



Scenscape and youth tobacco use in China: a symbolic study of expressive and volatile scenes

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ABSTRACT

Previous research often measured sites and venues as proxies for place, but the place effect on health also comes from the symbolic value emanating from a place—namely the scenscape. This study investigates how scenscapes affected adolescent tobacco use by combining the number of venues and the symbolic meanings of each venue measured via separate surveys. We sampled 2800 adolescents and youths (age 15–25) from 33 schools from 4 major Sinitic cultural regions and tested whether exposure to highly expressive and volatile scenscapes increases the likelihood of tobacco use. We assessed and calculated the scores of expressiveness and volatility of the neighbourhood within the 3 km radius of the respondent's household. Then, we conducted hierarchical logistic regression on tobacco use and the scene scores, adjusted for random effects and covariates. The results indicate that adolescents living in volatile scenes were more likely to smoke combustible cigarettes (3.66, $p < 0.05$), whereas expressive scenes were negatively associated with smoking (-3.58 , $p < 0.01$). Vaping e-cigarettes showed no significant association with either expressiveness or volatility. These findings highlight the importance of the symbolic scenes in understanding youth substance use.

1. Introduction

Tobacco use is a paramount threat to public health, especially for adolescents, causing reduced life expectancy by introducing risks of cancer, respiratory, and cardiovascular diseases (Rentería et al., 2016; Rogers and Powell-Griner, 1991). Multiple factors contribute to the spread and adoption of tobacco use among adolescents, such as psychological, socioeconomic, cultural, and biological elements (Gagné et al., 2015; Hiscock et al., 2012). Some even suggested that smoking may be a gateway to other risky behaviours, such as binge drinking, illicit drug use, and sexual risk behaviours (Hequembourg et al., 2020; Johnson and Jennison, 1992).

An emerging theme in tobacco research has turned to the significance of place and space in regard to how they shape smoking and cessation experiences and likelihoods. Exposure to certain scenes or geographical features may increase the likelihood of adopting deleterious behaviours. Research has shown that people tend to manage their smoking behaviour in different spaces (Rooke et al., 2013), and many spatial contexts pose either a deterrence or an incentive of cigarettes (Barnett et al., 2017). One theme in this field focuses on tobacco outlets. Access to tobacco outlets is found to be associated with a higher

rate of smoking (Barnett et al., 2017; Marsh et al., 2021; Mennis et al., 2016).

However, places are not just composed of physical entities. A place is also a symbolically manifested scene. Previous research has primarily focused on objectively measured venues and amenities, leaving a dearth of exploration into how different combinations of symbols distinguish different scenes and affect health behaviours. Scenscape, a concept by Silver and Clark (Silver, 2012; Silver and Clark, 2016), suggests that venues emit symbolic values and they may cluster together to create a scenscape that attracts a certain group of people and affects behaviours. First, the symbolic meanings embedded in places are sometimes latent and subjectively perceived by the people, but not inherently designed for the sites and amenities. For example, smoking at a nightclub or pool hall is often perceived as socially desirable even with an indoor smoking ban. Second, a scenscape comprises *not* a sum of individual venues but a cluster of related venues that may exert a spillover effect and amplify each other. If a gym is considered to exhibit a very high level of expressiveness and a restaurant exhibits a low level of expressiveness, then a neighbourhood would need multiple restaurants to match the expressiveness of the neighbourhood with a single gym.

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The current study explored the understudied scenscape effect on health, focusing on the expressiveness and volatility of a scene on youth tobacco use. We also compared smoking combustible cigarettes and vaping e-cigarettes, investigating whether the scenscape effects differ by the type of tobacco.

2. Literature review

2.1. Place, scenscape, and smoking

Place serves as a fundamental concept, representing the complexity of social structures and relationships embodied in a physical space, functioning as a security and stabilizer of social networks and controls. A place offers possibilities for people to interact and communicate, showing features and prompting collective actions (Gieryn, 2000). Previous research has highlighted the importance of places concerning tobacco use (Kadowaki et al., 2015; Moon et al., 2018; Yang, 2017; Yang et al., 2021).

A place carries not only physical and functional entities, it also embodies a symbolic domain. Early urban study scholars emphasised introducing the cultural dimension to geography research. Scenes, or landscapes, which carry the symbolic features of a certain area, function as a basis for fostering a sense of community (Hull et al., 1994). Health scholars also call for more research on tobacco use through the cultural lens, on how people perceive and conform to religious or cultural norms (Nichter, 2003; Nie and Yang, 2019).

The scenscape theory, proposed by Silver and Clark (2016), has developed the concept “scene” and argued that the totality of scenes in a place constitutes the social and cultural world unique to that place. The symbolic dimension of a place involves the subjective meanings perceived for each building and venue—irreducible to the designed functional utility of the venue itself—as well as the totality of the venues. A cluster of related venues altogether contributes to scenscape, with each contributing more or less to different symbolic dimensions. In the real world, a tattoo shop gives rise to high expressiveness but low or negative authority, whereas a monument exhibits high authority but lower volatility. Their combination will lead to a specific type of scenscape with unique levels of expressiveness and authority.

On the one hand, scenes may alter concrete health practices. Research finds that an identical scene plays the role of assimilator of different groups, as they gradually show similar practices when exposed to such scenscapes (Yáñez and Rodríguez-García, 2014). Besides, scenes may selectively attract people with a particular type of health beliefs and behaviors. Scholars revealed that cities adapt themselves to youth cultures and creativities by allowing them to introduce scenes based on their ideas in urban renewal to create economic revitalisation (Denmead, 2018; Morgan and Ren, 2012).

Walker and Hiller (2007) investigated urban neighbourhood scenscapes and their impact on physical activity and mental health, finding that well-designed urban scenscapes promote healthier lifestyles and mental well-being. Picture narrative analysis shows that specific landscapes or settings provide smokers with space and incentives, promoting tobacco use in such scenarios (Haines et al., 2009). Scholars also found that the economic development in cities encourages a “premium scenario”, which will promote healthy consumption and lifestyles, especially for those disadvantaged groups (Zapata-Moya et al., 2020). Therefore, if we regard scenes or the embedded cultural symbols as reflections of the social environments of communities, we could assume that there is a relation between scenes and health risk behaviours.

The cultural consumption hypothesis also supports the scene and symbolic interpretation of the place effect on substance use. Tobacco use as cultural consumption underscores its embeddedness in a specific cultural environment. People consume substances to gain the cultural and social status associated with the substance. These symbolic mean-

ings can help them construct their images to others and their self-identities (Becker, 1953; Denscombe, 2001). For instance, the marketing of cigarettes to women transformed smoking from a social taboo to a symbol of freedom, leveraging feminist ideals to normalize the habit (Amos and Haglund, 2000; Yang et al., 2021).

2.2. Expressiveness and volatility in scenscape

Expressive scenes may constitute a facilitatory environment for tobacco use. Research has explored the possible relationships between expressiveness and residents’ health outcomes. Fine and Kleinman (1979) regard subculture as a cultural cluster of elements or symbols. Thus, certain types of scenscapes may exhibit symbol clusters to facilitate risk behaviours. Expressiveness may reflect such non-conforming symbolic elements. Studies show that people utilise expressive elements in artworks to reflect subcultures (Kelly, 2007; Williams, 2004) and symbolic boundaries exist between different types of drug use (Vuolo et al., 2014). Scholars also found that expressive adolescents resist tobacco use denormalisation (Lucherini et al., 2018). On college campuses, students tend to violate smoke-free policies under a culture of noncompliance (Jancey et al., 2014).

Volatility refers to the instability in a place’s structures, population, and venues, which may reflect social control or cohesion in the environment (Hanibuchi et al., 2015). It may promote tobacco use by these two routes: the unstructured socialization hypothesis argues that volatility may provide anonymity and remove traditional guardians for new tobacco users (Osgood and Anderson, 2004); volatility can also create stressors and lead to tobacco use as a coping choice (Mays et al., 2007). We hypothesise that constantly changing venues in the living environment may function as expressiveness does, increasing the possibility of tobacco use among adolescents.

Based on the literature above, there is a possibility that expressive and volatile scenes provide adolescents with incentives to use smoking to express personal identities. Thus, we propose the *Promoting Hypothesis*, which aims to examine expressive scenscapes’ influence on adolescent tobacco use: People who are more exposed to expressive scenes have a higher possibility of tobacco use; People who are more exposed to volatile scenes have a higher possibility of tobacco use.

Besides the common latent influencers of tobacco use introduced by expressive scene escape and subculture, there might also be a difference between smoking conventional combustible cigarettes and vaping e-cigarettes. Abundant research reveals that vapers share a subculture about vaping to build their self-identities (Tokle and Pedersen, 2019; Yang et al., 2022a,b). The cultural and symbolic values associated with expressive and volatile scenes may not affect vaping e-cigarettes equally as they affect smoking. Consequently, we propose the *cultural sensitivity hypothesis*: as a novel substance use behaviour, vaping is more susceptible to the mechanisms facilitated by scenes than traditional tobacco use.

3. Methodology

3.1. Data

This study uses data from the 2022–2023 Chinese Gen-Z Health Behaviour Survey. The survey employed a robust multi-stage complex sampling method covering four major regions in China: the Yangtze River Delta, the Pearl River Delta, North China, and Southwest China. Thirty-five schools were selected from various educational institutions, including general high schools, vocational high schools, junior colleges, and undergraduate colleges, across a total of 13 cities. From all schools, a total of 64 classes were included in the study, and questionnaires were distributed to the attending students in these classes. The details of the survey are shown in Table 1. Fig. 1 illustrates the distribution of survey respondents’ home locations. In this figure, the location of the point in-

Table 1

2022–2023 Chinese Gen-Z Health Behaviour Survey sampling frames (N = 2815).

Regions	Municipalities	Schools	Classes
Yangtze River Delta (N = 1161)	Suzhou (N = 188)	1	5
	Shanghai (N = 71)	2	2
	Hangzhou (N = 683)	5	12
	Yuyao (N = 219)	2	6
	Guangzhou (N = 484)	7	14
Pearl River Delta (N = 640)	Zhongshan (N = 86)	1	2
	Shenzhen (N = 70)	2	5
	Beijing (N = 103)	2	3
Northern China (N = 581)	Taiyuan (N = 425)	4	6
	Longkou (N = 53)	2	2
	Kunming (N = 91)	2	2
Southwestern China (N = 433)	Chongqing (N = 126)	2	3
	Chengdu (N = 216)	4	7

dicates where the participants resided, and the four colours, as shown in the legend, represent the region of the sampled schools. The survey collected a total of 2815 valid questionnaires.

The survey considered valid the samples that had finished the main health behaviour and basic demographic questions. But not all valid questionnaires provided their home addresses that can be used to determine the scene scores. A total of 2371 samples provided useable locations. For the missing data, we conducted multiple imputations on scene score values. We finally conducted the analysis based on the imputed data research. The full process of sampling is shown in Fig. 2.

3.2. Measurements

In this study, we chose combustible cigarette smoking and e-cigarette vaping as the dependent variables. For e-cigarette smoking, we chose the variable based on the question “Have you ever vaped electronic cigarettes?”; for combustible cigarette smoking, the measurement was built on the question “have you ever smoked cigarettes”. The

two dichotomous variables were fit under the logistic probability function.

3.3. Quantitative scene scores

The independent variables of this study are the scores of scenescores. The main variables of this research are those measuring the expressiveness and volatility of the scenes. According to Silver and Clark, the measurement of scenescores depends on comprehensive data concerning the urban area. Principally, researchers should locate themselves as wanderers in the city, adopting non-participatory ways to record different constructions, scenes, and activities. The concrete ways to collect such information are divided into several steps: firstly, researchers should acquire the amenities of a certain area, both the categorisations and the amount. After that, researchers have to calculate the scores of the places of different dimensions with an objective criterion (Silver and Clark, 2016). With this principle, we conducted the data collection reported below: We used *Amap* electronic map database to procure the Point of Interest (POI) information based on the home address provided by the respondents. We define the neighbourhood as a circle around their home with a radius of 5 km (≈ 3 miles), which is a convenient cycling distance. Next, we selected 13 representative POIs to generate the scenescore scores for further research. The 13 POIs are: bar, pool room, monument, police station, floristry, temple, hospital, park, basketball field, factory, village committee, night club, and salon. Similar methods were taken in previous research on tobacco retailers and smoking status (Brooks et al., 2021). We collected the information on scenescores and their scores based on Silver & Clark's theoretical development and the ethnographic toolkit TESS developed by Low and her colleagues (Low et al., 2019).

In the next stage, we calculated the scene scores by multiplying the number of POIs with a matrix of scores rated on seven symbolic dimensions by an independent sample. The detailed procedure to generate scores of the scenescores was:

For assessing the scene scores of the POIs, we conducted a separate survey with an independent sample ($n = 104$) to evaluate the subjec-

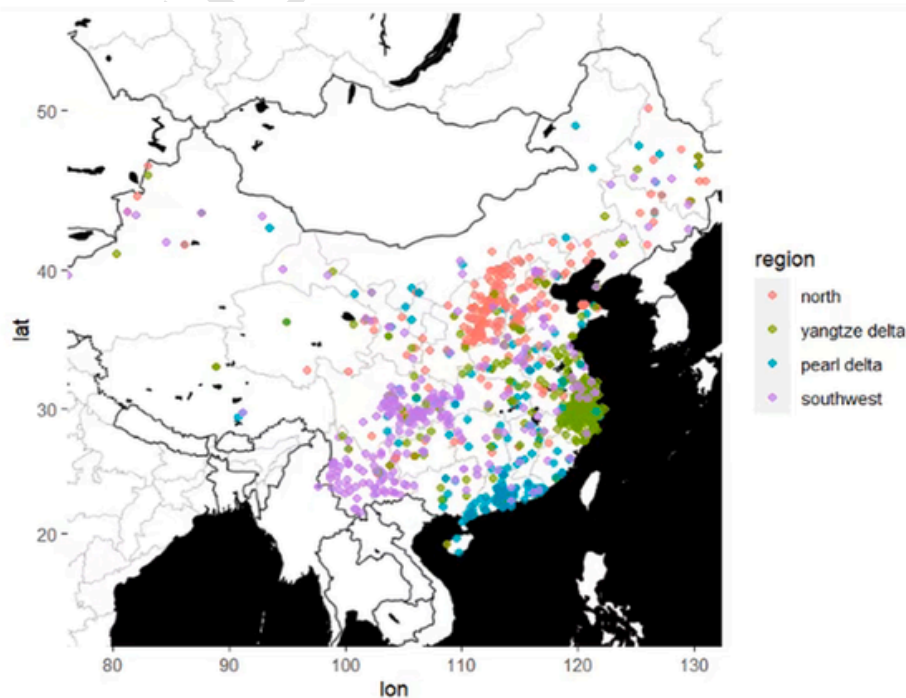


Fig. 1. Sample distribution.

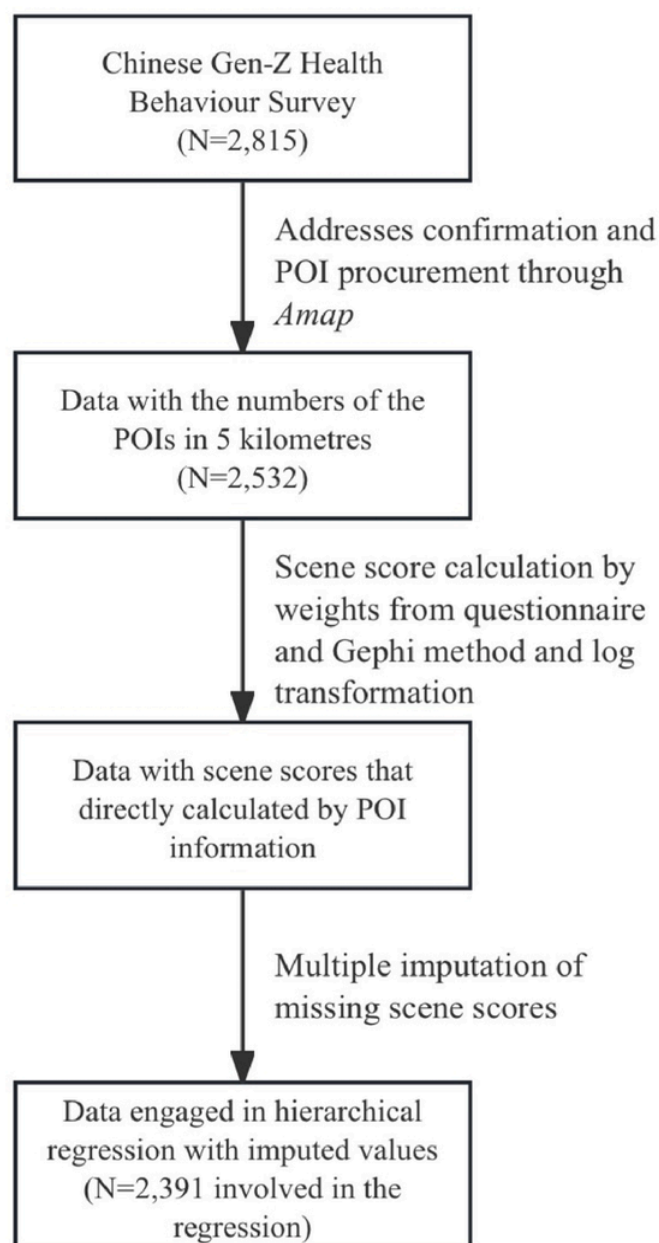


Fig. 2. Sample processing flowchart.

tively perceived scene dimensions for the 13 different venues. Such scores were also referred to as performance scores (Silver and Clark, 2016). In the questionnaire, we showed a daytime moderate-distanced façade picture of each POI (see example in Table 3) and asked the respondents to rate their impressions of the POI in seven dimensions (i.e., neighbourliness, expressiveness, rurality, authority, historicity, utilitarianism, safety, and volatility) by an 8-point Likert scale. Table 2 contains a more detailed explanation of the seven dimensions, and the wording on the questionnaire is in Appendix 1. After that, we calculated the average scores of the POIs in each dimension, respectively. Finally, we generated the samples' scenscape scores by the matrix multiplication of the scene scores-by-POIs matrix and the individuals-by-POIs matrix. The scores were also log-transformed to approach normality. The resultant variables are the values of scene scores (e.g. expressiveness) of all venues (e.g. monuments, night clubs, etc) surrounding a respondent's household. The results of the quantitative scenscape scor-

Table 2
Definitions of different dimensions of scene scores.

Dimension	Definition
<i>Quantitative dimension</i>	
neighbourliness	The place conveys a sense of community and neighbourliness. The neighbourliness reflects the closeness, personal networks and intimacy in the scene.
expressiveness	The place makes people think it is trying to grasp their attention and to convey a certain idea. The place encourages people to act based on their personalities.
rurality	The place conveys the feeling of being in rural areas. The place combines facilities or features highly related to rural areas, lack the traits of urbans.
authority	The space evokes power, control, and formality, often through architecture, staff, or restricted access. It suggests that the environment is governed by rules or protocols linked to the authority of a specific institution.
historicity	The space reflects a connection to the past, often through preserved architecture, artifacts, or markers that highlight historical events, fostering a sense of nostalgia or reverence for its historical significance. The place may also foster the sense of tradition.
utilitarianism	The space is designed for a particular function or service, emphasizing efficiency and practicality, and it often prompts people to consider the cost-benefit of using it for its intended purpose.
safety	The environment provides a sense of security and reassurance, often through physical design, surveillance, or social norms, making individuals feel protected and free from harm.
volatility	This space is characterized by constant flux, with frequent changes in its physical features, social interactions, and activities, creating a fast-paced or transient environment.
<i>Qualitative dimension</i>	
Publicity	The place is a public space accessible and shared by everyone, fostering a sense of openness and inclusivity.
Liveability	The place provides a comfortable and agreeable environment, making people feel at ease and willing to stay for extended periods.
Kid-friendliness	The place is designed to be safe, engaging, and suitable for children, with features that support their needs and activities.
Elder-friendliness	The place is accessible and accommodating for senior citizens, with design elements that support their mobility and comfort.
scenicity	The place creates a visually striking or attractive environment that captures people's attention, often drawing them in for its beauty or uniqueness.
Chaos	The place is disordered and unpredictable, characterized by noise, confusion, and a lack of structure, creating a sense of turmoil.

ing are consistent with our typical ideation of the places. For example, the monument received the highest historicity score, and the hospital received the highest utilitarianism score.


We have listed one POI's quantitative and qualitative scene scores and the fieldwork assessment from the professional panel in Table 3. The complete scores of the 13 POIs in these dimensions and the wordings of the questionnaire are listed in Appendix 1.

3.4. Qualitative scene scores

Another score we collected is the qualitative score of "scenicity". This approach is based on the TESS method. The TESS method is developed for the credibility and robustness of research on places or spaces employing a qualitative approach. This is the concrete process to gain this data: We dispatched a professional group to conduct qualitative examinations of the several typical POIs collected in the former procurement. The professional group was assigned to visit and carry out non-participatory observations of the POIs in their neighbourhood without intended selection. During the visit, the members recorded the basic features of the present people and their behaviours; additionally, they also wrote down their feelings about the places. After the observations, meetings were held for the members to report and subsequently revise their notes and comments about the POIs. Finally, Qualitative scores were generated from summing the outputs of three rounds of expert

Table 3

A sample of questions and field notes about POI and their respective dimensions of scene scores.

Dimension	Quantitative Scores		Qualitative Scores		Fieldwork Assessment
	Expressiveness	... volatility	Publicity	... Scenicity	
Wording in the questionnaire	This place makes people feel expressive and individualistic.	... This place makes people feel complex and ever-changing.			
Temple 	2.38	... 3.43	4.29	... 3.75	This category includes both Taoist and Buddhist temples, often located in scenic areas or in older towns. The number of visitors largely depends on the temple's location and local religious practices, with senior citizens being the primary visitors. Thanks to the work of temple staff and volunteers, the temples are typically well-maintained and clean. The ancient buildings, combined with the pilgrims, are very attractive in modern Chinese cities.

Note: The complete fieldwork assessment and scene scores in every dimension are listed in the appendix.

panel review among the raters using the Delphi method. Then, we transformed the original scores into their natural log. We have described the concrete meaning of the six dimensions in Table 2 and used temples as an example to show the qualitative scores and assessments in Table 3. The complete scores and assessment of the POIs from the professional panel's fieldwork are included in Appendix 2.

The control variables of this research include demographical features of the population, such as gender, age, school performance, minority identity and income. The measure of the income is generated from the respondents' allowance and transformed into the natural log of the original number plus 1. To avoid multicollinearity in the regression, as the involved individuals' neighbourhoods have great heterogeneity in numbers, we also employ the total number of POIs in the models as control variables for both quantitative and qualitative scores.

3.5. Analytical strategy

We begin by conducting descriptive analyses to provide an overview of the basic characteristics of the sample population and the neighbourhoods they inhabit. This step helps to establish a foundational understanding of the demographic and environmental context of contemporary Chinese adolescents' smoking behaviour and the scenscapes of the respondents. Then, we proceed with hierarchical logistic regression analyses to test the effects of both control variables and the quantitative and qualitative indicators of the scenscape on tobacco use. To reduce the compositional effect, we allowed the intercepts to randomly vary at the school-level ($n = 33$). Since we have web-scraped the POIs based on the household address of each individual and calculated scene scores from the POIs, we consider the scene scores as individual-level attributes. We assess the outcomes separately for combustible cigarette smoking and e-cigarette vaping, ensuring that distinct patterns and predictors for each form of tobacco use are appropriately captured. The logistic regressions involved six models: The first three regressed on smoking, and the next three on vaping. Model 1 and Model 4 are baseline models that only involve control variables. Model 2 and Model 5 test the qualitative expressiveness indicator on vaping and smoking, respectively. Finally, Model 3 and Model 6 incorporate quantitative scores of the scenes. Analyses were conducted in Stata version 18.

4. Results

Descriptive statistics for the initial items are presented in Table 4. The sample consists of 2815 observations. The average age is 18, and most of the samples align with the age definition of adolescents. About 92.2 % of the observations are ethnic Han people. For the dependent variables, about 9.7 % of respondents have ever smoked and 6.2 % of the participants have tried e-cigarettes.

Table 4

Descriptive statistics: control and dependent variables.

Variables	N	Mean/%	SD	Min	Max
Age	2810	18.06	2.199	12	27
Han ethnicity	2815	0.922	0.268	0	1
Male	2815	0.472	0.499	0	1
Logarithm of income	2815	6.312	1.935	0	9.904
Number of POIs	2815	266.5	220.2	0	734
Ever smoking	2815	0.097	0.296	0	1
Ever vaping	2815	0.062	0.240	0	1
School Performance	2810		1.071	1	4
Highest	420	14.95			
Upper Middle	711	25.30			
Middle	1117	39.75			
Lower Middle	392	13.95			
Last	170	6.05			
<i>Quantitative Scores</i>					
Neighbourliness	2532	3.152	0.329	0	3.888
Expressiveness	2532	2.793	0.317	0	3.946
Rurality	2532	3.161	0.300	0	4.266
Authority	2532	2.418	0.270	0	4.290
Historicity	2532	2.315	0.236	0	3.482
Utilitarianism	2532	4.086	0.349	0	4.674
Safety	2532	3.337	0.335	0	4.616
Volatility	2532	3.460	0.301	0	4.095
Logarithm of Expressiveness	2521	1.026	0.105	0.086	1.373
Logarithm of Volatility	2521	1.244	0.064	0.426	1.410
<i>Qualitative Scores</i>					
Publicity	2532	6.686	1.111	0	8.590
Liveability	2532	6.616	1.090	0	8.394
Kid-friendliness	2532	6.352	1.104	0	8.186
Elder-friendliness	2532	6.675	1.064	0	8.512
Scenicity	2532	6.856	1.072	0	8.744
Chaos	2532	6.759	1.110	0	8.640
Logarithm of Scenicity	2521	6.883	0.982	1.899	8.743

Here, we present the average scores of each individual's neighbourhoods on each dimension. They indicate that the population we examined lived in diverse spatial contexts, allowing us to research the issue we are concerned with. The quantitative scores reveal that neighbourhoods have an average "expressiveness" score of 2.793 ($SD = 0.317$) (log transformed, the original average is 1,064, $SD = 512.0$). The "volatility" score, which is particularly significant, averages 3.460 ($SD = 0.301$) (original average score is 1,413, $SD = 840.5$). In terms of qualitative scores, the "scenicity" score, which emphasises the expressive nature of the environment, averages 6.865 ($SD = 1.072$) (original average is 1,193, $SD = 585.5$). These descriptive statistics highlight the variability and richness of the cultural and social contexts of the neighbourhoods studied, with particular emphasis on the expressive and volatile dimensions, which are crucial for understanding the complex interplay between environmental factors and substance use behaviours among adolescents.

Table 5 presents the results of three logistic regression models examining the factors associated with smoking and vaping. Models 1 and 4 include only control variables, Models 2 and 5 introduce a qualitative scene score, and Models 3 and 6 further incorporate quantitative scene scores. Being a male is a consistent risk factor of smoking and vaping, although the male effect on smoking is more pronounced than vaping. Compared to the best performing adolescents, having the worst level of schoolwork performance is associated with smoking (1.163, $p < 0.01$) and vaping (1.447, $p < 0.01$), and a lower-middle performance is also associated with tobacco use. In addition, having more income or allowance is positively associated with smoking (0.408, $p < 0.01$) and vaping (0.519, $p < 0.01$). Age and ethnicity are not significantly associated with either dependent variable.

For tobacco smoking, scenicity exhibits a significant negative effect in Model 2 ($\beta = -0.262$, $p < 0.01$), suggesting that higher scenicity is associated with a lower likelihood of smoking. Expressiveness is also a significant factor, showing a strong negative association with smoking ($\beta = -3.577$, $p < 0.01$). Conversely, volatility is positively associated with smoking ($\beta = 3.664$, $p < 0.05$), suggesting that living environments with greater volatility may increase the likelihood of smoking. The results for smoking contradict the hypothesis that expressive scenescape might function as a risk factor of adolescents' smoking behaviour, but they render evidence that a volatile neighbourhood may be facilitative to at-risk behaviours.

Different from hypothesis 2, there is no significant influence on vaping by expressive scenescape. This finding leads to the suspicion that vaping may be relatively novel and its spatial-symbolic mechanisms may not have fully formed yet. Adolescents' vaping behaviour might be

more influenced by other factors less embedded in scenesapes or places. The variance of random effect at the school-level (τ_u) from model 1 to 3 decreased from 0.948 to 0.866 for smoking, and 0.944 to 0.864 for vaping. This change indicated that adding scenescape variables at the individual-level also slightly explains the school-level variance, likely due to the overlap between household residence and school location for most respondents.

Comparing the models of vaping and smoking, the results do not support the cultural sensitivity hypothesis. Vaping is not significantly associated with expressive or volatile scenes. In contrast, smoking shows a significant association with the scenes of the neighbourhoods where the adolescents live.

5. Discussion

Important scholarship has been done to explain smoking through the lens of places. Scholars have deemed places as key factors to finalise the battle with the tobacco use pandemic (Moon et al., 2018). Places can engender affectual, sensorial and social registers of smoking and contribute to the identity construction of smokers. Additionally, previous research tries to explain the nuances between places and tobacco behaviour through an ecological perspective, in which scholars emphasise the importance of smokers and the environments, including their moderation by the places and conformity to controls embedded in places (Böhling, 2014; Denney et al., 2022; Glenn et al., 2017). However, the existing literature was concentrated in the physical environment or sociological attributes of the place, with fewer studies attending to how cultural-symbolic attributes, especially those abstracted

Table 5
Results of hierarchical logistic regression.

VARIABLES	Ever Smoking			Ever Vaping		
	(1) basic model	(2) qualitative scores	(3) quantitative scores	(4) basic model	(5) qualitative scores	(6) quantitative scores
Male	1.392*** (7.96)	1.533*** (7.84)	1.545*** (7.88)	1.098*** (5.37)	1.077*** (4.94)	1.077*** (4.92)
Han	-0.440* (-1.72)	-0.286 (-0.96)	-0.353 (-1.19)	-0.448 (-1.52)	-0.286 (-0.85)	-0.279 (-0.82)
School performance (<i>Reference = Highest</i>)						
Upper Middle	0.190 (0.69)	0.280 (0.92)	0.297 (0.97)	0.034 (0.10)	0.041 (0.11)	0.044 (0.12)
Middle	0.456* (1.83)	0.572** (2.03)	0.586** (2.09)	0.466 (1.54)	0.438 (1.35)	0.449 (1.39)
Lower Middle	0.863*** (3.02)	1.030*** (3.20)	1.032*** (3.21)	1.095*** (3.32)	1.167*** (3.33)	1.170*** (3.33)
Low	1.163*** (3.65)	1.314*** (3.65)	1.292*** (3.59)	1.447*** (3.99)	1.363*** (3.47)	1.374*** (3.49)
Age	0.026 (0.50)	0.033 (0.56)	0.028 (0.47)	-0.091 (-1.43)	-0.065 (-0.92)	-0.063 (-0.87)
Log Income	0.408*** (4.86)	0.557*** (5.55)	0.550*** (5.48)	0.519*** (5.27)	0.535*** (4.98)	0.531*** (4.97)
#POIs	-0.001*** (-3.27)	-0.000	-0.000	-0.001 (-1.03)	-0.000 (-0.28)	-0.001 (-0.97)
Scenicity		-0.262*** (-2.81)			-0.046 (-0.40)	
Expressiveness			-3.577*** (-2.64)			1.043 (0.63)
Volatility			3.664** (2.04)			-0.479 (-0.22)
Constant	-6.630*** (-5.45)	-7.009*** (-4.86)	-9.379*** (-4.78)	-5.902*** (-4.10)	-6.434*** (-3.73)	-7.129*** (-2.99)
τ_u	0.948 (0.17)	0.916 (0.17)	0.866 (0.15)	0.944 (0.20)	0.915 (0.20)	0.864 (0.179)
N1	2656	2382	2382	2656	2382	2382
N2	33	33	33	33	33	33

t-statistics in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

from specific locations, contribute to a broader understanding of places' influences.

By surveying and web-scraping the POIs surrounding respondents' household, assessing seven dimensions of symbolic values associated with each of the 13 POIs, and calculating the scene scores with both quantitative and qualitative interviews, the current study offers a comprehensive examination of how expressiveness and volatility as two indicators of the scenscape are associated with tobacco use among Chinese adolescents. We found that smoking combustible cigarettes was negatively associated with expressiveness in scenes, but was positively associated with volatility in scenes. However, these scene scores were not associated with vaping.

An expressive scenscape could be a powerful deterrent against smoking. Our research hypothesised that the expressive scenes contain symbols encouraging deviant and at-risk behaviours among the youths (Kelly, 2007). However, the possibility that expressive scenes convey the middle-class bourgeoisie culture, which is associated with health literacy and avoids risks (Vuolo et al. 2014), could complicate the results. It is possible that smoking was not an expressive behaviour to begin with. Many studies pointed out that social confirmation and peer pressure were a common motif in smoking (Urberg et al., 1990; Yang, 2020; Yang, Vuolo and Wu 2022), making it contradict an expressive scenscape.

There is a positive association between volatility and smoking. In areas where there is high social or economic instability, such as frequent changes in the local community or public spaces, individuals may turn to smoking as a coping mechanism for stress or uncertainty. Previous research has confirmed that housing instability, which also signifies the volatility of the living environment, is positively associated with smoking (Vijayaraghavan et al., 2024). Additionally, the presence of other smokers and the normalisation of smoking in such environments can create a social contagion effect, where people are more likely to adopt smoking behaviours if they see it regularly practiced by others. This volatile environment can undermine efforts to promote healthier lifestyles and may contribute to higher smoking rates in these areas.

This study did not find scenscape associated with vaping e-cigarettes. E-cigarettes are still in their early phase of diffusion, and China has stringent controls on the sale and promotion of e-cigarettes due to their encroachment on government tax income and the profits of state-owned tobacco corporations. As a new method of tobacco use, vaping carries the stereotype of being healthier and is closely associated with personality and identity maintenance. The contextual effect of scenscape on vaping may not have fully come into force.

5.1. Implications for future research

As a fast-developing country, China has experienced rapid industrialization and urbanization. This transformation has influenced the effort for tobacco regulation and places. Many neighbourhoods have undergone significant transitions within several decades. Some adolescents examined in this research may have witnessed these changes firsthand. Such longitudinal differentiation, intertwined with spatial heterogeneity—the major concern of this study—might show more pronounced effects in major urban areas. Megacities included in the dataset, like Guangzhou, Chengdu, and Beijing, consist of highly divided and diversified enclaves and areas. In these cities, certain communities may have developed into specialised areas with highly centralised functions. People living near such areas may experience more profound transitions and face greater economic, social, and mental challenges in dealing with these changes. This phenomenon might provide a strong explanation for the relationship between city scenes, cultures, and individual health.

Although we lack longitudinal data to justify this disparity, this temporal issue should be considered in future research. Future studies

should aim to incorporate longitudinal data to better understand these dynamics and their implications on adolescent behaviour and health.

5.2. Public health implications

Through this research, we suggest that smoking behaviour does not just happen in a space or place but is also strongly influenced by the scene in the community. Because our results showed that tobacco use is positively associated with volatile scenes and negatively associated with expressive scenes, public health policy may collaborate with social workers, architects, and urban planning administration will build and plant venues with greater expressive values recognizable by the community residents while avoiding creating an environment perceived as volatile. The results can help further public health policies to incorporate interdisciplinary insights and measures.

5.3. Limitation

A major deficiency of this research is the lack of direct examination of adolescents' tobacco use and their perception of tobacco use in expressing their identities. Tobacco use, as a behaviour, is highly influenced by people's perceptions of adopting it. If an expressive space could provide incentives for people to try and adopt tobacco use, it might promote the idea that individuals should showcase their uniqueness through smoking. Therefore, we suggest further research employing a culture-perception framework to shed light on this issue.

Another limitation of this research is that we have not fully excluded the composition effect. We have mitigated the impact by selecting schools as units for a random effect, which minimizes cluster-based homogeneity. However, as we intend to understand the scenscape in their neighbourhoods, the influence of the residents in their neighbourhoods has not been separated in the model. Since it is challenging to observe or collect residents' health risk behaviour in every neighbourhood, a more advanced method for collecting this data is essential to mitigate this problem.

6. Concluding remarks

Our research on expressiveness and volatility has expanded the discussion on the influence of places on health by incorporating a cultural perspective. This approach allows for a deeper understanding of how the scenscape of a place can influence health behaviours. Smoking combustible cigarettes is associated with a volatile scene but inhibited in an expressive scene. These distinctions underscore the importance of considering both qualitative cultural contexts and quantitative environmental factors when analysing youth substance use behaviours. Scenscape is not significantly associated with vaping e-cigarettes. Future research is needed to explore cultural symbols that influence vaping behaviour.

CRediT authorship contribution statement

Chengzhe C. Xu: Writing – original draft, Visualization, Methodology, Formal analysis, Data curation. **Xiaozhao Y. Yang:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Data availability

The data that has been used is confidential. This study is funded by China Medical Board (CMB-21436)

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.healthplace.2025.103485>.

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