Abstract: The rise in obesity prevalence has increased research interest in the obesogenic environment and its influence on excess weight. The aim of the present study was to review and map data collection instruments for obesogenic environments in adults in order to provide an overview of the existing evidence and enable comparisons. Through the scoping review method, different databases and webpages were searched between January 1997 and May 2018. Instruments were included if they targeted adults. The documents were categorised as food environment or built environment. In terms of results, 92 instruments were found: 46 instruments measuring the food environment, 42 measuring the built environment, and 4 that characterised both environments. Numerous diverse instruments have been developed to characterise the obesogenic environment, and some of them have been developed based on existing ones; however, most of them have not been validated and there is very little similarity between them, hindering comparison of the results obtained. In addition, most of them were developed and used in the United States and were written in English. In conclusion, there is a need for a robust instrument, improving or combining existing ones, for use within and across countries, and more sophisticated study designs where the environment is contemplated in an interdisciplinary approach.

Keywords: environment; built environment; food environment; obesity; adult; surveys and questionnaires; measurement

1. Introduction

The rising prevalence of obesity and overweight has generated a growing research interest in determining their causes. One of the key factors that has been identified as contributing to the development of obesity and overweight is the obesogenic environment. This has been defined as “the sum of influences exerted by environments, opportunities and life circumstances that promote obesity in individuals or society” [1]. In other words, the obesogenic environment refers to environmental factors that determine consumption and energy expenditure in individuals and influence the development of obesity. The obesogenic environment is a complex concept, and several models have been developed to conceptualise it and explain how it influences the behaviour of individuals [2,3].

When characterising the obesogenic environment through models, differences have been established between the food environment and the built environment [4]. The food environment is defined as the opportunity to obtain food, which includes the availability, accessibility, advertising, and marketing of food [4]. Food can be accessed in various ways from the food environment:
in shops (grocery shops, supermarkets, markets), in catering establishments (bars, restaurants, canteens, takeaway outlets), and in the institutions where people spend part of their day (worksites, schools, homes) [5]. On the other hand, the built environment consists of three elements: physical design, land use (residential, commercial, industrial, and other activities), and the transport system. These make opportunities available for physical activity and for healthy and unhealthy food access. Neighbourhoods providing a range of local facilities within an easy active travel (walking and cycling) distance, with good quality infrastructure (such as well-maintained pavements), and which are regarded as safe and pleasant may support physical activity and influence the propensity of an individual to have an active lifestyle. This environment has generally been studied and characterised by the use of questionnaires and geographic information systems (GIS) [6,7].

Although the concept of obesogenic environment has gained widespread recognition over the last decade [8], studies have used different instruments to identify its components. The developed instruments to measure the obesogenic environment assess either characteristics of it related to the home, worksite, schools, shops, supermarkets, and restaurants, or the possibilities for walking or cycling in a given neighbourhood or city [4,8].

It is often stated that the environment exerts an influence on obesity, but further research is required to identify its specific components and how these influence behaviour in order to be able to modify them. Obesity is the result of multiple and complex factors: to identify all of its causes still remains a research goal. However, studies aimed at characterising the environment have utilized various approaches, methods, metrics, and variables; as a result, it is difficult to compare the evidence and scientific characterisation of the environment, as it continues to be unclear and complex [8].

Although the environment impacts all that comes in contact with it, the way in which it influences according to age group is not the same [8]. In addition, there are specific data collection instruments that are classified for each population age group and the characteristics of the studies performed in children are different from those carried out in adults.

The aim of the present study was to review and map data collection instruments for obesogenic environments in adults in order to provide an overview of the existing evidence and enable comparison.

2. Materials and Methods

A scoping review was performed since the field is heterogeneous and perhaps not suitable for a more precise systematic review because it is necessary to retrieve information from a variety of documentary sources, including research projects, governmental organisations, and scientific articles indexed in databases. This method is used to facilitate a more exhaustive review of all the literature available on the subject and is useful for answering much broader questions [9]. Moreover, the results of the scoping review will give recommendations for measurements and methods for future research in this field [10].

The scoping review method employed was that proposed by Arksey and O’Malley [11], the Joanna Briggs Institute [12], and PRISMA Extension for Scoping Reviews (PRISMA-ScR) [9], formulating the initial research question: What instruments are available for collecting data on obesogenic environments in adults?

2.1. Selection Criteria

Instruments were included if they targeted adults aged 18 to 65 or a mixed-age population sample (adolescents and older adults).

Instruments targeting pregnant women, people with a particular pathology or people living in institutions were excluded, as were population surveys, dietary assessment questionnaires, instruments that were not specifically designed to measure the obesogenic environment, and geographic mapping systems. Instruments unrelated to the subject of the initial research question were also excluded. In the event that the same instrument had been used in more than one study, only the study that described the instrument in most detail was included.
2.2. Search Strategy

Different databases were searched, including PubMed, Scopus, PsycInfo, Cochrane, and Web of Science, using the following descriptors: “Surveys and Questionnaires”, “Environment”, “Obesity”, and “Adult”, varying the search strategy according to the database interrogated (Table 1). Controlled language was used to perform the search, using MeSH (Medical Subject Headings) terms (in the case of PubMed), thesauri, and keywords, depending on each database. A search was also performed using free language in the title and abstract fields for all databases, using the term “obesogenic environment”.

In addition, articles cited in previously identified studies that met the inclusion criteria were examined and several webpages was consulted, such as Active Living Research measures, the National Collaborative on Childhood Obesity Research (NCCOR), the National Institutes of Health (NIH), and webpages for existing projects and universities with projects related to the subject and government reports. Documents published worldwide between 1 January 1997 and 31 May 2018 were selected, due to the fact that the concept of “obesogenic environment” appeared for the first time in 1997 [2].

Table 1. Search strategy.

| Database          | Search strategy                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| PUBMED            | (((obesity[MeSH Terms] OR overweight[MeSH Terms] OR body mass index[MeSH Terms]) AND (environment[MeSH Terms]) AND (adult[MeSH Terms]) AND (surveys and questionnaires[MeSH Terms]))) |
| SCOPUS            | (TITLE-ABS-KEY (overweight) OR TITLE-ABS-KEY (obesity) OR TITLE-ABS-KEY (body AND mass AND index) AND TITLE-ABS-KEY (environment) AND TITLE-ABS-KEY (adult) AND TITLE-ABS-KEY (surveys AND questionnaires)) |
| PSYCINFO          | ((obesity) OR (overweight) OR (body mass index)) AND (environment) AND (adult) AND (survey AND questionnaires)                               |
| CINAHL            | (AB (overweight or obesity or obese) AND AB adults AND AB environment AND AB (survey or questionnaire or scale or instrument))                   |
| Web Of Science    | TOPIC: (obesity OR overweight) AND TOPIC: (environment) AND TOPIC: (adult) AND TOPIC: (surveys and questionnaires)                          |

2.3. Study Selection

All the identified documents were downloaded in EndNote (EndNote X7 citation management software, Thomson Reuters, Philadelphia, PA, USA). This program was used to remove duplicates and, independently, documents were excluded by title and abstract based on the initial research question as well as inclusion and exclusion criteria. Then, the selected full-text documents were reviewed and those that met the criteria were included.

First, duplicates were eliminated and the documents were assessed by title. The remaining documents were then selected by abstract and full text by two independent researchers. Differences were discussed and resolved by a third reviewer.

2.4. Organisation of the Information

Since the obesogenic environment can be measured and classified in different fields, the information was classified according to the data collection instruments and is presented in two tables: the first shows instruments used to analyse the food environment (Table 2), and the second shows those used to analyse the built environment (Table 3). The papers/instruments in Tables 2 and 3 were ordered by date.

The following information was extracted from each of the documents and entered in a database: author(s)’ names, year of study, name of the instrument, city/country where used, type of instrument, the population/sample targeted, the kind of environment analysed, psychometric properties as instrument validity and instrument reliability according to the author’s criterion, number of items in
the instrument, number of different versions, language, and if the instrument had a cultural adaptation and the country where it was culturally adapted and validated. All this information was collected in Tables 2 and 3.

The food environment (Table 2) was categorised into six different types: (1) food store (e.g., grocery stores, supermarkets, convenience stores, snack bars, specialty food stores, farmers’ markets, bodegas, and food banks); (2) home food environment (food available at home); (3) macro food environment (e.g., food supply); (4) public facilities to access the food environment (e.g., cafeterias, vending machines or other public locations that offer this type of food); (5) restaurants (including fast food and buffet-type outlets); (6) worksites (cafeterias, vending machines, and snack shops in the workplace) [13,14]; and (7) perceived food environment.

The built environment (Table 3) was classified according to different aspects of the environment, such as: (1) physical activity environment (places where people are, or can be, physically active); (2) walkability and bikeability in the neighbourhood; (3) worksite physical attributes; (4) neighbourhood design; (5) street-scale features; (6) trail use; and (7) perceived built environment. The places we live, work and so on can either provide or constrain opportunities for physical activity and for healthy and unhealthy food access [8].

In the event that an instrument could be used to measure both food and built environments, it was included in both tables (Tables 2 and 3).

In both tables, types of instruments were classified as checklist or checkbox (a pre-defined list or box of indicator foods which are selected based on predetermined criteria, such as those foods that are identified by the researchers as aligning with current dietary guidance), interview/questionnaire (a pre-determined list of questions that is administered by a trained interviewer or completed by the respondent via self-report), inventory (a form for recording all foods available in a given environment), and market basket (a pre-defined list of foods that represent a range of food choices across a total diet. These foods may be based on foods frequently consumed by the population or may reflect a standardized diet plan), and audit tool (allows systematic observation of the environment, including the presence and qualities of its features) [13,14].

3. Results

Figure 1 shows a flow diagram of the search strategy. As can be seen, 1500 documents were identified, to which 470 obtained from other sources were added, yielding a total of 1970 documents. After deleting duplicates, we obtained 1474 documents for consideration, which were reduced to 198 following an analysis by title and abstract. The full text of these documents was examined, and finally 91 documents were selected due to their characteristics, in which 92 instruments were described (one of the documents reported two instruments).

3.1. General Characteristics of the Instruments

A total of 46 instruments were found for characterising the food environment and 42 for analysing the built environment, and 4 instruments that characterised both environments. Of the identified instruments \((n = 92)\), 79.4% were developed in the United States, 8.7% in European countries, and 7.6% in Australia, whilst 4.3% were from multiple countries.

The majority of the studies reviewed have reported psychometric properties \((n = 64)\), but out of all the studies \((n = 92)\), only 38.0% were reported to be valid and reliable by the authors; 28.3% met some reliability criteria, 3.3% met some criteria of validity, and no mention was made of any criteria in the case of the remaining 30.4%.

Regarding the types of reliability and validity, studies tended mostly to assess inter-rater reliability \((n = 34)\), test–retest reliability \((n = 30)\), face-validity \((n = 12)\), and construct validity \((n = 12)\), whereas only few studies have reported internal-consistency reliability \((n = 8)\), criterion-validity \((n = 8)\), content-validity \((n = 5)\), concurrent-validity \((n = 4)\), predictive validity \((n = 3)\), and discriminant validity \((n = 2)\).
In addition, the instruments used to characterise the built environment were observed to report more psychometric properties than those targeting the food environment, with 88.6% (n = 39) using different types of validity and/or reliability, in contrast to the 54.2% (n = 26) of the food environment instruments.

With regard to language, almost all instruments were written in English (97.6%), and out of this percentage, only 8.3% were also written in another language (French or Spanish); instruments
written in languages other than English (Swedish and Arabic) accounted for only 2.4% of instruments. The most widespread data collection method used in the instruments was the checklist (see Tables 2 and 3).

3.2. Food Environment

A total of 46 instruments were identified that collected data on the food environment (Table 2). Most of them characterised the food environment of stores (62.5%), followed by restaurants (12.5%), worksites (8.3%), home (8.3%), public facilities (6.3%), perceptions of the food environment (2.2%), and psychosocial factors (2.1%). Only five out of 46 questionnaires considered subjects’ perception of the environment [30,32,46,56,60].

The period 2006 to 2012 witnessed the development of the highest number of instruments. In 2012, two questionnaires were described that characterised the influence of vending machines on the obesogenic environment in public places; one was developed in Australia and the other one in the United States. The instruments contained a median of 33.5 items, with a minimum of 6 and a maximum of 267 items.

3.3. Built Environment

A total of 42 instruments were identified that analysed the built environment (Table 3). Most of them characterised the built environment by studying its physical activity environment (50.0%), followed by neighbourhood design (20.4%), or how these were related to being able to walk or cycle (9.1%). It should be noted that these instruments could collect information on both the population and the built environment (street segments, parks, etc). Only 11 of these 42 instruments considered subjects’ perception of the environment [66,76,78,84,85,91,98,106,108,109,113].

Most of the instruments that collected data on the built environment were developed between 2005 and 2006. However, the most widely used instrument, which has the most adapted and validated versions in different languages and cultures, was developed in 2003 [72]. The median number of items in these instruments was 40, with a minimum of 5 and a maximum of 273 items, showing the high heterogeneity of the number of items of the instruments. However, some instruments have also had short versions developed [65,66,72,114].

3.4. Instruments That Characterised Both Environments

Only four instruments were identified that considered both the built and food environments to measure the obesogenic environment. The Worksite Environment Measure (WEM) [26] and the Environment Assessment Tool (EAT) [27] focus only on the worksite environment. The EURO-PREVOB questionnaire [58], and the SPOTLIGHT virtual audit tool (S-VAT) [59] include some types of built and food environments. The S-VAT is particularly focused on collecting information about the food store environment, and the built environment was categorized into walking and cycling, public transport, aesthetics, land use-mix, and physical activity facilities.
| Author (Year)          | Instrument                                               | City; Country                           | Methods                          | Population/Sample                                                                                                   | Environment | Validity                   | Reliability          | Items; Versions | Language | Cultural Adaptation |
|-----------------------|----------------------------------------------------------|-----------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------|---------------------------|-----------------------|------------------|----------|----------------------|
| Oldenburg et al.      | Checklist of Health Promotion Environments at Worksites (CHEW) | Australia                               | Checklist Interview               | Workers                                                                                                              | Worksite    | Face-validity             | Inter-rater         | 112              | English | No                   |
| Abarca et al.         | Grocery Store Manager Questions                          | Arizona; United States (Mexico border communities) | Interview/Questionnaire           | Grocery store Manager/assistant manager                                                                                   | Food store  | No                         | No                    | 26               | English | Spanish No          |
| Shane et al.          | Healthy Food Assessment Survey                           | United States                           | Checklist                          | African-American community organizations and community residents in the target areas                                      | Food store  | No                         | No                    | 31               | English | No                   |
| Baker et al.          | Grocery Store Audit Tool                                 | Saint Louis; United States              | Audit checklist                   | Community supermarkets                                                                                                   | Food store  | No                         | No                    | 92               | English | No                   |
| Baker et al.          | Fast Food Restaurant Audit Tool                          | Saint Louis; United States              | Audit checklist                   | Community fast food restaurants                                                                                       | Restaurant  | No                         | No                    | 6                | English | No                   |
| Winkler et al.        | Micro-level Data Collection Worksheet (conventional food store major) | Brisbane City; Australia               | Checklist                          | Trained data collectors recorded detailed information about the availability, variety, and price of 10 fruits and 10 vegetables from nearly all local supermarkets, greengrocers or convenience stores | Food store  | No                         | No                    | 66               | English | No                   |
| Zenk et al.           | Southwest Chicago Food Store Audit Instrument            | Southwest Chicago; United States       | Checklist                          | In-person observations of retail food stores at 2 time points, 2 weeks apart                                           | Food store  | Test-retest                | No                    | Food list 16 food items | English | No                   |
| Anderson et al.       | Healthy Eating Indicator Shopping Basket (HEISB) Tool     | United Kingdom                          | Checklist                          | Five contiguous, racially/ethnically and socioeconomically diverse community areas in southwest Chicago                | Food store  | No                         | No                    | 35               | English | No                   |
| Glanz et al.          | Nutrition Environment Measures Study in Stores (NEMS-S)   | United States                           | Interview/Questionnaire            | Four neighborhoods that represented four possible combinations of neighbourhood walkability (high/low) and socioeconomic status (high/low). Two other neighborhoods (one high-walkability and one low-walkability) were selected for pretesting measures | Food store  | Face-validity; Construct-validity | Inter-rater and test-retest reliability | 93 (11 sections) | English | No                   |
| Glanz et al.          | Nutrition Environment Measures Study in Restaurants (NEMS-R) | United States                           | Interview/Questionnaire            | Four neighborhoods were selected to provide diversity in community design (walkable versus non-walkable) and socioeconomic status (higher and lower income). | Restaurants | Construct validity          | Inter-rater and test-retest reliability | 25               | English | No                   |
| Author (Year)        | Instrument                                                      | City; Country                  | Methods                                      | Population/Sample                                                                 | Environment          | Validity                        | Reliability                        | Items; Versions | Language | Cultural Adaptation |
|---------------------|-----------------------------------------------------------------|-------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------|----------------------|----------------------------------|-------------------------------------|----------------|----------|---------------------|
| Liese et al. (2007) | Food Store Survey                                               | Orangeburg County, South Carolina, United States | Checklist Interview/Questionnaire          | Rural county Food stores identified from a database were mapped and presence, location, and store type verified by ground-truthing | Food store          | No                              | Inter-rater reliability          | 13             | English     | No                  |
| Mujahid et al. (2007) | Neighborhood Health Questionnaire                              | Baltimore, Maryland, Forsyth County, North Carolina, and New York, New York, United States | Telephone interview/Questionnaire          | Residents at three U.S. study sites Food store Restaurants                           | Food store          | No                              | Internal consistency and test–retest reliability | 36             | English     | No                  |
| Shimotsu et al. (2007) | Worksite Environment Measure (WEM) *                           | United States                 | Checklist                                   | Two trained raters visited each of the four bus garages and independently completed the survey | Worksite            | No                              | Inter-rater reliability          | 86             | English     | No                  |
| DeJoy et al. (2008) | Environmental Assessment Tool (EAT) *                           | United States                 | Checklist                                   | Section I completed by site staff and Section II completed by independent observers who toured the site and recorded their observations | Worksite            | Concurrent validity; Predictive validity | Inter-rater reliability          | 105            | English     | No                  |
| Tessier et al. (2008) | “Food supply questionnaire”                                     | Tunis; Africa                 | Checklist (yes/no)                          | Food retail outlets                                                                    | Food store          | No                              | No                    | 146            | Arabic     | No                  |
| Zenk et al. (2008) | Food Environment Audit for Diverse Neighborhoods (FEAD-N)       | Detroit, United States        | Checklist                                   | Trained observers conducted observations of 167 food stores                           | Food store          | Face-validity; Construct-validity | Inter-rater reliability          | 267            | English     | No                  |
| Ball et al. (2009)  | Food Store Survey                                               | Melbourne; Australia          | Checklist                                   | Women aged between 18 and 65 years in each of the 45 neighbourhoods                  | Food store          | No                              | No                    | 53             | English     | No                  |
| Cappelleri et al. (2009) | Power of Food Scale (FPS)                                       | United States                 | Five-point Likert scale ranging from 1 (do not agree at all) to 5 (strongly agree)   | Obese and general population, age not mentioned                                       | Obese and general population, age not mentioned | Psychological impact of living in food-abundant environments | Content validity; Test–retest reliability; internal consistency | 21             | English     | No                  |
| Freedman et al. (2009) | Grocery store survey Perception of Food Environment Scale      | Nashville, TN; United States  | Checklist                                   | Anyone (adults) shopping at one of the three farmers’ markets that were established at the Boys and Girls Clubs | Food store          | No                              | No                    | 33             | English     | No                  |
| French et al. (2009) | Annotated Receipts to Capture Household Purchasing             | Minneapolis, Minnesota; United States | Inventory                                 | At least one adult and one child in the household, residence in a private house or apartment within 15 miles of the university, and willingness to be randomized to active intervention or control group | Home food environment | No                              | No                    | 24             | English     | No                  |
| Fulkerson et al. (2009) | Home Food Inventory (HFI)                                       | Minneapolis, Minnesota; United States | Inventory Yes/no (15) response options      | Adults and families in which parents completed the HFI                                | Home food environment | Construct validity; Criterion validity | No                    | 23             | English     | Somali               |
| Song et al. (2009)   | Baltimore Healthy Stores Project Survey                        | Baltimore, United States      | Checklist                                   | Low socioeconomic level                                                                | Food store          | No                              | No                    | 42             | English     | No                  |
Table 2. Cont.

| Author (Year) | Instrument Description | City; Country | Methods | Population/Sample | Environment | Validity | Reliability | Items; Versions | Language | Cultural Adaptation |
|---------------|------------------------|---------------|---------|-------------------|-------------|----------|-------------|-----------------|----------|---------------------|
| Nelson MC, Story M (2009) [36] | Dorm room food inventory form | Minnesota, United States | Inventory | Dormitory-residing students from public university | Home food environment | No | No | 16 | English | No |
| Minaker et al. (2009) [37] | Assessment tools (food availability and affordability, and establishments) | North America (United States) | Checklist | Food service outlets, (preparing and serving food for immediate consumption), within the geographic boundaries of the campus of the University of Alberta | Restaurants | Face validity; Content validity | No | NM | English | No |
| Franzen, Smith (2010) [38] | Food Survey Tool for Grocery Stores | Minnesota; United States | Checklist | Grocery stores (13 Hmong/Asian and 2 American) | Food store | No | Test-retest reliability | 21 | English | No |
| Fentrell et al. (2010) [39] | Food Ubiquity Study | United States | Checklist | Retail stores | Food store | No | No | 7 | English | No |
| Gloria et al. (2010) [40] | Texas Nutrition Environment Assessment (TxNEA) | Austin, Texas; United States | Checklist | Convenience stores and grocery stores in one high-income and one low-income neighbourhood | Food store | Face validity | Inter-rater and test-retest reliability | 21 | English | No |
| Lucan et al. (2010) [41] | Instrument for Corner Store Snack Food Assessment | Philadelphia; United States | Checklist | Snack foods in 17 Philadelphia corner stores, located in three ethnically distinct, low-income school neighborhoods | Food store | No | No | Depending on the products | English | No |
| Lake et al. (2010) [42] | Food Environment Classification Tool | Newcastle-Upon-Tyne; United Kingdom | Classification tool | Establishments selling food and/or food products | Food store | NM | Inter-rater | 21 points, with 77 sub-categories | English | No |
| Lee et al. (2010) [43] | Carry-out/fast food restaurant checklist | Baltimore; United States | Checklist | prepared food sources in low-income neighborhoods | Restaurants | No | No | 10 | English | No |
| Chirandelli et al (2011) [44] | Communities of Excellence in Nutrition, Physical Activity, and Obesity Prevention (CX3) Food Availability and Marketing Survey | United States | Checklist | Twenty six retail food stores in low-income areas | Food store | Face validity | Inter-rater reliability | 34 | English | No |
| Gordon et al. (2011) [45] | Retail Food Assessment | New York; United States | Checklist | Low-income and largely Black and Hispanic neighborhoods with high levels of premature morbidity and mortality | Food store | No | No | 10 | English | No |
| Gustafson et al. (2011) [46] | Perceived and objective measures of the food store environment | North Carolina; United States | Questionnaire with 5-point Likert Scale (items Adapted from others instruments) | Women aged 40 to 64 years, with incomes at or below 250 % of the federal poverty level, and who had a Body Mass Index between 27.5 and 45.0 kg/m² inclusive | Food store | No | No | 37 | English | No |
| Hieseker and Dharsse (2011) [47] | Food Retail Outlet Survey Tool (FROST) | New York; United States | Checklist | 39 food stores were visited by the research team | Food store | No | Inter-rater reliability | 23 | English | No |
| Author (Year)          | Instrument                                                                 | City; Country                        | Methods    | Population/Sample                                                                 | Environment          | Validity | Reliability | Items; Versions | Language  | Cultural Adaptation |
|------------------------|----------------------------------------------------------------------------|--------------------------------------|------------|-----------------------------------------------------------------------------------|----------------------|----------|-------------|-----------------|-----------|------------------|
| Stevens et al. (2011)  | Exhaustive Home Food Inventory (EHFI)                                      | North Carolina, Durham counties, United States | Inventory  | Low-income African-American women with an infant between the ages of 12 and 18 months | Home food environment | No       | No          | NM              | English   | No               |
| Suratkar et al. (2011) | Consumer Impact Questionnaire (CIQ)                                        | Baltimore City, United States         | Interview  | Low-income African-American adult residents                                    | Food store           | NM       | No          | 106             | English   | No               |
| Ayala et al. (2012)    | Grocery Store Observation Guide                                             | South San Diego County; United States | Checklist  | Ten stores and 15 supermarkets                                                       | Food store           | No       | Inter-rater reliability | 155            | English   | No               |
| French et al. (2012)   | Pharmacy Food Environment: Promoting Sugary Snacks at the Point of Prescription Drug Purchase | Minneapolis, United States           | Checklist  | Employees from community clinic, hospital and commercial pharmacies                | Public facilities    | No       | Inter-rater reliability | 16            | English   | No               |
| Glanz et al. (2012)    | Nutrition Environment Measures Survey-Vending (NEMS-V)                    | United States                        | Checklist  | Vending machines in Businesses, schools, and communities                            | Public facilities    | NM       | Inter-rater reliability | Test-retest reliability | English   | No               |
| Kelly et al. (2012)    | Measuring Food Environments at Public Transport Sites                      | Sydney, Australia                    | Checklist  | Vending machines in train stations                                                 | Public facilities    | No       | Inter-rater reliability | 8              | English   | No               |
| Kersten et al. (2012)  | Northern CA Retail Food Environment Store Survey                           | Northern California; United States   | Checklist  | Small food stores                                                                  | Food store           | No       | No          | 18             | English   | No               |
| Glanz et al. (2013)    | Nutrition Environment Survey for Corner Stores (NEMS-CS)                  | Philadelphia, United States          | Checklist  | Corner stores                                                                      | Food store           | NM       | Inter-rater reliability | Test-retest reliability | 111       | English           |
| Hoehner et al. (2013)  | Worksite and Energy Balance Survey (WEBS)                                  | Missouri regions; United States      | Interview  | Adults 21-65 years old, employed at least 20 hours/week, works at one primary location; primary workplace has ≥5 employees, not pregnant, and no physical limitations to prevent walking or bicycling in the past week | Perceptions food environment worksite | No       | Test-retest reliability | 84             | English   | No               |
| Krukowski et al. (2013) | Food Store Selection Questionnaire (FSoSQA)                              | Arkansas communities; United States  | Interview  | Household food shoppers (93% female, 64% African American), in rural and urban communities | Food store           | No       | No          | 49             | English   | No               |
| Pomerleau et al. (2013) | EURO-PREVORB *                                                           | Ankara, Brno, Marseille, Riga, and Sarajevo, Europe | Community Questionnaire | Urban areas                                                                      | Food and built environment | Content, face and discriminant validity | Inter-rater reliability | English   | No               |
| Lakerveld et al. (2014) | SPOTLIGHT Virtual Audit Tool (S-VAT) *                                     | The four largest Dutch cities and their surroundings, west of the Netherlands | Checklist  | 128 street segments in four Dutch urban neighbourhood that were heterogeneous in socio-economic status and residential density | Food store           | Criterion validity | Inter- and intra-observer reliability | 40            | English   | No               |
Table 2. Cont.

| Author (Year)          | Instrument                                                                 | City; Country               | Methods                  | Population/Sample                                                                 | Environment                                                                 | Validity                          | Reliability                  | Items; Versions | Language | Cultural Adaptation |
|------------------------|----------------------------------------------------------------------------|-----------------------------|--------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------|-----------------------------|----------------|----------|---------------------|
| Glanz et al. (2015) [60] | Perceived Nutrition Environment Measures Survey (NEMS-P)                  | Philadelphia, United States | Interview/Questionnaire   | Adults (18 or older) residents of higher- and lower-SES neighborhoods             | Perceived food environment                                                   | Face and content validity        | Test-retest reliability | 118            | English             | No                  |
| Lo et al. (2015) [61]   | NEMS Grab and GO: Food Environment Assessment (NEMS-GG)                    | Canada, United States       | Checklist                | Grab-and-go establishments at the University of Toronto                           | Restaurants: Grab-and-go establishments                                      | Face-and construct validity       | Inter-rater reliability  | 7 sections, 22 items | English             | No                  |
| Ruff et al. (2016) [62] | “A store assessment, a health and behavior survey”                         | New York City; United States | Interview                | Any bodega shopper aged 18+ who purchased food or beverage from a participating store | Food store                                                                    | No, but included validated questions | Inter-rater reliability | 0             | NM                   | English             | No                  |
| DeWeese et al. (2018) [63] | Short-Form Corner Store Audit Tool (SCAT)                                  | New Jersey cities; United States | Checklist              | Corner stores                                                                     | Food store                                                                    | Criterion validity               | Inter-rater reliability | 7             | English             | No                  |

* Instruments that characterised both environments and are included in Tables 2 and 3. NM = Not Mentioned.

Table 3. Measures on built environment.

| Author (Year)          | Instrument                                                                 | City; Country               | Kind of instrument                  | Population/Sample                                                                 | Environment                                                                 | Validity                          | Reliability                  | Items; Versions | Language | Cultural Adaptation |
|------------------------|----------------------------------------------------------------------------|-----------------------------|--------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------|-----------------------------|----------------|----------|---------------------|
| Pikora et al. (2000) [64] | Systematic Pedestrian and Cycling Environmental Scan (SPACES) Instrument | Perth (Western Australia)   | Checklist                            | Sixteen observers with prior experience and trained examined segments within a 400-meter radius of each of the 1803 residences of individuals who had participated in the previous survey of physical activity | Physical activity environment                                                   | No                                | Inter- and intra-rater reliability | 37            | English | No                  |
| Ainsworth et al. (2002) [65] | Environmental Supports for Physical Activity Questionnaire | South Carolina; United States | Multiple choice scale questionnaire-Telephone survey | Adults of geographically selected households | Physical activity environment                                                   | Content validity                  | Test-retest reliability        | Original version: 27 Long version: 11 Short version: 5 | English | No                  |
| Saelens and Salis, (2002) [66] | Neighborhood Environment Walkability Survey (NEWS) and Neighborhood Environment Walkability Survey-Abbreviated (NEWS-A) | San Diego; United States    | Multiple choice scale questionnaire-Self-administered or interview | Adults from two neighborhoods with differing “walkability”, high walkability neighborhood had a mixture of single-family and multiple-family residences, which is consistent with higher residential density; whereas the low-walkability neighborhood had predominantly single-family homes | Perception of built environment                                                | Construct validity                | Test-retest reliability        | 98 NEWS 54 NEWS-A | English | CNEWS (China) [67] NEWS (Brazil) [68] NEWS (Africa) [69] NEWS (India) [70] |
| Brownson et al. (2003) [71] | Analytic Audit Tool Checklist Audit Tool | St Louis; United States     | “Analytic” (with Likert-scale and ordinal-response choices) “Checklist” (with dichotomous response choices) | Higher income and lower income street segments were audited by different observer pairs | Street-scale environments and rates of physical activity                   | No                                | Inter-rater reliability        | Analytic: 27 Checklist: 24 | English | No                  |
Table 3. Cont.

| Author (Year) | Instrument | City; Country | Kind of instrument | Population/Sample | Environment | Validity | Reliability | Items; Versions | Language | Cultural Adaptation |
|---------------|------------|---------------|--------------------|-------------------|-------------|----------|-------------|----------------|----------|---------------------|
| Craig et al. (2003) [72] | International Physical Activity Questionnaire (IPAQ) | 12 countries (international) | Checklist | 35–64 years | Physical activity environments | Concurrent validity | Test-retest reliability | 7 items | English | Arabic, Croatian, Bahasa-Malaysian, Danish, Dutch (Belgian), Hebrew, Greek, German, French, Estonian, Korean, Icelandic, Italian, Spanish (Argentina, Columbia, and the United States), Lithuanian, Norwegian, Persian-Farsi, Polish, Swedish, Taiwanese, Vietnamese, Turkish |
| Emery et al. (2003) [75] | Walking and Bicycling Suitability Assessment (WABSA) | United States | Likert response system | Yes/no questions | Two data collectors used walking and bicycling suitability assessment instruments to collect data on 31 road segments | Walkability and bikeability in the neighbourhood | Criterion-related reliability | 44: Walking 17 Bicycling 27 | English | No |
| Huston et al. (2003) [76] | NC Six-County Cardiovascular Health (CVH) Survey | Cabarrus, Hendersons, Pitt, Robeson, Surry, Wake counties in North Carolina; United States | Cross-sectional telephone survey (mix of surveys) | Age: 18 or more | Perceived built environment | No | No | 133 | English | No |
| Clifton et al. (2004) [77] | Pedestrian Environment Data Scan (PEDS) Tool | United States | Audit tool | Segments of a pedestrian network or pathway | Physical activity environment | Internal and external validity | Inter- and intra-rater reliability | 35 | English | Large version (35 items); Spanish- version mini (19 items) |
| Humpel et al. (2004) [78] | Perceptions of Local Environmental Attributes | Australia | Questionnaire | Adults | Physical activity environment | No | Test-Retest Reliability | 10 | English | No |
Table 3. Cont.

| Author (Year) | Instrument | City; Country | Kind of instrument | Population/Sample | Environment | Validity | Reliability | Items; Versions | Language | Cultural Adaptation |
|---------------|------------|---------------|--------------------|-------------------|-------------|----------|-------------|-----------------|----------|---------------------|
| Rodriguez et al. (2004) [79] | Local Physical Environment | Chapel Hill and Carrboro; United States | Questionnaire | Adults Students and staff commuters to the University of North Carolina in Chapel Hill | Physical activity environment | No | No | NM | English | No |
| Bedimo-Rung (2005) [80] | Bedimo-Rung Assessment Tools-Direct Observation (BRAT-DO) | New Orleans, Luisiana; United States | Checklist | Fifteen pairs of observers were trained and sent to two parks simultaneously to assess two target areas each | Neighbourhood design Physical characteristics of parks | Criterion validity | Inter-rater reliability | 181 | English | No |
| Lee et al. (2005) [81] | Physical Activity Resource Assessment (PARA) instrument | Kansas City, Kansas and Missouri; United States | Check-box | Thirteen urban lower income, high ethnic minority concentration neighborhoods that surrounded public housing developments and four higher income, low ethnic minority concentration comparison neighborhoods | Physical activity environment | No | Test-retest | 49 | English | No |
| Armstrong et al. (2006) [82] | Global Physical Activity Questionnaire (GPAQ) | Global Developed by WHO for physical activity surveillance in countries | Questionnaire | Adults | Physical activity environment | Criterion validity | Test-retest reliability | 16 | English | No |
| Boarnet et al. (2006) [83] | Irvine Minnesota Inventory | Southern California and the Minneapolis; United States | Checklist | Street segments | Neighbourhood features and perceived safety | No | Inter-rater reliability | 160 | English | No |
| Boehmer et al. (2006) [84] | Telephone Questionnaire Physical Activity and Activity Friendliness of Missouri Ozark Region | Missouri, Tennessee, and Arkansas; United States | Telephone Interview/Questionnaire | 18 and older Rural communities | Perceived built environment | No | No | 106 | English | No |
| Brownson et al. (2006) [85] | Saint Louis Environment and Physical Activity Instrument | St Louis; United States | Telephone questionnaire | NM | Perceived built environmental | NM | NM | 60 | English | No |
| Giles-Corti B et al. (2006) [86] | Neighborhood Physical Activity Questionnaire (NPAQ) | Western Australia | Questionnaire | 20–71 years (mean 39 years; SD 11.7) A convenience sample of participants drawn from general and academic staff at three universities completed two instruments approximately 1 week apart | Physical Activity Environment | No | Test-retest reliability | 28 | English | No |
Table 3. Cont.

| Author (Year) | Instrument | City: Country | Kind of instrument | Population/Sample | Environment | Validity | Reliability | Items; Versions | Language | Cultural Adaptation |
|---------------|------------|---------------|--------------------|-------------------|-------------|----------|-------------|-----------------|----------|---------------------|
| Handy et al. (2006) [87] | Perceived Measures of Neighborhood Environment That May Affect Walking | San Francisco Bay area, Silicon Valley Area, Santa Rosa, Sacramento, and Modesto, California; United States | Questionnaire | Adults | Physical Activity Environment | NM | NM | 34 | English | No |
| McKenzie et al. (2006) [88] | SOPARC: System for Observing Play and Recreation in Communities | Los Angeles; United States | Check-box | Park and recreation areas, including park users’ physical activity levels, gender, activity modes/types, and estimated age and ethnicity groupings. It also collects information on park activity area characteristics (e.g., accessibility, usability, supervision, and organization) | Physical activity environment | Construct validity | Inter-rater | Two boxes | English | No |
| Troped et al. (2006) [89] | Path Environment Audit Tool (PEAT) | Massachusetts; United States | Audit Tool | Urban, suburban and rural communities | Neighbourhood design | Criterion validity | Inter-observer reliability | 36 | English | No |
| Hoehner et al. (2007) [90] | Active Neighborhood Checklist | St. Louis and southeastern Missouri; United States | Checklist-observational tool | Sixty-four street segments in St. Louis and southeastern Missouri were selected among diverse areas that varied with respect to socioeconomic levels, urbanization, and land use | Street-scale features | No | Inter-rater reliability | 40 | English | No |
| Shimotsu et al. (2007) [26] | Worksite Environment Measure (WEM) * | United States | Checklist | Two trained raters visited each of the four bus garages and independently completed the survey | Worksite physical activity environment | No | Inter-rater reliability | 86 (7 sections) | English | No |
| DeJoy et al. (2008) [27] | Environmental Assessment Tool (EAT) * | United States | Checklist | Section I completed by site staff and Section II completed by independent observers who toured the site and recorded their observations | Worksite physical activity environment | Concurrent validity; Predictive validity | Inter-rater reliability | 105 | English | No |
| Forman et al. (2008) [91] | Perceived Barriers to Walking or Cycling Survey | San Diego (CA); Boston (MA); Cincinnati (OH); United States | Questionnaire | Adults parents of children aged 2–18 years | Physical activity environment | Concurrent validity | Test–retest reliability Internal consistency | 17 | English | No |
| Author (Year)          | Instrument                                                                 | City; Country                        | Kind of instrument | Population/Sample                  | Environment                                                                 | Validity                      | Reliability                      | Items; Versions | Language  | Cultural Adaptation |
|-----------------------|----------------------------------------------------------------------------|--------------------------------------|--------------------|------------------------------------|----------------------------------------------------------------------------|--------------------------------|----------------------------------|----------------|-----------|---------------------|
| Ogilvie et al. (2008) | Environmental Characteristics Scale                                       | Glasgow; Scotland                    | Questionnaire      | Adults and those aged 12–18 years  | Physical activity environment                                               | Face validity; Concurrent validity | Internal consistency and test-retest reliability | 14             | English   | No                  |
| Evenson et al. (2009) | Pregnancy, Infection, and Nutrition (PIN3) Neighborhood Audit Instrument  | North Carolina; United States        | Audit-instrument.  | Street segments in the research area| Neighbourhood design and walkability                                         | Construct validity              | Test-retest reliability            | 43             | English   | No                  |
| Forsyth et al. (2009) | Twin Cities Walking Survey                                               | Minnesota; United States             | Checklist          | Adults                             | Physical activity environment                                               | No                             | Test-retest reliability            | 273 (5 sections) | English   | No                  |
| Purciel et al. (2009) | Measurement Instrument for Urban Design Quantities Related to Walkability | New York; United States              | Questionnaire with pictures | Urban design qualities             | Built environment and walking behavior                                       | Predictive validity             | Inter-rater reliability            | 25             | English   | No                  |
| Spittaels et al. (2009) | Assessing Levels of Physical Activity and fitness at population level (ALPHA) | Europe                               | Questionnaire      | General adult populations          | Physical activity environment                                               | Predictive validity             | Internal consistency              | 49 items grouped in 9 themes | Dutch, English, French, Finnish, German, Spanish | No                  |
| Yousefian et al. (2009) | The Rural Active Living Assessment (RALA) Tools                           | United States                        | Checklist          | Street segment in seven rural US communities | Neighbourhood design Physical activity environment                           | No                             | Inter-rater reliability            | 81             | English   | No                  |
| Blunt and Hallam (2010) | The Worksite Supportive Environments for Active Living Survey (SEALS)     | Kentucky and Mississippi; United States | Self-report questionnaire form using a four-point, Likert-type response scale | 20–80 years, and the mean age was 45.5 ± 6.43 years | Worksite perceived built environment                                        | Face and content validity; Discriminant validity | Internal consistency; Construct reliability; Test-retest | 28             | English   | No                  |
| Kaiser BL et al. (2010) | “Cross-sectional survey”                                                   | Wisconsin counties; United States    | Questionnaire      | Low-income Anglo and Latino adults | Physical activity behaviour and individual, social, and environmental influences on physical activity among adults | Physical activity environment   | Test-retest reliability            | 63             | Spanish   | No                  |
| Sallis, J.F. et al. (2010) | The Neighborhood Quality of Life Study (NQLS) Survey                      | 32 neighborhoods in Seattle, WA and Baltimore; United States | Checklist          | 20–65 residents of neighbourhoods stratified on “walkability” characteristics and median household income | Physical activity environment   | NM                              | 222            | English   | No                  |
| Author (Year) | Instrument | City; Country | Kind of instrument | Population/Sample | Environment | Validity | Reliability | Items, Versions | Language | Cultural Adaptation |
|--------------|------------|---------------|--------------------|-------------------|-------------|---------|-------------|----------------|----------|---------------------|
| Sallis, J.F. et al. (2010) [101] | PANES: Physical Activity Neighborhood Environment Survey | United States | Checklist (self-administered) | Adults recruited from neighborhoods that varied in walkability in three U.S. cities | Walkability and bikeability in the neighborhood | No | Test–retest reliability | 17 | English | Japan, Italian, Nigeria |
| Spruijt-Metz D. et al. (2010) [105] | Research on Urban Trail Environments (ROUTES) Trail Use Questionnaire | Chicago, Dallas, and Los Angeles; United States | Checklist Yes/no questions and 9 items with multiple response | STUDY 1: 40 and 60 years of age (10 men and 24 women) Study 2: 490 adults (48% female and 73% white), mean age 48 years | Trail use | Construct validity | Test–retest reliability | 43 | English | No |
| Wahlgren L. (2010) [106] | Active Commuting Route Environment Scale (ACRES) | Urban and suburban parts of Greater Stockholm, Sweden, Europe | Questionnaire, 11 or 15-point response scale | 20 years or older, living in urban and suburban part of Stockholm County, commute to work or study walking or bicycling at least once a year | Perceived built environment Walkability and bikeability | Criterion-related Test–retest validity | 18 | Sweden | No |
| Kaczynski et al. (2012) [107] | COMMUNITY PARK AUDIT TOOL (CPAT) | Kansas City, Missouri; United States | Checklist | 32 adults and 2 teenagers agreed to participate (14 male, 20 female) These included representatives from public health, parks and recreation, planning, nonprofit agencies, youth agencies, education, business associations, municipal legislators, academicians, and adult and youth park users and nonusers | Neighbourhood design Physical characteristics of parks | No | Inter-rater reliability | 28 | English | No |
| Umstattd et al. (2012) [108] | Development of the Rural Active Living Perceived Environmental Support Scale (RALPES) | Two rural southeastern states in the United States | Checklist | Adolescents, parents, public school staff, and older adults in two rural southeastern United States counties | Physical activity environment Perceived built environment | Face and content validity | Internal consistency | 33 | English | No |
| Adams et al. (2013) [109] | Perceptions of the Environment in the Neighbourhood (FENS) | Cardiff, Kenilworth and Southampton, United Kingdom | Survey scale | Adults living in the study areas | Perceived built environment | No | Test–retest reliability | 13 | English | No |
| Duncan et al. (2013) [110] | Office Environment and Sitting Scale (OFFESS) | Australia | Self-administered questionnaire | Adults, workers | Physical Activity Environment Worksite environment | Construct validity | Internal consistency and test re-test reliability | 42 | English | No |
Table 3. Cont.

| Author (Year)          | Instrument                                      | City; Country                        | Kind of instrument                  | Population/Sample                  | Environment                        | Validity                        | Reliability                      | Items; Versions | Language | Cultural Adaptation |
|------------------------|--------------------------------------------------|--------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|----------------------------------|-----------------|----------|---------------------|
| Pomerleau et al. (2013) [58] | EURO-PREVOB *                                   | Ankara, Brno, Marseille, Riga, and Sarajevo; Europe | Community Questionnaire            | Urban areas                      | Food and Built Environment       | Content, face and discriminant validity | Inter-rater reliability | English  | No                  |
| Sasidhara et al. (2014) [111] | SOPARNA: System for Observing Physical Activity and Recreation in Natural Areas | Los Angeles; United States          | Checklist—direct observation tool  | Wilderness zones and natural open spaces | Physical activity environment in natural zones | Construct validity               | Inter-rater NM                  | English  | No                  |
| Malecki et al. (2014) [112] | The Wisconsin Wasabe of the Social and Built Environment (WASABE) | Wisconsin; United States            | Multi-dimensional objective audit instrument | Adults aged 21–65 years | Neighbourhood design           | Construct validity               | Inter-rater reliability 153 | English  | No                  |
| Lakerveld et al. (2014) [59] | SPOTLIGHT virtual audit tool (S-VAT) *           | Four largest Dutch cities and their surroundings; west of the Netherlands | Checklist                          | 128 street segments in four Dutch urban neighbourhoods, heterogeneous in socio-economic status and residential density | Neighbourhood design Physical activity environment Walkability and bikeability in the neighbourhood | Criterion validity               | Inter- and intra-observer reliability 40 | English  | No                  |
| Drewnowski et al. (2014) [113] | “20-minute telephone survey” from Seattle Obesity Study (SOS) | King County Washington; United States | Interview/questionnaire Telephone survey | 18–65 or older Lower income population | Neighbourhood design | NM | NM | 22 | English  | No |
| Sallis et al. (2015) [114] | Microscale Audit of Pedestrian Streetscapes (MAPS) | United States                        | Audit Tool                          | Children, adolescents, younger adults, adults, older adults | Walkability in neighbourhoods | Internal consistency | Inter-observer reliability | MAPS-Full: 120 MAPS-Abbreviated: 54 [115] MAPS-Mini: 15 | English  | No |

* Instruments that characterised both environments and are included in Tables 2 and 3. NM = Not Mentioned
3.5. Reference Instruments for the Development of Others

Some of the instruments developed were based on others, such as: [24,26,27,29,34,40,43,46,50,51,54,56,61,63,65,71,76,82–84,86,88,90,93,99,101,106,107,109,112–114]. Table 4 shows the instrument or instruments that were used as a reference to develop others.

| Reference Instrument (Author; Instrument) | Instrument Developed Based on Reference Instrument (Article Reference Number) |
|------------------------------------------|--------------------------------------------------------------------------------|
| Food environment                         |                                                                                |
| Oldenburg et al.; CHEW [15]              | [26,56]                                                                        |
| Baker et al.; Grocery Store/Fast Food Restaurant Audit Tool, Saint Louis [16] | [29]                                                                          |
| Zenk et al.; Southwest Chicago Food Store Audit Instrument [20] | [29]                                                                          |
| Glanz et al.; NEMS-S [22]                | [29,40,46]                                                                     |
| Glanz et al.; NEMS-R [23]                | [43,61]                                                                        |
| Glanz et al.; NEMS-CS [55]               | [63]                                                                           |
| DeJoy et al.; EAT [27]                   | [56]                                                                           |
| Lake et al.; Food Environment Classification Tool [42] | [105]                                                                       |
| Ghirardelli et al.; CX³ Food Availability and Marketing Survey [44] | [54]                                                                         |
| Other tools not included in present review (such as population surveys, etc.) | [24,27,29,34,46,50,51]                                                       |
| Built environment                        |                                                                                |
| Pikora et al.; SPACES [64]               | [77,87]                                                                        |
| Saelens and Sallis; NEWS [66]             | [78,92,97,106]                                                                 |
| Brownson et al.; Analytic/Checklist Audit Tool [67] | [77,84,93,104]                                                              |
| Craig et al.; IPAQ [68]                  | [76,80,95]                                                                     |
| Emery et al.; WABSA [69]                 | [104]                                                                           |
| Giles-Corti B et al.; NPAQ [80]          | [106]                                                                           |
| Hoehner et al.; Active Neighborhood Checklist [84] | [104,105]                                                                 |
| Other tools not included in present review (such as population surveys, etc.) | [65,67,70,77,82,87,98,100,104–107]                                            |

4. Discussion

The present review has identified the available evidence on the instruments used to characterise the obesogenic environment, in terms of both the food and built environments. This is the first scoping review on this subject, and the first review of instruments that considers both environments in adults.

Diverse instruments have been developed to characterise the obesogenic environment. Most of them had been developed in the United States and were written in English. Moreover, the majority of the studies reviewed have reported psychometric properties, but out of the all studies only a few were reported to be valid and reliable.

Some studies conducted in this field until 2015 only consider the influence of the food environment [14,116], or only that of the food store environment [117]. The present review includes, as a novelty, the measures developed in adults both at the food environment and the built environment levels, as well as their types. These can be observed in the tables, which show relevant characteristics to facilitate the selection of one or several instruments for carrying out future research. Additionally,
this is the first article where the characteristics of the data collection instruments are classified and described in tables in a clear and fast way for consultation.

The importance of determining the factors that constitute the obesogenic environment has led to the development of a large number of data collection instruments. Most of the identified instruments measured the characteristics of the built or food environments, focusing on one particular area of each environment. These include for example physical activity or the characteristics of an area in the case of the built environment, or food shops, restaurants, the workplace, or home in the case of the food environment. Few instruments considered subjects’ perception of their environment. However, recent research has shown that perception is a mediator between objectively measured exposure and interaction; consequently, studies that combine both are preferable [8].

Although most of the instruments focus only on one type of environment (built or food), there are four that contemplate both. However, they do not meet all the necessary criteria and different types of environments should be contemplated. First of all, WEM [26] and EAT [27] focus on the worksite environment (measuring food and built environments), but only in the workplace. In addition, in the case of EAT, it covers the physical activity environment, and although it includes the food environment, it does so in a lighter way. On the other hand, the questionnaire EURO-PREVOb [58] could be a good instrument to measure obesogenic environments in Europe. Nevertheless, more work is needed to refine and further test the reliability and validity of this instrument in a range of other environments. Although both types of environment are included, they do not include all the types that exist and that need to improve their psychometric properties. Finally, with the S-VAT [59], it does not contemplate all the types of environments that characterize the food and the built environment. Within the food environment it is particularly focused on collecting information about food store environment, and the built environment was categorized into walking and cycling, public transport, aesthetics, land use-mix, and physical activity facilities. For this reason, it cannot be recommended as a robust and reliable tool to assess both environments.

Both the food and built environment data collection instruments showed a wide disparity in the minimum and maximum number of items, which makes comparison difficult. A high number of items reflected inventories or checklists of foods available in shops or restaurants in the case of the food environment, or a list of the characteristics of a neighbourhood or defined area in the case of the built environment.

Although there has been a significant increase over the last decade in the amount of evidence indicating that the environment exerts an influence, there are still unquestionable gaps in current evidence, as shown in this review. Different measures, definitions, and approaches, and continuing attempts to be novel by creating new instruments to measure the environment have merely generated confusion [8].

However, the results showed that the most widely used instruments to characterise the food environment to date are those developed by Glanz et al. (Nutrition Environment Measures Study in Stores (NEMS-S) [22] and Nutrition Environment Measures Study in Restaurants (NEMS-R) [23]) and Oldenburg et al. (Checklist of Health Promotion Environments at Worksites (CHEW) [15]). With regard to the built environment, the most widely used instruments to identify this environment are the Systematic Pedestrian and Cycling Environmental Scan (SPACES) [64], the Neighborhood Environment Walkability Survey (NEWS) [66], the Analitic/Checklist Audit Tool [71], the Active Neighbourhood Checklist [90], and the International Physical Activity Questionnaire (IPAQ) [74], which are often combined with mapping using geographic information systems (GIS), despite limitations since this assumes that food choices are determined primarily by individuals’ proximity to food outlets, without accounting for travel patterns, taste preferences, social norms about where to procure food, or ability to afford foods [13]. They have also served as the basis for various subsequent instruments (Table 4), as well as for studies on the food and built environment.
Few new instruments have been developed for an adult population during the last three years, and this is maybe due to the fact that the majority of studies that were found until May 2018 used the available instruments developed previously, cited in Tables 2 and 3 [118–124].

Most of the instruments have been developed and used in the United States. This may be due to concern about the high prevalence of overweight and obesity in this country [125]. Furthermore, there was important role played by the NIH, which has the capacity to finance prevention and intervention initiatives in the development of overweight and obesity, as well as in the development of instruments to characterise the environment [126].

Nevertheless, the prevalence of overweight and obesity in Europe is steadily rising and requires more uniform and comprehensive characterisation of the problem and its environments. Although Europe, Australia, and the United States present different food patterns and consumption characteristics, the prevalence of overweight has remained stable or is rising in all three regions [13,125–129]. Influenced by the obesogenic environment, food habits and patterns of consumption are changing in many developed and developing countries, with a marked move towards low vegetable consumption and high animal protein intake [130]. Hence, obesity rates will continue to rise as long as individuals, society, policy-makers, health professionals, social workers, schools, and prevention campaigns continue to give little importance or priority to the obesogenic capacity of environments [131]. Although public health policies have begun to include measures such as banning marketing of unhealthy foods and taxing unhealthy options [132], there is still a need for vigorous action to prevent and reduce obesity by modifying these environments. It is therefore essential for policy-makers to implement effective interventions that tackle the elements involved in the development of obesity, such as certain sectors of the food industry and food marketing and advertising [133].

**Limitations**

There is no MESH term for the obesogenic environment. This fact hindered the search for evidence and generated more non-meaningful data or information. Database searches would be easier and more accurate if a new term were created referring to this concept and its types (“food environment” and “built environment”).

5. **Conclusions**

The present study has provided an overview of the instruments used worldwide to measure the obesogenic environment in adults, identifying the components and characteristics of each tool. Numerous diverse instruments have been developed to characterise the obesogenic environment, and some of them have been developed based on existing ones; however, most have not been validated and there is very little similarity between them, hindering comparison of the results obtained.

Future research should combine validated instruments that characterise the built and food environments and also include subjects’ perception of their environment. In addition, validated tools are required in other countries besides the United States, since those that exist are scarce. In conclusion, there is also a need for robust instruments, improving or combining existing ones, for use within and across countries, and more sophisticated study designs where the environment is contemplated in an interdisciplinary approach.

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