents answer negatively to the first question and positively to the second. The intensity of the scent was lowered until six consecutive respondents did not spontaneously notice the scent but could smell it when told there was one present. Results showed that the intensity of the fragrance appliance should be set to the lowest level for each scent. Moreover, the ventilation of the retail lab needed to be set on level 6 (maximum power) for the mint scent and level 4 for the coffee scent.

3.2. Participants, Procedure, and Measures

A power analysis for a 3 × 2 ANOVA (medium effect size **f** of 0.25, $\alpha = 0.05$, power of 0.80, and six groups) showed that the required sample size was 211 participants or 35 participants per condition. A total of 240 participants (94 men and 146 women) aged between 22 and 79 years were recruited by an editorial announcement in a local newspaper, which was also posted on the newspaper's website. This announcement contained information about the purpose and the location of the study, as well as contact information and a subscription link. Participants entered the retail lab one at a time and were instructed to go shopping for lunch for the next day. For this task, they received a budget of 20 credits (a fictive monetary unit). Each product's price was also displayed on the shelves in terms of credits. This imposed budget ensured that the participants' own financial resources did not bias the results. During their store visit, participants could take products from the shelves and put them in their baskets. After the shopping task, the participants filled in a questionnaire containing evaluations (i.e., evaluation of the store environment, evaluation of the store, and evaluation of the products), approach behavior, and demographics. The participants received a gift certificate of 10 euros.

The evaluation of the store environment (means of 14 7-point semantic differential items) was assessed by a 13-item environmental quality scale [47] plus one additional item ([18]: unpleasant/pleasant). Store evaluation was measured by the mean of five 7-point semantic differential items [18,30]. Product evaluation was assessed with a combination of two 7-point semantic differential scales [18,48]. Participants indicated that price-related items were difficult to answer because they had to pay with credits instead of real money. Therefore, two price-related items (i.e., low prices/high prices and poor value/good value) were deleted. A summated scale (means of items) of the six remaining items was calculated and used in further analyses. Approach behavior was measured by eight items on a 7-point Likert scale, ranging from 1 = totally disagree to 7 = totally agree [16]. A factor and reliability analysis suggested the deletion of two items. A summary of the scale items used in our study and the results of the factor and reliability analyses are provided in Table 2. All Cronbach's alphas are above 0.86, indicating good reliability.

3.3. Analytical Approach

To test the effect of high (vs. low) congruity between ambient light and scent (H1), a 2 × 3 MANOVA with light and scent as fixed factors and evaluation of the store environment, store evaluation, product evaluation, and approach behavior as dependent variables was conducted. Subsequently, ANOVA and Fisher's Least Significant Difference (LSD) post hoc tests per dependent variable were run.

To examine the role of store environment, store, and product evaluations as mediators between multisensory congruity and approach behavior (H3), a serial mediation analysis was conducted using PROCESS for SPSS (model 6) [49]. Direct and indirect effects were estimated using OLS regression and bootstrapping analysis with 10.000 samples and a 95% confidence interval. As explained further in the results section, the ANOVA and post hoc tests showed that both high congruity conditions (i.e., warm and dim light combined with warm and dim scent and cold and bright light combined with cold and bright scent) had similar effects on evaluations and approach behavior. Therefore, these conditions were aggregated into a single high congruent condition and compared with, on the one hand, the aggregated low congruent light and scent conditions and, on the other hand, the aggregated light-only conditions. Store environment evaluations, store evaluations, and product evaluations were included as serial mediators, and approach behavior was included as the dependent variable.

3.4. Results and Discussion

3.4.1. High vs. Low Congruity

The MANOVA showed no significant main effect of light (Roy's Largest Root = 0.02, $F(4, 231) = 1.33$, $p = 0.26$) or scent (Roy's Largest Root = 0.02, $F(4, 232) = 1.16$, $p = 0.33$). However, the overall interaction effect between light and scent is significant (Roy's Largest Root = 0.14, $F(4, 232) = 8.25$, $p < 0.001$, $\eta_p^2 = 0.13$). The univariate analyses revealed a significant interaction effect for every dependent variable (see Table 3). Specifically, there was a significant interaction effect for evaluation of the store environment ($F(2, 234) = 14.11$, $p < 0.001$, $\eta_p^2 = 0.11$), store evaluation ($F(2, 234) = 14.94$, $p < 0.001$, $\eta_p^2 = 0.11$), product evaluation ($F(2, 234) = 11.11$, $p < 0.001$, $\eta_p^2 = 0.09$), and approach behavior ($F(2, 234) = 10.39$, $p < 0.001$, $\eta_p^2 = 0.08$). The effect sizes indicate a medium effect [50].

Table 1. Scales of dependent measures and the assessments of their psychometric properties, Study 1 and Study 2.

Dependent Measures	7-Point Scale	Study 1		Study 2	
		Item Loadings	Cronbach's Alpha	Item Loadings	Cronbach's Alpha
Evaluation of the store environment (14 items; [18,47])			0.96		0.95
	unattractive/attractive	0.85		0.86	
	tense/relaxed	0.70		0.60	
	uncomfortable/comfortable	0.78		0.79	
	depressing/cheerful	0.80		0.82	
	drab/colorful	0.82		0.73	
	negative/positive	0.88		0.88	
	boring/stimulating	0.84		0.82	
	bad/good	0.86		0.87	
	unlively/lively	0.84		0.81	
	unmotivating/motivating	0.87		0.84	
	uninteresting/interesting	0.85		0.86	
	unpleasant/pleasant	0.87		0.88	
	closed/open	0.76		0.63	
	dull/bright	0.76		0.71	
Evaluation of the store (5 items [18,30])			0.95		0.93
	bad/good	0.94		0.94	
	unfavorable/favorable	0.95		0.93	
	negative/positive	0.93		0.93	
	dislike/like	0.92		0.90	
	outdated/modern	0.80		0.67	
Evaluation of the products (6 items [18,48])			0.91		0.90
	bad/good	0.91		0.87	
	unpleasant/pleasant	0.91		0.82	
	unfavorable/favorable	0.89		0.86	
	low quality/high quality	0.71		0.74	
	unattractive/attractive	0.89		0.90	
	outdated/up-to-date	0.72		0.74	
	high prices/low prices				
	poor value/good value				

Table 2. Scales of dependent measures and the assessments of their psychometric properties, Study 1 and Study 2.

Dependent Measures	7-Point Scale	Study 1		Study 2	
		Item Loadings	Cronbach's Alpha	Item Loadings	Cronbach's Alpha
Approach/Avoidance behavior (6 items [16])			0.86		0.83
	I enjoyed shopping in this store.	0.85		0.84	
	I wanted to stay as long as possible in this store.	0.76		0.77	
	I wanted to leave this store as soon as possible.	−0.82		−0.80	
	I felt friendly and talkative to a stranger in this store.	0.85		0.83	
	I avoided looking around and exploring the store as much as possible.	−0.64		−0.55	
	This is a place where I might try to avoid other people and avoid having to talk to them.	−0.70		−0.62	
	I spent more time in the store than I originally intended.				
	I spent more money than I originally set out to spend.				

Note. Items in italics are deleted based on factor analysis or respondents' feedback.

Table 3. Summary of 2 × 3 ANOVA results, Study 1.

Dependent Variables	Model		Light		Scent		Light x Scent Interaction	
	***F*(5, 234)**	***p***	***F*(1, 234)**	***p***	***F*(2, 234)**	***p***	***F*(2, 234)**	***p***
Store environment evaluation	6.58	<0.001	0.21	0.65	2.23	0.11	14.11	<0.001
Store evaluation	7.06	<0.001	1.24	0.27	2.08	0.13	14.94	<0.001
Product evaluation	4.75	<0.001	0.003	0.95	0.75	0.47	11.11	<0.001
Approach behavior	4.64	<0.001	0.37	0.54	1.03	0.36	10.39	<0.001

Fisher's LSD post hoc tests showed that matching ambient light and scent stimuli on both associations (i.e., high congruity: warm and dim light/warm and dim scent or cold and bright light/cold and bright scent) led to a more positive evaluation of the store environment, a more positive evaluation of the store, a more positive evaluation of the products, and more approach behavior compared to low congruity conditions (i.e., no fit on both associations: warm and dim light/cold and bright scent or cold and bright light/warm and dim scent) and compared to the no added scent conditions (all $p < 0.05$). The match between cold, bright light and a cold, bright scent ($M = 4.92$, $SD = 1.05$) also improved product evaluations compared to no scent/cold, bright light condition ($M = 4.52$, $SD = 1.10$); however, this difference was not significant ($p = 0.11$). Means and standard deviations are provided in Table 4. In sum, the results support hypothesis 1 and demonstrate a positive multisensory high congruity effect between ambient light and scent.

Table 4. Study 1: Effect of high vs. low congruent light and scent on evaluations and approach behavior.

	***M* (*SD*)**			***M* (*SD*)**		
	Warm, Dim Light			**Cool, Bright Light**		
Dependent Variables	**No Scent [a] (*n* = 40)**	**Warm, Dim Scent [b] (*n* = 40)**	**Cool, Bright Scent [c] (*n* = 40)**	**No Scent [d] (*n* = 40)**	**Warm, Dim Scent [e] (*n* = 40)**	**Cool, Bright Scent [f] (*n* = 40)**
Store environment evaluation	3.60 *bf* (1.20)	4.39 *acde* (1.37)	3.25 **bf** (1.29)	3.52 *bf* (1.21)	3.53 *bf* (1.03)	4.40 *acde* (1.09)
Store evaluation	3.35 *bf* (1.20)	4.48 **acde** (1.51)	3.07 **bf** (1.51)	3.71 bf (1.34)	3.44 *bf* (1.20)	4.34 *acde* (1.29)
Product evaluation	4.27 *bf* (0.93)	5.04 *ac***de** (1.06)	4.23 *bf* (1.31)	4.52 b (1.10)	4.13 *bf* (1.14)	4.92 *ace* (1.05)
Approach behavior	4.08 *bf* (0.99)	4.76 *acd***e** (1.18)	3.94 *bf* (1.27)	4.08 *bf* (0.86)	3.87 *bf* (1.01)	4.58 *acde* (1.04)

Superscripts indicate a significant difference at $p < 0.05$ (in italic when $p < 0.01$ and in bold when $p < 0.001$) with the mean of the respective column (LSD post hoc tests).

3.4.2. Mediation Analyses

To test the mediating role of store and product evaluations on the effect of congruity on approach behavior, direct and indirect effects were estimated (using OLS regression and bootstrapping analysis—PROCESS—serial mediation model 6 [49]). As mentioned in the analytical approach section, the two high as well as the two low congruity conditions were aggregated into one high and one low congruity condition for the mediation analysis. An overview of the direct and indirect effects is provided in Appendix B. Figure 2 shows a statistical diagram of the serial mediation model. Consistent with the ANOVA results, high congruent light and scent settings led to a higher store environment evaluation than low congruent light and scent settings ($\beta = -1.00$, $p < 0.001$) and only light settings ($\beta = -0.83$, $p < 0.001$, see Appendix B Table A2). Concerning the direct effects of high congruity on (store environment, store, or product) evaluation or approach behavior, tests showed that when controlling for one or multiple evaluations (i.e., store environment, store, and/or

product), no direct effects of high congruent light and scent were found (all $p > 0.11$). On the other hand, store environment evaluation had a positive direct effect on store evaluation ($\beta = 0.96$, $p < 0.001$), product evaluation ($\beta = 0.16$, $p = 0.08$), and approach behavior ($\beta = 0.37$, $p < 0.001$); store evaluation had a positive direct effect on product evaluation ($\beta = 0.38$, $p < 0.001$)) and approach behavior ($\beta = 0.20$, $p < 0.01$); and product evaluation had a positive direct effect on approach behavior ($\beta = 0.13$, $p = 0.02$).

The indirect effects of high congruity on approach behavior were examined to test the mediation (see Appendix B Table A3). High congruity led to increased approach behavior through (1) store environment evaluation (all 95% CI (-0.62, -0.13)), (2) store environment evaluation, and, subsequently, store evaluation (all 95% CI (-0.38, -0.03)), and (3) store environment evaluation, subsequently, store evaluation, and, finally, product evaluation (all 95% CI (-0.11; -0.01)). These results indicated that high congruity (compared to low congruity or only one cue) led to a more positive store environment evaluation, which directly and indirectly (via store evaluation and, subsequently, product evaluation) increased approach behavior, supporting H3. In general, non-significant direct effects of high congruity in combination with three significant indirect effects indicate an indirect-only, full mediation process [51].

Study 1 confirmed that when multiple associations elicited by atmospheric cues are congruent, consumers evaluate the store environment and, subsequently, the store and the products more positively, leading to increased approach behavior. In Study 2, we further investigate the necessity of high congruity. As mentioned above, most research studying congruity effects determined congruity via one specific association such as arousing quality [10,12], masculinity vs. femininity [14], or temperature (warm vs. cold [14]). However, atmospheric cues can elicit multiple associations, and the question remains whether partial congruity (i.e., congruity of only one association) is sufficient to trigger positive congruity effects.

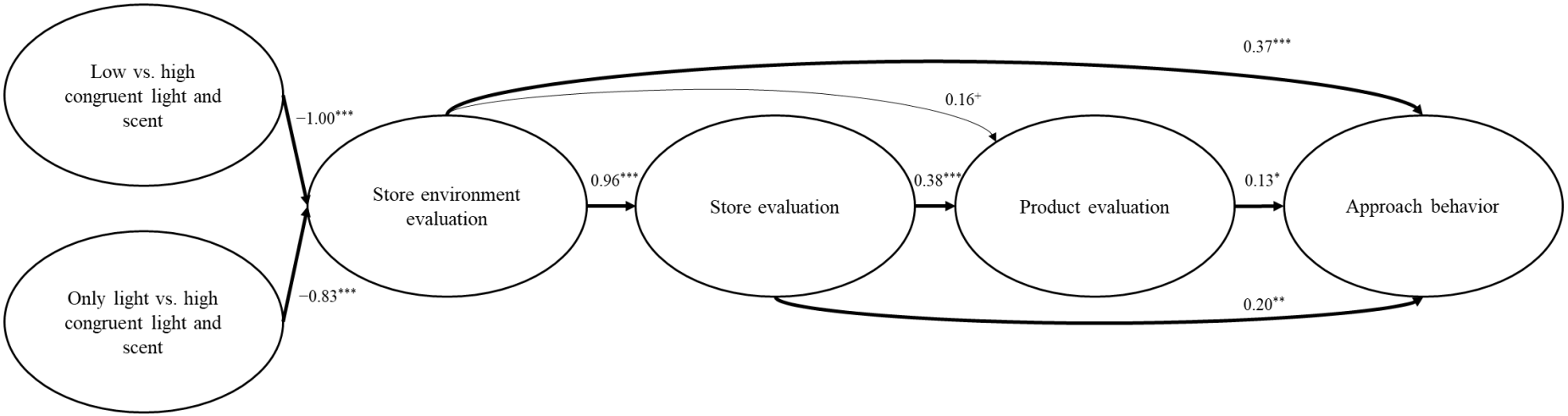

Figure 2. A statistical diagram of the serial mediation model—Study 1. Figures represent unstandardized beta coefficients of the significant direct effects. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Arrows in bold indicate mediation (95% CI). High congruent light and scent as the reference group.

4. Study 2

The objective of Study 2 was to see whether the positive congruity effect between ambient light and scent could be found when these atmospheric cues were only partially matched with each other (i.e., via only one specific association). Since the two high and two low congruity conditions had similar effects in Study 1, only one high and one low congruity condition were selected for Study 2. To create the partial congruity conditions, light settings were manipulated via correlated color temperature and were held constant with respect to illuminance level (i.e., warm and dim light vs. cold and dim light), whereas scent settings were manipulated via both temperature and illuminance associations (warm and dim scent versus cold and bright scent).

4.1. Design and Independent Variables

Study 2 took place in the same simulated grocery store as Study 1. A 4 × 1 between-subjects design was used, creating four conditions: high congruent cues (i.e., fit on two associations: warm, dim scent—warm, dim light), low congruent cues (i.e., no fit: cool, bright scent—warm, dim light), partial congruent cues via a match in temperature (i.e., fit on one association: cool, bright scent—cool, dim light), and partial congruent cues via a match in illuminance (i.e., fit on one association: warm, dim scent—cool, dim light).

Light. In line with previous research, only manipulating one characteristic of the atmospheric cues to create congruity, we only changed the correlated color temperature of the light settings and held the illuminance level constant at 415 lux. The warm, dim light setting was the same as in Study 1, that is, 3000 K and 415 lux, whereas the cold, dim light had a correlated color temperature of 4000 K and an illuminance level of 415 lux. As in Study 1, a pretest with 30 undergraduate students (9 men and 21 women, M_{age} = 21.33 years) evaluating the perceived temperature and brightness of the light settings via two 7-point semantic differential scales (i.e., cold/warm, dim/bright), confirmed that the warm, dim light setting (3000 K—415 lux) was indeed perceived as warm (M = 4.83, SD = 1.09) and dim (M = 3.90, SD = 0.96), while the cold, dim light setting (4000 K—415 lux) was perceived as cold (M = 2.30, SD = 1.12) and dim (M = 3.97, SD = 1.16). Moreover, the light settings significantly differed on perceived temperature ($t(29) = 11.60$, $p < 0.001$), but not on perceived brightness ($t(29) = -0.63$, $p = 0.54$).

Scent. To create a store environment with ambient cues that only match each other on one association, we selected a warm, dim scent and a cold, bright scent. The pretests of Study 1 made clear that the coffee scent was perceived as warm and dim, while the mint scent was perceived as cold and bright. This was confirmed by another pretest with 30 undergraduate students (19 men and 11 women, M_{age} = 21.37 years; cool vs. warm: M_{coffee} = 5.07, SD_{coffee} = 1.05; M_{mint} = 2.70, SD_{mint} = 1.54; $t(29) = -6.95$, $p < 0.001$; dim vs. bright: M_{coffee} = 3.67, SD_{coffee} = 1.30; M_{mint} = 4.83, SD_{mint} = 1.84; $t(29) = 2.74$, $p < 0.01$).

4.2. Participants, Procedure, Dependent Measures, and Analytical Approach

A power analysis for a one-way ANOVA (medium effect size **f** of 0.31 (based on results of Study 1), $\alpha = 0.05$, power of 0.80, and four groups) showed that the required sample size was 120 participants or 30 participants per condition. Participants were 120 undergraduate students (convenience sample of 53 men and 67 women). The same procedure and dependent measures from Study 1 were used in Study 2. As in Study 1, all Cronbach's alphas are greater than 0.83, indicating good reliability (see Table 2).

In line with Study 1, the effect of congruity (high vs. low vs. partial) on evaluations and approach behavior (H1 and H2) was examined via a MANOVA and subsequent ANOVA's per dependent variable. The proposed serial mediation model (H3) was tested by making use of PROCESS for SPSS (model 6) [49]. Direct and indirect effects were estimated using OLS regression and bootstrapping analysis with 10.000 samples and a 95% or 90% confidence interval. "Scent—light congruity" was included as a predictor (i.e., simple indicator coding, three dummy variables, with "high congruity" as the reference group).

Store environment evaluation, store evaluation, and product evaluation were included as serial mediators, and approach behavior was included as the dependent variable.

4.3. Results and Discussion

4.3.1. High vs. Partial vs. Low Congruity

A MANOVA with cue congruity as a fixed factor and store environment evaluation, store evaluation, product evaluation, and approach behavior as dependent variables was conducted. The multivariate tests showed a significant main effect of scent—light congruity (Roy's Largest Root = 0.09, $F(4, 115) = 2.61$, $p = 0.04$, $\eta_p^2 = 0.08$). A summary of the subsequent univariate analyses results can be found in Table 5. Although the mean scores indicated that high congruity between ambient light and scent led to enhanced store environment evaluations, store evaluations, product evaluations, and approach behavior compared to only partial or low congruity, the effect was only significant for store environment evaluation ($F(3, 116) = 2.96$, $p = 0.03$, $\eta_p^2 = 0.07$) and store evaluation ($F(3, 116) = 3.11$, $p = 0.03$, $\eta_p^2 = 0.07$), confirming H1a, H1b, H2a and H2b. The effect sizes indicate a medium effect [50]. There were no differences between the two partial congruity conditions or between the partial congruity conditions and low congruity.

4.3.2. Mediation Analyses

In line with Study 1, the effects of high congruity on product evaluation and approach behavior can also be indirect via store environment evaluation and store evaluation. A comprehensive overview of the direct and indirect effects of the serial mediation model is provided in Appendix C, and a statistical diagram of the serial mediation model can be found in Figure 3.

Consistent with the ANOVA results, high congruent light and scent settings led to a higher store environment evaluation than low congruent light and scent settings ($\beta = -0.45$, $p = 0.07$) and compared to partial congruent light and scent settings (match on illuminance: $\beta = -0.64$, $p = 0.01$; match on temperature: $\beta = -0.65$, $p = 0.01$, see Appendix C Table A4). When controlling for one or multiple evaluations (i.e., store environment, store, and/or product), no direct effects of congruity were found (all $p > 0.20$). On the other hand, store environment evaluation had a positive direct effect on store evaluation ($\beta = 0.95$, $p < 0.001$) and approach behavior ($\beta = 0.45$, $p < 0.001$), store evaluation had a positive direct effect on product evaluation ($\beta = 0.59$, $p < 0.001$), and product evaluation had a positive direct effect on approach behavior ($\beta = 0.27$, $p < 0.01$). With respect to the mediation analyses (see Appendix C Table A5), the indirect effects showed that high congruity (vs. low congruity and vs. partial congruity) led to increased approach behavior through (1) store environment evaluation (all 95% CI (-0.61, -0.05); 90% CI (-0.44, -0.01) for low vs. high congruity), and (2) store environment evaluation, subsequently, store evaluation, and, finally, product evaluation (all 95% CI (-0.23; -0.01); 90% CI (-0.17, -0.01) for low vs. high congruity). In line with Study 1, high congruity (compared to low or partial congruity) led to a more positive store environment evaluation, which directly and indirectly (via store evaluation and, subsequently, product evaluation) led to more approach behavior, supporting H3. Non-significant direct effects of high congruity in combination with three significant indirect effects indicate an indirect-only, full mediation [51].

In sum, the results support our hypotheses and demonstrate that when searching for congruent atmospheric cues, a more holistic view is necessary and different associations should be taken into account.

Table 5. Study 2: Effect of high, partial, and low congruity on evaluations and approach behavior.

			***M* (*SD*)**			
Dependent Variables	***F*(3, 116)**	***p***	**Warm, Dim Scent and Warm, Dim Light —High Congruity [a] (*n* = 30)**	**Cool, Bright Scent and Warm, Dim light— Low Congruity [b] (*n* = 30)**	**Warm, Dim Scent and Cool, Dim Light — Partial Congruity via Illuminance [c] (*n* = 30)**	**Cool, Bright Scent and Cool, Dim Light — Partial Congruity via Temperature [d] (*n* = 30)**
Store environment evaluation	2.98	0.03	4.38 [bcd] (1.06)	3.92 [a] (0.92)	3.74 [a] (0.98)	3.73 [a] (0.89)
Store evaluation	3.11	0.03	4.56 [bcd] (1.11)	3.95 [a] (0.93)	3.87 [a] (1.24)	3.84 [a] (0.92)
Product evaluation	0.94	0.42	4.79 (1.02)	4.53 (0.84)	4.46 (1.03)	4.42 (0.79)
Approach behavior	1.50	0.22	4.47 (1.08)	4.01 (0.88)	4.05 (0.97)	4.18 (0.78)

Superscripts indicate a significant difference at $p < 0.05$ (and in italics when $p < 0.10$) with the mean of the respective column (LSD post hoc tests).

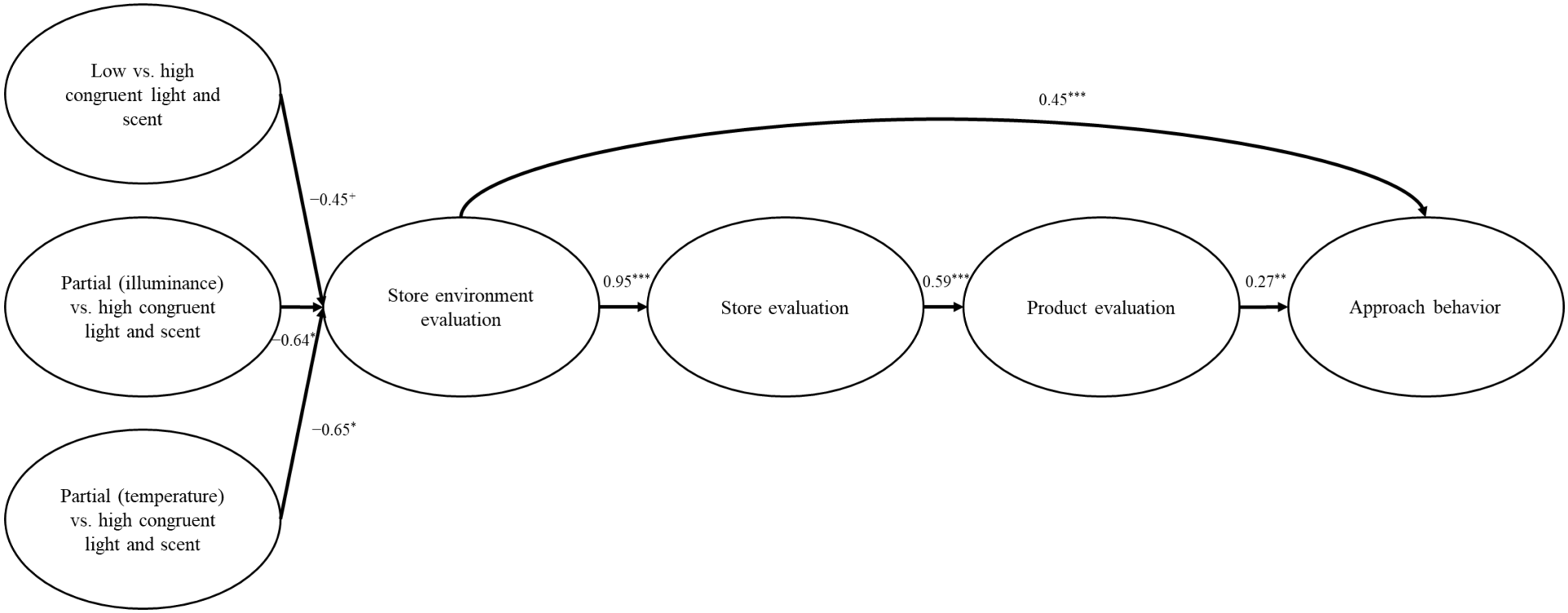

Figure 3. A statistical diagram of the serial mediation model—Study 2. Figures represent unstandardized beta coefficients of the significant direct effects. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Arrows in bold indicate mediation (95% CI, expect for low congruent vs. high congruent light and scent: 90% CI). High congruent light and scent as the reference group.

5. Discussion

This study extends existing research on multisensory congruity effects between atmospheric cues by examining whether multiple sensory associations (e.g., warmth and brightness) of ambient cues (e.g., light and scent) must match to create positive effects on consumer evaluations and behavior or whether a match on only one sensory association is sufficient. In particular, based on the processing fluency theory [37], we expected that only high (i.e., match on multiple sensory associations) and not partial (i.e., match on only one sensory association) multisensory congruity between ambient light and scent would lead to more positive consumer evaluations and behavior. Results from two experiments in a retail lab confirmed our expectations. High congruent ambient light and scent led to more positive store environment evaluations, store evaluations, product evaluations, and approach behavior than low congruent ambient light and scent (i.e., no match) and led to more positive store environment evaluations and store evaluations than partial ambient light and scent. In Study 2, the positive effect of high congruity on product evaluation and approach behavior was not confirmed. In this study, high congruity only had an indirect effect on product evaluation and approach behavior via store environment evaluation and store evaluation. This might be explained by the relatively small sample. Although the sample sizes were in line with previous research examining multisensory congruity effects [9,10,30] and a priori power analysis indicated that our sample size was large enough to detect medium effects (which were found in Study 1), the high congruity effects on product evaluation and approach behavior might have been too small to detect with our sample. Furthermore, as expected, partial congruity did not enhance evaluations or approach behavior compared to low congruity. Moreover, in line with previous research investigating mediating variables between a single atmospheric cue and approach behavior [45], we found that high congruity (vs. partial or low congruity) led to a more positive store environment evaluation, which directly and indirectly—via store evaluation and, subsequently, product evaluation—led to more approach behavior.

5.1. Theoretical and Managerial Implications

Our research offers several key contributions. First, we extend retail atmospherics literature by examining an atmospheric cue that is inherent in the retail environment but received less attention within consumer behavior research: ambient light [6]. Moreover, since ambient light is inevitable in the store, investigating interaction effects between ambient light and other atmospheric cues to understand better how the store environment affects consumer behavior is crucial. Although of great value, research focusing on the effect of a single atmospheric cue has been criticized for its lack of a holistic perspective [7]. Store environments are perceived holistically, and the effect of one specific atmospheric cue might depend on the presence of another atmospheric cue. By investigating the unexamined combination between ambient light and scent, we contribute to the multisensory atmospheric congruity literature. Second, we further advance multisensory atmospheric congruity research by examining the process by which high congruity influences approach behavior via different evaluations both on store and product levels, going beyond the widespread investigation of store-related consumer reactions. Third, we are the first to apply the concept of partial sensory congruity to atmospheric cue congruity. Recent research [13] introduced partial sensory attribute-function congruity, meaning that there is only a match between one (vs. two) sensory cue(s) (i.e., color, scent, or music) and a product's primary function (e.g., blue color, spearmint scent, or cold music for cooling pad). This research found positive effects of partial congruity but only if the partial match between sensory cue and product function was on product level (i.e., color of the product) and not on ambient level (i.e., color of the product display, ambient scent or music). In our research, we created partial congruity via the multiple sensory associations elicited by atmospheric cues (i.e., temperature and illuminance associations of scent and light). As such, we are the first to establish congruity between atmospheric cues going beyond the sharing of one specific association (e.g., arousing quality; [10,12]; softness [9], or temperature [13,14]) and creating

a congruity-continuum with high congruent cues (i.e., a fit on multiple associations), partial congruent cues (i.e., a fit on one association), and low congruent cues (i.e., no fit). Our results show that partial congruity between atmospheric cues does not have a positive effect on consumer reactions, indicating that different sensory associations should be taken into account when selecting atmospheric cues in the retail environment.

Our results also have managerial implications. Retailers who want to create in-store experiences with atmospheric stimuli should be aware that atmospheric stimuli are never present in isolation and that the choice of atmospheric stimuli should be considered carefully. Because ensuring high congruity between atmospheric cues can be time and money consuming, we examined whether partial congruency is sufficient for creating positive effects on consumer evaluations and behavior. However, our results show that only fully multisensory congruity leads to more positive consumer reactions, meaning that retailers, store managers, and designers should be attentive to multiple sensory associations of atmospheric cues when designing the store environment.

5.2. Limitations and Future Research

Our study has several limitations that offer opportunities for further research. First, since our study is the first to investigate partial congruity effects between atmospheric cues, further research could explore these effects using other senses (e.g., auditory sense) and/or other sensory associations (e.g., shape, lightness, roughness). Second, to make the experiments manageable, two high and two low congruity conditions in Study 1 and one high, one low, and two partial congruity conditions in Study 2 were created via temperature and illuminance associations (out of 16 possible combinations). Although Study 1 showed no differences in the two high and the two low congruity conditions, future research can select other temperature–illuminance combinations to ensure congruity effects do not depend on the specific sensory association combination. Third, although sample sizes were similar to previous research investigating multisensory congruity effects [9,10,30] and a priori power analysis indicated that our sample sizes were large enough to detect medium effects, future research could test multisensory congruity effects on large samples, possibly identifying small effects. Fourth, as our two studies were conducted in a controlled laboratory setting, future research should explore the magnitude of multisensory congruity effects in a field setting to generalize our findings. Fifth, actual behavioral measures (e.g., purchase and word-of-mouth) might also be of interest. In our retail lab, respondents received a budget of a fictive monetary unit to make sure that their own financial resources did not bias the results, and in Study 1, they received a gift certificate of 10 euros after completing the experiment. Our respondents were not allowed to buy products to avoid inventory problems. However, future research could measure actual behavior by, for example, giving the respondents their incentive beforehand and allowing them to use the money to buy products.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Hasselt University (CME2014/451 and approved on 07-03-2014).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the author and will be made publicly available upon publication.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Stimuli used in Study 1 and Study 2.

		Congruity					
		High		Low		Partial	
Study	**Ambient Cue**	**1**	**2**	**1**	**2**	**1**	**2**
1	Light	Warm: 4000 K Dim: 657 lux	Cold: 3000 K Bright: 415 lux	Warm: 4000 K Dim: 657 lux	Cold: 3000 K Bright: 415 lux	N/a	N/a
	Scent	Warm, dim: Coffee	Cold, bright: Mint	Cold, bright: Mint	Warm, dim: Coffee	N/a	N/a
2	Light	Warm: 4000 K Dim: 657 lux	N/a	Warm: 4000 K dim: 657 lux	N/a	Cold: 3000 K Dim: 415 lux	Cold: 3000 K Bright: 657 lux
	Scent	Warm, dim: Coffee	N/a	Cold, bright: Mint	N/a	Warm, dim: Coffee	Cold, bright: Mint

N/a = these congruity conditions were not examined in this study. In Study 1, six conditions were compared: two high congruity conditions, two low congruity conditions, and two conditions with only ambient light and no scent. In Study 2, four congruity conditions were examined: one high, one low, and two partial congruity conditions.

Appendix B

Table A2. Direct effects of high congruity (compared to low congruity or only light) on evaluations and approach behavior, Study 1.

	Store Environment Evaluation		**Store Evaluation**		**Product Evaluation**		**Approach Behavior**	
	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***
Constant	4.39 (0.13)	<0.001	0.17 (0.18)	0.36	2.59 (0.23)	<0.001	1.51 (0.24)	<0.001
Low vs. high congruent light and scent	−1.00 (0.19)	<0.001	−0.19 (0.11)	0.11	−0.19 (0.15)	0.18	−0.06 (0.12)	0.61
Only light vs. high congruent light and scent	−0.83 (0.19)	<0.001	−0.08 (0.11)	0.48	−0.11 (0.14)	0.43	−0.03 (0.12)	0.81
Store environment evaluations	N/a		0.96 (0.04)	<0.001	0.16 (0.09)	0.08	0.37 (0.08)	<0.001
Store evaluation	N/a		N/a		0.38 (0.08)	<0.001	0.20 (0.07)	<0.01
Product evaluation	N/a		N/a		N/a		0.13 (0.05)	0.02
	$R^2 = 0.12$ $F(2, 237) = 15.97$ $p < 0.001$		$R^2 = 0.77$ $F(3, 236) = 266.40$ $p < 0.001$		$R^2 = 0.44$ $F(4, 235) = 46.59$ $p < 0.001$		$R^2 = 0.59$ $F(5, 234) = 66.26$ $p < 0.001$	

Note: A serial multiple mediator model was estimated. The direct effect is the effect of high congruity (compared to low congruity or only light) on store evaluation, product evaluation, or approach behavior controlling for, respectively, store environment evaluation, store environment, and store evaluations, or store environment, store, and product evaluation [49]. The condition "high congruent light and scent" was chosen as the reference group. *Coeff.* = unstandardized regression coefficients; *SE* = standard errors.

Table A3. Indirect effects (through store environment evaluation, store evaluation, and product evaluation) of high congruity (compared to low congruity or only light) on approach behavior, Study 1.

	Indirect Effects on Approach Behavior Through								
	Store Environment Evaluation			**Store Evaluation**			**Product Evaluation**		
	Coeff. (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI
Low vs. high congruent light and scent	−0.38 (0.12)	−0.62	−0.16	−0.04 (0.03)	−0.10	0.01	−0.03 (0.02)	−0.08	0.01
Only light vs. high congruent light and scent	−0.31 (0.10)	−0.54	−0.13	−0.02 (0.03)	−0.08	0.03	−0.01 (0.02)	−0.06	0.02

	Indirect effects on approach behavior through											
	store environment evaluation → store evaluation			store environment evaluation → product evaluation			store evaluation → product evaluation			store environment evaluation → store evaluation → product evaluation		
	Coeff. (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI
Low vs. high congruent light and scent	−0.19 (0.09)	−0.38	−0.04	−0.02 (0.02)	−0.07	0.01	−0.01 (0.01)	−0.03	0.01	−0.05 (0.03)	−0.11	−0.01
Only light vs. high congruent light and scent	−0.16 (0.08)	−0.33	−0.03	−0.02 (0.02)	−0.06	0.01	−0.01 (0.01)	−0.02	0.01	−0.04 (0.02)	−0.10	−0.01

Note: A serial multiple mediator model was estimated. A bootstrapping analysis with 10.000 samples and a 95% confidence interval was conducted. If the confidence interval does not include zero, mediation occurred. The condition "high congruent light and scent" was chosen as the reference group. *Coeff.* = unstandardized regression coefficients; *SE* = standard errors; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval.

Appendix C

Table A4. Direct effects of high congruity (compared to low or partial congruent light and scent) on evaluations and approach behavior, Study 2.

	Store Environment Evaluation		**Store Evaluation**		**Product Evaluation**		**Approach Behavior**	
	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***	***Coeff.* (*SE*)**	***p***
Constant	4.38 (0.18)	<0.001	0.40 (0.25)	0.11	2.06 (0.32)	<0.001	0.69 (0.33)	0.04
Low vs. high congruent light and scent	−0.45 (0.25)	0.07	−0.18 (0.14)	0.20	0.10 (0.18)	0.56	−0.12 (0.16)	0.46
Partial (illuminance) vs. high congruent light and scent	−0.64 (0.25)	0.01	−0.09 (0.14)	0.55	0.08 (0.18)	0.68	0.03 (0.16)	0.83
Partial (temperature) vs. high congruent light and scent	−0.65 (0.25)	0.01	−0.11 (0.14)	0.45	0.06 (0.18)	0.75	0.18 (0.16)	0.27
Store environment evaluations	N/a		0.95 (0.05)	<0.001	0.01 (0.13)	0.94	0.45 (0.11)	<0.001
Store evaluation	N/a		N/a		0.59 (0.12)	<0.001	0.11 (0.11)	0.35
Product evaluation	N/a		N/a		N/a		0.27 (0.08)	< 0.01
	$R^2 = 0.07$ $F(3, 116) = 2.97$ $p = 0.03$		$R^2 = 0.76$ $F(4, 115) = 93.30$ $p < 0.001$		$R^2 = 0.48$ $F(5, 114) = 20.83$ $p < 0.001$		$R^2 = 0.61$ $F(6, 113) = 29.70$ $p < 0.001$	

Note: A serial multiple mediator model was estimated. The direct effect is the effect of high congruity (compared to low or partial congruent light and scent) on store evaluation, product evaluation, or approach behavior controlling for, respectively, store environment evaluation, store environment, and store evaluations, or store environment, store, and product evaluation [49]. The condition "high congruent light and scent" was chosen as the reference group. *Coeff* = unstandardized regression coefficients; *SE* = standard errors.

Table A5. Indirect effects (through store environment evaluation, store evaluation, and product evaluation) of high congruity (compared to low or partial congruent light and scent) on approach behavior, Study 2.

	Indirect Effects on Approach Behavior Through								
	Store environment Evaluation			**Store Evaluation**			**Product Evaluation**		
	Coeff. (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI
Low vs. high congruent light and scent	−0.21 * (0.13)	−0.44	−0.01	−0.02 (0.03)	−0.09	0.02	0.03 (0.06)	−0.05	0.17
Partial (illuminance) vs. high congruent light and scent	−0.29 (0.14)	−0.60	−0.05	−0.01 (0.02)	−0.06	0.03	0.02 (0.05)	−0.08	0.15
Partial (temperature) vs. high congruent light and scent	−0.29 (0.14)	−0.61	−0.05	−0.01 (0.02)	−0.08	0.02	0.02 (0.06)	−0.09	0.14

	Indirect effects on approach behavior through											
	store environment evaluation → store evaluation			store environment evaluation → product evaluation			store evaluation → product evaluation			store environment evaluation → store evaluation → product evaluation		
	Coeff. (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI	*Coeff.* (*SE*)	LLCI	ULCI
Low vs. high congruent light and scent	−0.05 (0.06)	−0.19	0.05	−0.01 (0.02)	−0.05	0.04	−0.03 (0.03)	−0.09	0.01	−0.07 * (0.05)	−0.17	−0.01
Partial (illuminance) vs. high congruent light and scent	−0.07 (0.07)	−0.24	0.06	−0.01 (0.03)	−0.06	0.05	0.01 (0.02)	−0.07	0.03	−0.10 (0.06)	−0.23	−0.01
Partial (temperature) vs. high congruent light and scent	−0.07 (0.07)	−0.24	0.06	−0.01 (0.03)	−0.06	0.05	−0.02 (0.03)	−0.07	0.03	−0.10 (0.06)	−0.23	−0.01

Note: A serial multiple mediator model was estimated. A bootstrapping analysis with 10.000 samples and a 95% confidence interval was conducted. If the confidence interval does not include zero, mediation occurred. The condition "high congruent light and scent" was chosen as the reference group. *Coeff.* = unstandardized regression coefficients; *SE* = standard errors; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval. * Indirect effects through store environment evaluation and through store environment evaluation, store evaluation, and product evaluation are significant at 90%.

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