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Longitudinal designs to study the impact of individuals' residential history on the development of obesity: a scoping review protocol

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1

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Scoping review, obesity, neighbourhood effect, longitudinal design, residential history

ABSTRACT

Introduction

The prevalence of obesity has increased significantly in the last three decades and became an important public health concern. Evidence of weight status variability at the neighborhood level has led researchers to look more precisely at the characteristics of small geographic areas that might influence energy balance related behaviors, giving rise to the field of the "neighborhood effect" in public health research. Amongst an abundant literature about neighborhood effects and obesity, we propose a protocol for a scoping review that will aim at determining how longitudinal measurement of residential area characteristics is integrated in the study of the impacts of physical and socioeconomic environments on adult weight status.

Methods and Analysis

A list of relevant citations will be obtained through a systematic database search in Pubmed, Web of science and Embase. A standard three steps screening process performed by the investigators will yield a list of selected publications that meet specific eligibility criteria. Data from the publications included in the scoping review will be charted according to bibliographic information, study population, exposure, outcomes and results.

Discussion and Conclusion

To our knowledge, our protocol will yield the first scoping review regarding the impact of individuals' residential history and obesity. Because the causal pathways between environmental characteristics and the development of obesity is not straightforward and

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may take some time before being observed, describing findings specifically from longitudinal designs is an essential first step to disentangle which contextual characteristics are likely to be involved in an individual's life course. Such information would bring new knowledge to complement current etiologic investigations and would contribute to enhance resource allocation strategies for stakeholders in developing relevant interventions to prevent obesity and its negative impacts.

STRENGHTS AND LIMITATIONS OF THIS STUDY

- To our knowledge, the first review of longitudinal designs of neighbourhood effect studies on obesity;

- Includes a comprehensive research strategy that takes into account the complexity of neighbourhood research;

- The descriptive nature of a scoping review prevents a quantitative analysis of the results;

- Not including children in this scoping review limits its scope but increases the homogeneity of the results.

INTRODUCTION

Rationale

With an increasing prevalence in the last three decades, obesity has become an important public health concern in most countries of the world. Individuals with obesity are more at risk of developing certain conditions, including diabetes, cardiovascular diseases and cancer. The loss of productivity and costs associated with the treatment of obesity-related health problems are taking a toll on many developed and developing countries.[1 ,2]

In an effort to develop more effective obesity prevention, researchers have looked at the various causes, both proximal and distal, of the obesity epidemic.[3]

Figure 1

Figure 1 shows a complex influence system on obesity proposed by Glass and McAtee [4] on which the scientific community has reached a certain degree of consensus,

3

although the system is sometimes depicted in its more or less complicated form.[5-7] At the center of this model lies a largely accepted premise: an increase in body fatness is the result of an imbalance between energy intake and energy expenditure.[7] Yet, causal pathways underlying the energy balance are much more complex, and many researchers suggest that interventions focused on re-establishing the proper balance by individual control of their diet and physical activity has limited effects.[7 ,8]

For example, public health professionals, although preoccupied by population health issues, have historically focused on the personal responsibility of individuals for their weight loss, leading to numerous mass media campaigns on healthy eating and physical activity. As a result, collective knowledge on favorably perceived or "healthy" behavior was increased, but the effect on body weight was limited.[9]

At the individual level, dieticians, exercise specialists and health care professionals also work on behavior modification to help persons with overweight or obesity achieve weight loss. And although short-term weight loss is generally obtained when patients are offered sufficient support, maintenance of weight loss is much more difficult and weight is often regained over a five-year time lapse. [10 ,11]

At the physiological level, bariatric surgeons acting directly digestive mechanisms, have had successful results, with an average excess weight loss up to 70%, depending on the procedure used.[12]   But as with dieting, long term weight loss maintenance is not a certitude.[13-16]

Acknowledging these difficulties leads to an argument that the modern world has a strong obesogenic influence and that personal control may not be enough to prevent weight grain through the life course. This is why the obesity research community has engaged in studies aimed at finding which factors above the individual level have an impact on obesity. Many contextual characteristics, illustrated in figure 1, have been theorized to have an impact on behaviors that influence either energy intake, energy expenditure, or both. A rich body of literature explored these contextual forces going from the micro to the local and the global scale: family behaviors, social norms, foodscape, built environment, education, market globalization, etc.[3 ,4]

4

Researchers have taken particular interest to weight status variability at the local level and are now looking more precisely at the characteristics of smaller residential geographic areas [17 ,18]. This so-called "neighborhood effect" research field examines whether neighborhoods might influence weight gain.[19-22] From a socioeconomic perspective, a literature review from McLaren [23] reports a negative relationship between contextual indicators of socioeconomic status and BMI, for women and for both sexes combined in developed countries. Although the same type of studies [19 ,24-28] exists for physical environments and their influence on body mass, the conclusions tend to show less significant relationships. Urban sprawl (positive) and land use mix (negative) being the only indicators shown to have a relatively consistent and statistically significant association with an increased BMI in recently published reviews.[25 ,27 ,29]

The lack of strong associations in neighborhood effect studies can be explained, in part, by methodological obstacles.[26] Among these difficulties is the challenge of conducting randomized experiments. Randomized experiments are the gold standard to assess causality between an exposure and an outcome.[30] However, a social randomized experiment controlling for the place where one lives would be particularly complex to realize, and would raise important ethical concerns. Therefore, the vast majority of studies looking into neighborhood influences on obesity are observational and have cross-sectional designs, measuring exposure to residential areas and body weight at only one point in time. These studies rarely take into account the life course perspective of weight gain, self-selection biases related to residential preferences and other confounding sources due to the absence of exchangeability between contexts.[29 ,31 ,32] These important limitations are constantly reported by researchers and curb the capacity to infer which interventions would have the greatest effect on controlling the obesity epidemic. In recent literature, specific calls for comparable longitudinal or experimental data have been made to measure more precisely neighborhood effects on weight gain.[29 ,32-35]

An increasing number of research teams are presenting upgraded study designs, moving off cross-sectional studies that are limited to observations at one particular point in time. However, there is still no review providing information on existing longitudinal studies, their results and the specific study designs used. Mapping the literature regarding the

5

neighborhood effect on obesity, where residential area characteristics are measured at different points in time, whether in experimental or observational studies, would be the next logical step. We are thus presenting a scoping review protocol with the objective of summarizing the influence of distal factors on the development of obesity.

The scoping review approach was chosen for this literature review protocol since the broad number of study designs makes it difficult, and hardly relevant, to compare results and assess their quality, a necessary step of systematic reviews and meta-analysis. The framework of this review will follow the five-step framework proposed by Arksey & O'Malley for scoping reviews in a process of "summarizing a range of evidence in order to convey the breadth and depth of a field".[36 ,37]

Research question and objectives

Amongst an abundant literature about neighborhood effects on obesity, this scoping review will aim at drawing an up-to-date portrait using the following research question: *How is the longitudinal measurement of residential area characteristics integrated into studies that explore the impacts of physical and socioeconomic environments on adult weight status?*
In this review, a longitudinal design will be considered in its broadest meaning, including any study having residential characteristics measured at more than one point in time.[38 ,39]

The specific objectives of this review are: To detail the number of studies investigating longitudinal neighborhood effects on weight status; to describe and classify the study designs used to investigate longitudinal neighborhood effects on weight status; to carry out a qualitative summary of longitudinal results comparing them with recent reviews of cross-sectional studies of neighborhood effects on obesity.

According to the main findings, recommendations for future research on neighborhood effects will be proposed.

METHODS AND ANALYSIS

Identifying relevant studies: transitioning from the conceptual model to key words

Two major difficulties arise when trying to identify neighborhood effect studies 1) defining what a neighborhood is; and 2) identifying measures of neighborhood characteristics. To settle those problems, previous literature reviews (not focusing on longitudinal designs) have used a very broad definition of neighborhood going from "residence characteristics" to "environment" and where not necessarily specific on the indicators used to measure it.[19 ,24 ,25 ,27 ,28 ,40 ,41] This strategy, which was replicated in this protocol, generally yields numerous relevant citations collected by the search strategy that then have to be screened manually for eligibility criteria.

Table 1 displays the eligibility criteria that are derived from the conceptual model shown in Figure 1 with a specific interest in the neighborhood context.

Table 1 Eligibility criteria for selection of publications. Modified from the PICO (Population, Intervention, Comparison, Outcome) framework. [42]

Criteria	Description
Population	The target population of this study will be adults between 18 and 65 years of age, as weight changes are not always homogeneous during both childhood and old age. Multiple (at least two) measurements are required in a longitudinal study and here, at least one measurement of weight and neighborhood characteristics must have been performed during adult age (18 to 65 years old), other measurements could be done in childhood, youth or old age.
Exposure	Exposure will be measured by any indicator of neighborhood characteristic, where neighborhood is defined as an administratively delimited geographic area enclosing the participant's residence or a buffer delimited area (no size limit) around the participant's residence.
Outcome	Many outcomes of neighborhood effects on obesity-related behaviors can be measured (fruits and vegetable consumption, leisure time physical activity, transport physical activity, …), but to ease the review process and facilitate design comparison, only studies with body composition indicators will be selected. Eligible studies will be those reporting measured or declared weight status as total body weight, body mass index, waist circumference, waist/hip ratio and/or skin fold

7

	thickness. Obesity is often used as a general term to refer to weight gain or overweight in the literature, although it has a very specific clinical definition (BMI>30). In this review, any studies considering body composition as an outcome will be included, whether it categorizes weight status or not.
Study Design	Selected studies will include a longitudinal perspective in the measurement of the exposure. For example, studies with the following design could be considered as longitudinal: experimental or quasi-experimental schemes, where participants are exposed to different living environments over time; case-control studies and cohort studies, where exposure is measured at different points in time or is classified as a pattern over time. No specific number or interval of outcome measurement is specified at this time. Cross-sectional studies will be systematically excluded. Study designs that focus only on life course changes in weight status (or of the secondary outcomes) without considering change in the environment will not be included in this review.

Studies regarding neighborhood effects on health can be published in a large spectrum of scientific journals covering various disciplines: epidemiology, public health, economy, urban planning, etc. This multidisciplinary perspective requires that a variety of scientific citation indexes be explored. The electronic databases used for this scoping review will include: Medline (PubMed), Embase and Web of Science. Only English peer-reviewed literature published in a referenced journal will be considered. No limit on dates of coverage is yet imposed.

The selected databases will be screened using a comprehensive search strategy. A sample search terms combination for the PubMed database is presented in Table 2. Strategies for other databases will be adapted in a way to be as close as possible to the PubMed strategy. The search term combination is fragmented into five keyword combinations to match the components of the study question as closely as possible. They take into account the desired outcomes, the numerous contextual level indicators which may be used to measure neighborhood exposure and the longitudinal designs that are the focus of this scoping review.

The search components will be articulated as follows:

8

Outcome terms AND longitudinal design terms AND (geographic context terms AND (social environment exposure terms OR physical environment exposure terms))

Table 2 Sample search strategy (PubMed). "Type" refer to the tags complementing search terms in queries. "MeSH" (Medical Subject Heading) terms will be searched in the controlled vocabulary assigned by U.S National Library of medicine to index scientific articles in its database. "MeSH:noexp" terms have the same function as MeSH, except that the search will be limited to the exact term not including subordinate terms generally linked to MeSH terms. "TIAB" terms will be searched in the title and abstract of the citations.

Terms		Type
Outcome		
1	Obesity	MeSH:noexp, TIAB
2	Obesity, Morbid	MeSH
3	Body Mass Index	MeSH, TIAB
4	BMI	TIAB
5	Overweight	MeSH:noexp, TIAB
6	Weight	TIAB
7	Adiposity	TIAB
Longitudinal design		
8	Cohort studies	MeSH
9	Prospective studies	MeSH
10	Cohort*	TIAB
11	Follow up	TIAB
12	Longitudinal	TIAB
13	Retrospective	TIAB
14	Life course	TIAB
15	Randomized	TIAB
16	Change	TIAB
17	Experimental	TIAB
18	History	TIAB
Geographic context		
19	Environment	MeSH:noexp
20	Residence characteristics	MeSH:noexp
21	Neighborhood*	TIAB
22	Neighbourhood*	TIAB
23	Catchment Area (Health)	MeSH
24	Residential	TIAB
25	Residence	TIAB
26	Context	TIAB
27	Composition	TIAB
28	Urban	TIAB
Social environment exposure		
29	Sociological Factors	MeSH:noexp, TIAB

9

30	Socioeconomic Factors	MeSH
31	Low-income	TIAB
32	Education	TIAB
33	Poverty	TIAB
34	Socioeconomic	TIAB
35	Income	TIAB
36	Social conditions	TIAB
Physical environment exposure		
37	Environment Design	MeSH
38	City Planning	MeSH, TIAB
39	Food service	MeSH
40	Urban planning	TIAB
41	Built Environment	TIAB
42	Physical environment	TIAB
43	Urban form	TIAB
44	Obesogenic environment	TIAB

Study selection

Results from the search strategy will yield an extended list of scientific citations that are related to the research question closely or remotely. This list, managed in a Microsoft® Access®.15.0.2013 database, will be completed with citations referenced in relevant publications that fit the eligibility criteria but that did not turn up in the systematic search strategy. This is the first step of a selection process that will lead to a formal list of citations to be included in the scoping review. The steps involved in selecting the studies are outlined in Figure 2. After collecting relevant citations through the searches of the three key databases, the next step involves screening titles and abstracts for possible eligibility. Selected studies will have to meet all the criteria specified in Table 1 to be included. The screening process will be performed separately by two investigators. Both investigators will start the process by conducting a pilot trial on the first 5% of the relevant citation list to verify screening uniformity and to refine the screening strategy. The completion of the second step will yield a shorter list of relevant publications. In a third step of the selection, reviewers will assess eligibility by reading the full manuscript of the publications on the short list. Ultimately, final inclusion of the publications will be discussed by the two reviewers and any disagreement on the inclusion or exclusion will be resolved by consensus.

Figure 2

10

Charting the Data

Because publications focusing on neighborhood effects and body weight come from a wide variety of research areas, the data extraction phase will aim at systematically recording sufficient relevant information on study design or results to enable drawing conclusions on the validity of the study designs screened. Information will be extracted from the studies using a piloting form with *a priori* selected variables (*Table 3*). The piloting form will be applied for the charting of the first 10% of the included publications. In the light of this first round, variables could be added or eliminated to produce a working version of the chart. Since the focus of this scoping review is to take into account the sum of the literature on the impact of residential history on obesity and to address the multiplicity of designs, complementary notes on any particularity of the studies will be recorded.

Table 3 A priori *selected variables to be extracted from the publications included in the scoping review*

Study characteristics	Variables
Bibliographic	Title
	Author
	Year
	Journal name
Study population	Data provenance (source, year)
	Specific characteristic of chosen population (age, sex, country, socioeconomic status)
	Individual covariables used for model adjustment
Exposure	Data provenance (source, year)
	Environmental variables
	Geographic area measurement
Outcomes	Primary (obesity indicators)
	Secondary (energy expenditure, energy consumption)
Results	Important results (eg. sense, strength and significance of statistical association)
	Potential biases

Collating, Summarizing and Reporting the Results

Following the selection process and data extraction illustrated in Figure 2 and Table 3, a narrative account of the literature will be performed. This section of the scoping review

11

will be divided into two parts.[36] First, a simple numerical analysis of the number, nature and distribution of the variables extracted from the publications included in the review will be performed. This exercise will aim at drawing up a detailed picture of the literature concerned with the longitudinal impact of neighborhood characteristics on weight. Secondly, the studies will be classified according to their design (experimental, case-control, cohort…). For each group of studies, results will be summarized and possible bias will be identified.

DISCUSSION AND DISSEMINATION

Consistent with current research related to neighborhood impacts on weight, this scoping review will aim at drawing a general portrait of the publications addressing longitudinal impact of residential area characteristics on obesity.

In light of the importance of the global obesity epidemic, having a better understanding of neighborhood impacts on obesity is crucial. This scoping review will address a current need increasingly mentioned in the literature, and will orient researchers in developing high quality longitudinal study designs and data collection platforms in order to better understand the relationship between residential location and weight.

Beyond the scientific and methodological benefits of this study, it is also very relevant in the current practice of urban design. For over thirty years, urban planners have been asked to create supportive environments for obesity prevention and to facilitate individuals' health lifestyle.[43 ,44] But until now, little evidence allowed them to make informed, evidence-based decisions. Not knowing which characteristics or group of characteristics of neighborhoods have an impact on weight gain, at times forces misguided neighborhood design. Moving a step further on the path of neighborhood effects research by describing evidence issued from longitudinal study designs, could eventually lead to more significant results and contribute to disentangling the so-called neighborhood effect, or, clarify if contextual influences really have a role on weight gain. In both cases, such information is essential to plan resources allocation in developing relevant interventions against the obesity epidemic.

12

Scoping reviews, in their nature, are not intended to synthesize and aggregate results, as their topics are generally too heterogeneous to perform such analysis. Therefore, one limitation of this review will be the scope of its results, which will be limited to a descriptive analysis. Although no new quantitative evidence will emerge from this research, its conclusion could suggest the necessity and the feasibility of an extensive systematic review which, in its time, could generate new and more precise information.

The weight status of a human being has much variability over its life course with some periods and determinants being more critical to potential obesity development.[45 ,46] Therefore, for uniformity reasons, and although some authors have suggested that neighborhood effects are stronger when considering trajectories that include childhood, we have decided to limit this scoping review to the measurement of weight change in adults.[22] This restriction may limit the number of publications included and reduce the number of longitudinal designs to consider, but will certainly reduce the heterogeneity among the selected studies, and facilitate the comparability between them. Such an approach allows for a future systematic literature review with greater focus on those relationships. Performing a scoping review for longitudinal designs of research on neighborhood effects on children weight status could be considered as a research project on its own, taking into consideration that children have different weight gain and activity patterns than those of adults.

The results of this scoping review will be submitted to a peer-reviewed journal and the findings will be the focus of presentations at scientific conferences. No approval from an ethics committee was sought for this study as it will involve already published data.

AUTHOR'S CONTRIBUTIONS

Study concept and design: Letarte, Lebel.

Drafting of the manuscript: Letarte, Lebel.

Critical revision of the manuscript for important intellectual content: Lebel, Waygood, Tchernof, Biertho

13

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16

LEGENDS FOR FIGURES

Figure 1 Multilevel influences on obesity. Although presenting a much simplified illustration of the complexity of the causal pathways that might have an impact on weight status, this conceptual model displays in a very effective way the hierarchical structure of influences on health behaviors linked to obesity, where "context" includes levels of organisation above the individual and "physiology" comprises factors from various biological systems inside the individual. The longitudinal perspective of weight change is depicted as a horizontal axis where the context-behavior-physiology nexus changes as time passes. Also shown are the hypothesized socioeconomic (education, deprivation, norms, ect.) and physical (built environment, foodscape, etc) contextual influences on obesity   (Modified from Glass and McAtee).[4]

Figure 2 Suggested flow chart to identify publications that will be included in the scoping review from citations issued by the database search (based on Khan).[45]

17

Figure 1 Multilevel influences on obesity. Although presenting a much simplified illustration of the complexity of the causal pathways that might have an impact on weight status, this conceptual model displays in a very effective way the hierarchical structure of influences on health behaviors linked to obesity, where "context" includes levels of organisation above the individual and "physiology" comprises factors from various biological systems inside the individual. The longitudinal perspective of weight change is depicted as a horizontal axis where the context-behavior-physiology nexus changes as time passes. Also shown are the hypothesized socioeconomic (education, deprivation, norms, ect.) and physical (built environment, foodscape, etc) contextual influences on obesity   (Modified from Glass and McAtee).[4]

338x190mm (150 x 150 DPI)

Figure 2 Suggested flow chart to identify publications that will be included in the scoping review from citations issued by the database search (based on Khan).[45]
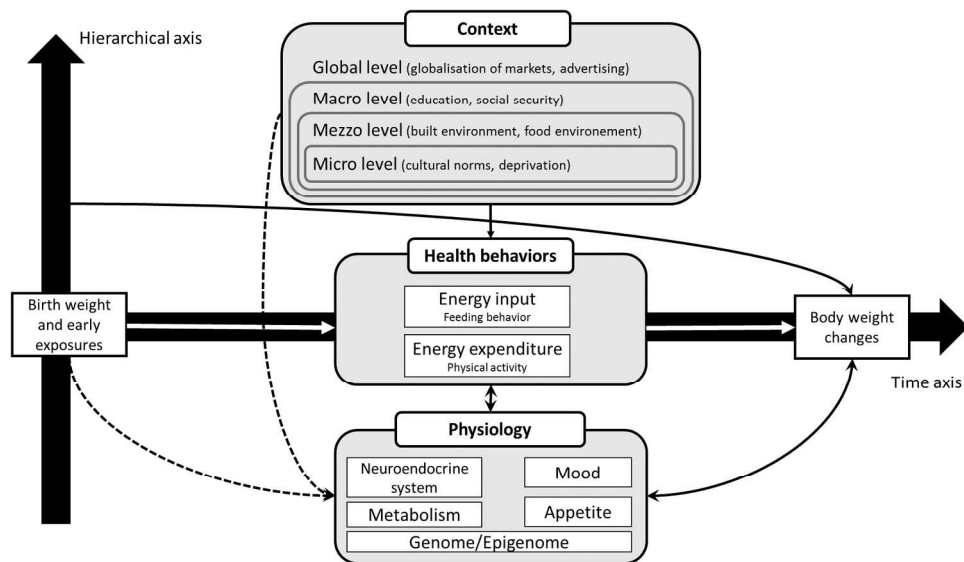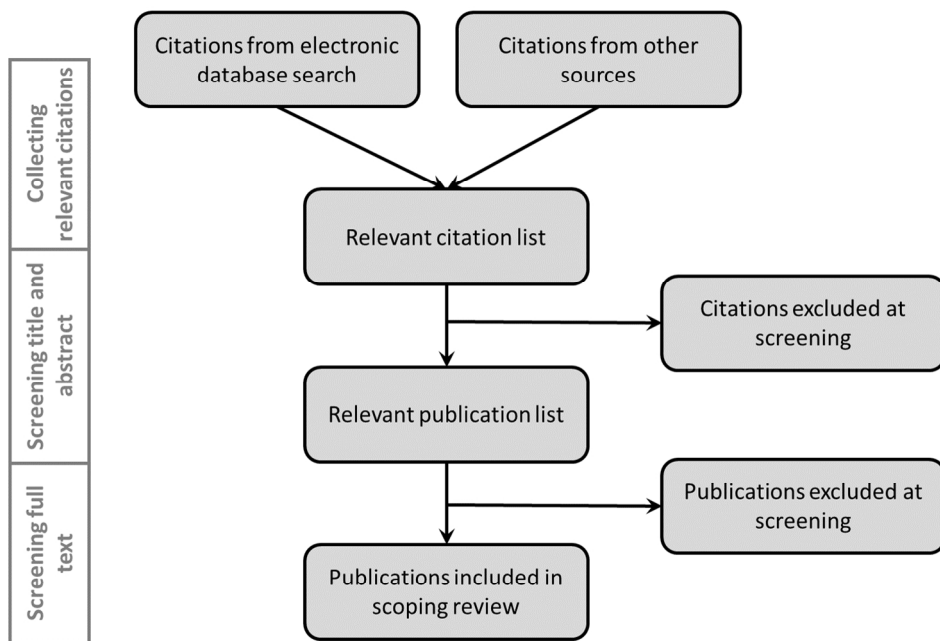
261x183mm (150 x 150 DPI)

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Note from author (L.Letarte): There is no checklist for scoping reviews, a modified systematic review checklist is used.

Section and topic	Item No	Checklist item	Reported on page #
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	Not applicable
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	Not applicable for a scoping review
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	15
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not applicable
Support:			
Sources	5a	Indicate sources of financial or other support for the review	15
Sponsor	5b	Provide name for the review funder and/or sponsor	15
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	15
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	3-7
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	7
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	8-9
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	9

Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	10
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	11
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	11-12
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	12-13
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	13
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	13
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Not applicable for a scoping review
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable for a scoping review
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Not applicable for a scoping review
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	Not applicable for a scoping review
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	13
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	Not applicable for a scoping review
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	Not applicable for a scoping review

* It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.

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Longitudinal designs to study neighborhood effects on the development of obesity: a scoping review protocol

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Longitudinal designs to study neighborhood effects on the development of obesity: a scoping review protocol

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WORD COUNT

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1

2   **KEYWORDS**

3   Scoping review, obesity, neighbourhood effect, longitudinal design, residential history

4   **ABSTRACT**

5   **Introduction**

6   The prevalence of obesity has increased significantly in the last three decades and

7   became an important public health concern. Evidence of weight status variability at the

8   neighborhood level has led researchers to look more precisely at the characteristics of

9   local geographic areas that might influence energy balance related behaviors, giving rise

10   to the field of the "neighborhood effect" in public health research. Amongst an abundant

11   literature about neighborhood effects and obesity, we propose a protocol for a scoping

12   review that will aim at determining how temporal measurements of residential

13   neighborhood exposure, individual covariates and weight outcome are integrated in

14   longitudinal designs.

15   **Methods and Analysis**

16   A list of relevant citations will be obtained through a comprehensive systematic database

17   search in Pubmed, Web of Science and Embase. The search strategy will be designed

18   using a broad definition of neighborhood to take into account for the heterogeneity of this

19   concept in research. Two investigators will screen titles, abstracts and entire publications

20   using predetermined eligibility criteria yielding a list of selected publications. Data from

21   the publications included in the scoping review will be charted according to bibliographic

22   information, study population, exposure, outcomes and results.

23   **Discussion and Conclusion**

24   To our knowledge, our protocol will yield the first scoping review regarding longitudinal

25   designs of neighborhood effect on obesity. Describing how longitudinal designs include

26   temporal measurements of exposure, covariates and outcome is a necessary step in the

27   quest to determine if or which contextual characteristics are likely to be involved in the

2

development of obesity. Such information would bring new knowledge to complement current etiologic investigations and would contribute to enhancing resource allocation strategies for stakeholders in developing relevant interventions to prevent obesity and its negative impacts.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- To our knowledge, the first review of longitudinal designs of neighbourhood effect studies on obesity;
- Includes a comprehensive research strategy that takes into account the complexity of neighbourhood research;
- The descriptive nature of a scoping review excludes a quantitative analysis of the results;
- Not including children in this scoping review limits its scope but increases the homogeneity of the results.

INTRODUCTION

Rationale

With an increasing prevalence in the last three decades, obesity has become an important public health concern in most countries of the world. Individuals with obesity are more at risk of developing certain conditions, including diabetes, cardiovascular diseases and cancer. The loss of productivity and costs associated with the treatment of obesity-related health problems are taking a toll on many developed and developing countries.[1 ,2]

In an effort to develop more effective obesity prevention, researchers have looked at the various causes, both proximal and distal, of the obesity epidemic.[3]

Figure 1

Figure 1 shows a complex influence system on obesity proposed by Glass and McAtee [4] on which the scientific community has reached a certain degree of consensus, although the system is sometimes depicted in its more or less complicated form.[5-7] At the center of this model lies a largely accepted premise: an increase in body fatness is the

3

1 result of an imbalance between energy intake and energy expenditure.[7] Yet, causal

2 pathways underlying the energy balance are much more complex, and many researchers

3 suggest that interventions focused on re-establishing the proper balance by individual

4 control of their diet and physical activity has limited effects.[7 ,8]

5 For example, public health professionals, although preoccupied by population health

6 issues, have historically focused on the personal responsibility of individuals for their

7 weight loss, leading to numerous mass media campaigns on healthy eating and physical

8 activity. As a result, collective knowledge on favorably perceived or "healthy" behavior

9 was increased, but the effect on body weight was limited.[9]

10 At the individual level, dieticians, exercise specialists and health care professionals also

11 work on behavior modification to help persons with overweight or obesity achieve weight

12 loss. And although short-term weight loss is generally obtained when patients are offered

13 sufficient support, maintenance of weight loss is much more difficult and weight is often

14 regained over a five-year time lapse. [10 ,11]

15 At the physiological level, bariatric surgeons acting directly digestive mechanisms, have

16 had successful results, with an average excess weight loss up to 70%, depending on the

17 procedure used.[12]   But as with dieting, long-term weight loss maintenance is

18 uncertain.[13-16]

19 Acknowledging these difficulties leads to an argument that the modern world has a strong

20 obesogenic influence and that personal control may not be enough to prevent weight

21 grain through the life course. This is why the obesity research community has engaged in

22 studies aimed at finding which factors above the individual level have an impact on

23 obesity. Many contextual characteristics, illustrated in figure 1, have been theorized to

24 have an impact on behaviors that influence either energy intake, energy expenditure, or

25 both. A rich body of literature explored these contextual forces going from the micro to

26 the local and the global scale: family behaviors, social norms, foodscape, built

27 environment, education, market globalization, etc.[3 ,4]

28 Researchers have taken particular interest to weight status variability at the local level

29 and are now looking more precisely at the characteristics of smaller residential

4

1　geographic areas [17 ,18]. This so-called "neighborhood effect" research field examines

2　whether neighborhoods might influence weight gain.[19-22] From a socioeconomic

3　perspective, a literature review from McLaren [23] reports a negative relationship

4　between contextual indicators of socioeconomic status and BMI, for women and for both

5　sexes combined in developed countries. Although the same type of studies [19 ,24-28]

6　exists for physical environments and their influence on body mass, the conclusions tend

7　to show less significant relationships. Urban sprawl (positive) and land use mix

8　(negative) being the only indicators shown to have a relatively consistent and statistically

9　significant association with an increased BMI in recently published reviews.[25 ,27 ,29]

10　The lack of strong associations in neighborhood effect studies can be explained, in part,

11　by the complexity of the obesity system of influence and by methodological

12　obstacles.[26] Amongst the methodological obstacles is the challenge of conducting

13　randomized experiments which are generally recommended to infer causality between

14　exposure and outcomes.[30] However, a social randomized experiment controlling for the

15　place where one lives would be particularly complex to realize, and would raise

16　important ethical concerns. Therefore, the vast majority of studies looking into

17　neighborhood influences on obesity are observational and have cross-sectional designs,

18　measuring exposure to residential areas and body weight at only one point in time. These

19　studies omit to take into account the temporal perspective of neighborhood effect which

20　include residential history, changes in the neighborhood characteristics over time and

21　residential self-selection.[29 ,31 ,32] These important limitations are constantly reported

22　by researchers and curb the capacity to infer which interventions would have the greatest

23　effect on controlling the obesity epidemic. In recent literature, specific calls for

24　comparable longitudinal or experimental data have been made to measure more precisely

25　neighborhood effects on weight gain.[29 ,32-35]

26　An increasing number of research teams are presenting upgraded study designs, moving

27　off cross-sectional studies that are limited to observations at one particular point in time.

28　However, there is still no review providing information on existing longitudinal studies.

29　Mapping the literature regarding the neighborhood effect on obesity, where contextual

30　exposure, individual covariates and weight outcome are measured at different points in

5

1 time, whether in experimental or observational studies, would be the next logical step.
2 We are thus presenting a scoping review protocol with the objective of looking more
3 specifically at longitudinal studies of neighborhood effects on obesity, the specific study
4 designs employed and their results.

5 The scoping review approach was chosen for this literature review protocol since the
6 broad number of study designs makes it difficult, and hardly relevant, to sum and
7 compare results quantitatively, a necessary step for systematic reviews and meta-
8 analyses. The framework of this review will follow the five-step framework proposed by
9 Arksey & O'Malley for scoping reviews in a process of "summarizing a range of
10 evidence in order to convey the breadth and depth of a field".[36 ,37]

11 **Research question and objectives**

12 Amongst an abundant literature about neighborhood effects on obesity, this scoping
13 review will aim at drawing an up-to-date portrait using the following research question:
14 *How are the temporal measurements of contextual exposure, individual covariates and*
15 *weight outcome integrated into studies that explore the impacts of physical and*
16 *socioeconomic neighborhood contexts on adult weight status?* In this review, a
17 longitudinal design will be considered in its broadest meaning, including any study
18 having contextual exposure and/or weight outcome and/or covariates measured at more
19 than one point in time.[38 ,39]

20

21 The specific objectives of this review are: To detail the number of studies investigating
22 longitudinal neighborhood effects on weight status; to describe and classify the study
23 designs used to investigate longitudinal neighborhood effects on weight status; to
24 describe and classify the type of analysis used to take into account the temporal
25 dimension to carry out a qualitative summary of results.

26

27 According to the main findings, recommendations for future research on neighborhood
28 effects will be proposed.

6

1   **METHODS AND ANALYSIS**

2   **Identifying relevant studies: transitioning from the conceptual model to key-words**

3   Two major difficulties arise when trying to identify neighborhood effect studies 1)
4   defining what a neighborhood is; and 2) identifying measures of neighborhood
5   characteristics. To settle those problems, a very broad definition of neighborhood will be
6   used in the search strategy, going from "residence characteristics" to "environment", and
7   its characteristics, going from "sociological factors" to "urban form". As a result of this
8   far-reaching search strategy, the relevant citations list will likely include an important
9   number of citations that will not meet the eligibility criteria and that will have to be
10   screened manually.

11   *Table 1* displays the eligibility criteria that are derived from the conceptual model shown
12   in Figure 1 with a specific interest in the neighborhood context.

13

14   *Table 1 Eligibility criteria for selection of publications. Modified from the PICO*
15   *(Population, Intervention, Comparison, Outcome) framework. [40]*
16

Criteria	Description
Population	The target population of this study will be adults between 18 and 65 years of age, as weight changes are not always homogeneous during both childhood and old age. Multiple (at least two) measurements are required in a longitudinal study and here, at least two measurements of weight and neighborhood characteristics must have been performed during adult age (18 to 65 years old), other measurements could be done in childhood, youth or old age.
Exposure	Exposure will be measured by any indicator of neighborhood characteristic, where neighborhood is defined as an administratively delimited geographic area enclosing the participant's residence, a buffer delimited area around the participant's residence or a perceived area delimited by the participant. The geographic area will have to be defined at the neighborhood level, which is smaller than a city or municipal area.
Outcome	Many outcomes of neighborhood effects on obesity-related behaviors can be measured (fruits and vegetable consumption, leisure time physical activity, transport physical activity, …), but to ease the review process and facilitate design comparison, only studies with body

7

		composition indicators will be selected. Eligible studies will be those reporting measured or declared weight status as total body weight, body mass index, waist circumference, waist/hip ratio and/or skin fold thickness. Obesity is often used as a general term to refer to weight gain or overweight in the literature, although it has a very specific clinical definition (BMI>30). In this review, any studies considering body composition as an outcome will be included, whether it categorizes weight status or not.
	Study Design	Selected studies will include a longitudinal perspective in the measurement of the exposure and/or outcome and/or covariates. For example, studies with the following design could be considered as longitudinal: experimental or quasi-experimental schemes, where participants are exposed to different living environments over time; case-control studies and cohort studies, where exposure is measured at different points in time or is classified as a pattern over time. Cross-sectional studies will be systematically excluded. Study designs that focus only on life-course changes in weight status (or of the secondary outcomes) without measuring contextual exposure will not be included in this review.

Studies regarding neighborhood effects on health can be published in a large spectrum of scientific journals covering various disciplines: epidemiology, public health, economy, urban planning, etc. Such multidisciplinary perspective requires that a variety of scientific citation indexes be explored. The electronic databases used for this scoping review will include: Medline (PubMed), Embase and Web of Science. Only English peer-reviewed literature published in a referenced journal will be considered. No limit on dates of coverage is yet imposed.

The selected databases will be screened using a comprehensive search strategy. A sample search terms combination for the PubMed database is presented in Table 2. Strategies for other databases will be adapted in a way to be as close as possible to the PubMed strategy. The search term combination is fragmented into five keyword combinations to match the components of the study question as closely as possible. They take into account the desired outcomes, the numerous contextual level indicators which may be used to measure neighborhood exposure and the longitudinal designs that are the focus of this scoping review.

8

1 The search components will be articulated as follows:

2 Outcome terms AND longitudinal design terms AND (geographic context terms AND

3 (social environment exposure terms OR physical environment exposure terms))

4 *Table 2 Sample search strategy (PubMed). "Type" refers to the tags complementing*
5 *search terms in queries. "MeSH" (Medical Subject Heading) terms will be searched in*
6 *the controlled vocabulary assigned by U.S National Library of medicine to index*
7 *scientific articles in its database. "MeSH:noexp" terms have the same function as MeSH,*
8 *except that the search will be limited to the exact term not including subordinate terms*
9 *generally linked to MeSH terms. "TIAB" terms will be searched in the title and abstract*
10 *of the citations.*

Terms		Type
Outcome		
1	Obesity	MeSH:noexp, TIAB
2	Obesity, Morbid	MeSH
3	Body Mass Index	MeSH, TIAB
4	BMI	TIAB
5	Overweight	MeSH:noexp, TIAB
6	Weight	TIAB
7	Adiposity	TIAB
Longitudinal design		
8	Cohort studies	MeSH
9	Prospective studies	MeSH
10	Cohort*	TIAB
11	Follow up	TIAB
12	Longitudinal	TIAB
13	Retrospective	TIAB
14	Life course	TIAB
15	Randomized	TIAB
16	Change	TIAB
17	Experimental	TIAB
18	History	TIAB
Geographic context		
19	Environment	MeSH:noexp
20	Residence characteristics	MeSH:noexp
21	Neighborhood*	TIAB
22	Neighbourhood*	TIAB
23	Catchment Area (Health)	MeSH
24	Residential	TIAB
25	Residence	TIAB
26	Context	TIAB
27	Composition	TIAB
28	Urban	TIAB

9

Social environment exposure		
29	Sociological Factors	MeSH:noexp, TIAB
30	Socioeconomic Factors	MeSH
31	Low-income	TIAB
32	Education	TIAB
33	Poverty	TIAB
34	Socioeconomic	TIAB
35	Income	TIAB
36	Social conditions	TIAB
Physical environment exposure		
37	Environment Design	MeSH
38	City Planning	MeSH, TIAB
39	Food service	MeSH
40	Urban planning	TIAB
41	Built Environment	TIAB
42	Physical environment	TIAB
43	Urban form	TIAB
44	Obesogenic environment	TIAB

Study selection

Results from the search strategy will yield an extended list of scientific citations that are related to the research question closely or remotely. This list, managed in a Microsoft® Access®.15.0.2013 database, will be completed with citations referenced in relevant publications that fit the eligibility criteria but that did not turn up in the systematic search strategy. This is the first step of a selection process that will lead to a formal list of citations to be included in the scoping review. The steps involved in selecting the studies are outlined in Figure 2. After collecting relevant citations through the searches of the three key databases, the next step involves screening titles and abstracts for possible eligibility. Selected studies will have to meet all the criteria specified in Table 1 to be included. The screening process will be performed separately by two investigators. Both investigators will start the process by conducting a pilot trial on the first 5% of the relevant citation list to verify screening uniformity and to refine the screening strategy. The completion of the second step will yield a shorter list of relevant publications. In a third step of the selection, reviewers will assess eligibility by reading the full manuscript of the publications on the short list. Ultimately, final inclusion of the publications will be discussed by the two reviewers and any disagreement on the inclusion or exclusion will be resolved by consensus.

10

1   *Figure 2*

2   **Charting the Data**

3   Because publications focusing on neighborhood effects and body weight come from a

4   wide variety of research areas, the data extraction phase will aim at systematically

5   recording sufficient relevant information on study designs or results to enable drawing

6   conclusions on the variety of the study designs screened. Information will be extracted

7   from the studies using a piloting form with *a priori* selected variables (*Table 3*). The

8   piloting form will be applied for the charting of the first 10% of the included

9   publications. In the light of this first round, variables could be added or eliminated to

10   produce a working version of the chart. Since the purpose of this scoping review is to

11   take into account the sum of the literature on longitudinal neighborhood effect on obesity

12   and to address the multiplicity of designs, complementary notes on any particularity of

13   the studies will be recorded.

14   Although quality assessment and identification of bias are not necessary requirements of

15   scoping reviews [36], some authors suggest that they could be relevant to identify gaps in

16   the evidence base [41]. The identification of potential bias is not included in this review

17   to assess the quality of the study's results per se but with the purpose of evaluating the

18   strengths and weaknesses associated with the various longitudinal designs. In this

19   perspective, a simple tool, the Joanna Briggs Institute Critical Appraisal tool, was chosen

20   to perform the quality assessment [42].

21

11

1 *Table 3* A priori *selected variables to be extracted from the publications included in the*
2 *scoping review*

Study characteristics	Variables
Bibliographic	Title
	Author
	Year
	Journal name
Study population	Data provenance (source, year)
	Specific characteristic of chosen population (age, sex, country, socioeconomic status)
	Individual covariates used for model adjustment
	Length of follow-up
Exposure	Data provenance (source, year)
	Contextual exposure
	Geographic area measurement
	Number and time of measurement
Outcomes	Primary (obesity indicators)
	Secondary (energy expenditure, energy consumption)
	Number and time of measurement
Analysis	Type of statistical model used
Results	Important results (eg. sense, strength and significance of statistical association)
	Potential biases

3 **Collating, Summarizing and Reporting the Results**

4 Following the selection process and data extraction illustrated in Figure 2 and Table 3, a
5 narrative account of the literature will be performed. This section of the scoping review
6 will be divided into two parts.[36] First, a simple numerical analysis of the number,
7 nature and distribution of the variables extracted from the publications included in the
8 review will be performed. This exercise will aim at drawing up a detailed picture of the
9 literature concerned with the longitudinal impact of neighborhood characteristics on
10 weight. Secondly, the studies will be classified according to their designs (experimental,
11 case-control, cohort…). For each group of studies, results will be summarized and
12 possible bias will be identified.

12

1 **DISCUSSION AND DISSEMINATION**

2 Consistent with current research related to neighborhood impacts on weight, this scoping
3 review will aim at drawing a general portrait of the publications using longitudinal
4 designs to include temporal measurements of contextual exposure, individual covariates
5 and weight outcome.

6 In light of the importance of the global obesity epidemic, having a better understanding
7 of neighborhood impacts on obesity is crucial. This scoping review will address a current
8 need increasingly mentioned in the literature, and will orient researchers in developing
9 high quality longitudinal study designs and data collection platforms in order to improve
10 our understanding of the relationship between neighborhood exposure and weight.

11 Beyond the scientific and methodological benefits of this study, it is also very relevant in
12 the current practice of urban design. For over thirty years, urban planners have been
13 asked to create supportive environments for obesity prevention and to facilitate
14 individuals' health lifestyle.[43 ,44] But the complexity of the obesity system limits the
15 possibility to make informed evidence-based decisions. Not knowing how or if contextual
16 exposures have an impact on weight gain could lead to misguided neighborhood design.
17 Moving a step further on the path of neighborhood effects research by describing
18 longitudinal study designs, might, eventually, lead to more significant results and
19 contribute to disentangling the so-called neighborhood effect, or, clarify if contextual
20 influences really do have a role on weight gain. And although the route towards more
21 causal evidence of neighborhood effect on obesity is not the only way to inform public
22 health policies, seeking to improve longitudinal studies could be part of a better planning
23 of interventions against the obesity epidemic.

24 Scoping reviews, in their nature, are not intended to synthesize and aggregate results, as
25 their topics are generally too heterogeneous to perform such analysis. Therefore, one
26 limitation of this review will be the scope of its results, which will be limited to a
27 descriptive analysis. Although no new quantitative evidence will emerge from this
28 research, its conclusion could suggest the necessity and the feasibility of an extensive
29 systematic review which, in its time, could generate new and more precise information.

13

1   The weight status of a human being has much variability over its life course with some

2   periods and determinants being more critical to potential obesity development.[45 ,46]

3   Therefore, for uniformity reasons, and although some authors have suggested that

4   neighborhood effects are stronger when considering trajectories that include childhood,

5   we have decided to limit this scoping review to the measurement of weight change in

6   adults.[22] This restriction may limit the number of publications included and reduce the

7   number of longitudinal designs to consider, but will certainly reduce the heterogeneity

8   amongst the selected studies, and facilitate the comparability between them. Such an

9   approach allows for a future systematic literature review with greater focus on those

10 relationships. Performing a scoping review for longitudinal designs of research on

11 neighborhood effects on children weight status could be considered as a research project

12 on its own, taking into consideration that children have different weight gain and activity

13 patterns than those of adults.

14 The results of this scoping review will be submitted to a peer-reviewed journal and the

15 findings will be the focus of presentations at scientific conferences. No approval from an

16 ethics committee was sought for this study as it will involve already published data.

17 **AUTHOR'S CONTRIBUTIONS**

18 Study concept and design: Letarte, Lebel.

19 Drafting of the manuscript: Letarte, Lebel.

20 Critical revision of the manuscript for important intellectual content: Lebel, Waygood,

21 Tchernof, Biertho

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25 **COMPETING INTERESTS**

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27 Companies for research on bariatric surgery not related to the present review.

14

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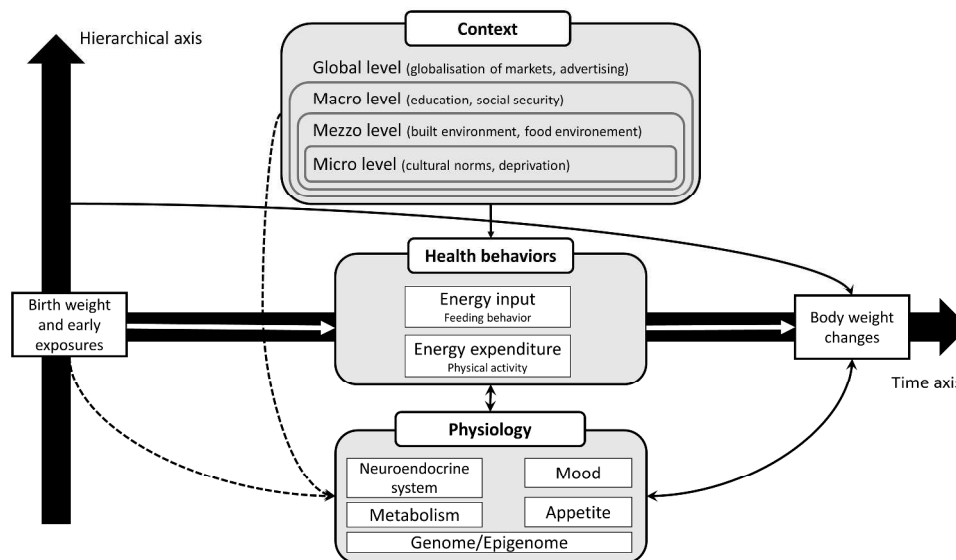8   Oxford University Press, 2004.

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1   **LEGENDS FOR FIGURES**

2   *Figure 1 Multilevel influences on obesity. Although presenting a much simplified*
3   *illustration of the complexity of the causal pathways that might have an impact on weight*
4   *status, this conceptual model displays in a very effective way the hierarchical structure of*
5   *influences on health behaviors linked to obesity, where "context" includes levels of*
6   *organisation above the individual and "physiology" comprises factors from various*
7   *biological systems inside the individual. The longitudinal perspective of weight change is*
8   *depicted as a horizontal axis where the context-behavior-physiology nexus changes as*
9   *time passes. Also shown are the hypothesized socioeconomic (education, deprivation,*
10   *norms, ect.) and physical (built environment, foodscape, etc) contextual influences on*
11   *obesity   (Modified from Glass and McAtee).[4]*

12   *Figure 2 Suggested flow chart to identify publications that will be included in the scoping*
13   *review from citations issued by the database search (based on Khan).[45]*
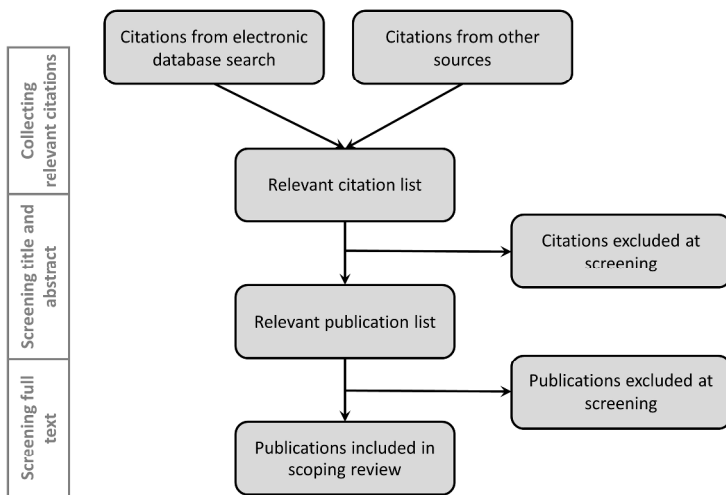
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Multilevel influences on obesity. Although presenting a much simplified illustration of the complexity of the causal pathways that might have an impact on weight status, this conceptual model displays in a very effective way the hierarchical structure of influences on health behaviors linked to obesity, where "context" includes levels of organisation above the individual and "physiology" comprises factors from various biological systems inside the individual. The longitudinal perspective of weight change is depicted as a horizontal axis where the context-behavior-physiology nexus changes as time passes. Also shown are the hypothesized socioeconomic (education, deprivation, norms, ect.) and physical (built environment, foodscape, etc) contextual influences on obesity   (Modified from Glass and McAtee).[4]

338x190mm (300 x 300 DPI)

Suggested flow chart to identify publications that will be included in the scoping review from citations issued by the database search (based on Khan).[45]

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PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Note from author (L.Letarte): There is no checklist for scoping reviews, a modified systematic review checklist is used.

Section and topic	Item No	Checklist item	Reported on page #
ADMINISTRATIVE INFORMATION			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	Not applicable
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	Not applicable for a scoping review
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	14
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not applicable
Support:			
Sources	5a	Indicate sources of financial or other support for the review	15
Sponsor	5b	Provide name for the review funder and/or sponsor	Not applicable
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	Not applicable
INTRODUCTION			
Rationale	6	Describe the rationale for the review in the context of what is already known	3-6
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	6
METHODS			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	7-8
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	8

Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	9
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	10
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	11-12
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	12
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	12
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	11
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable for a scoping review
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	Not applicable for a scoping review
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	Not applicable for a scoping review
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	12
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	Not applicable for a scoping review
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	Not applicable for a scoping review

* It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.

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