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Walking, The invisible transport mode?

Research on Walking and Walkability today

REPORT FOR THE VOLVO RESEARCH AND EDUCATION FOUNDATION, JANUARY 2022

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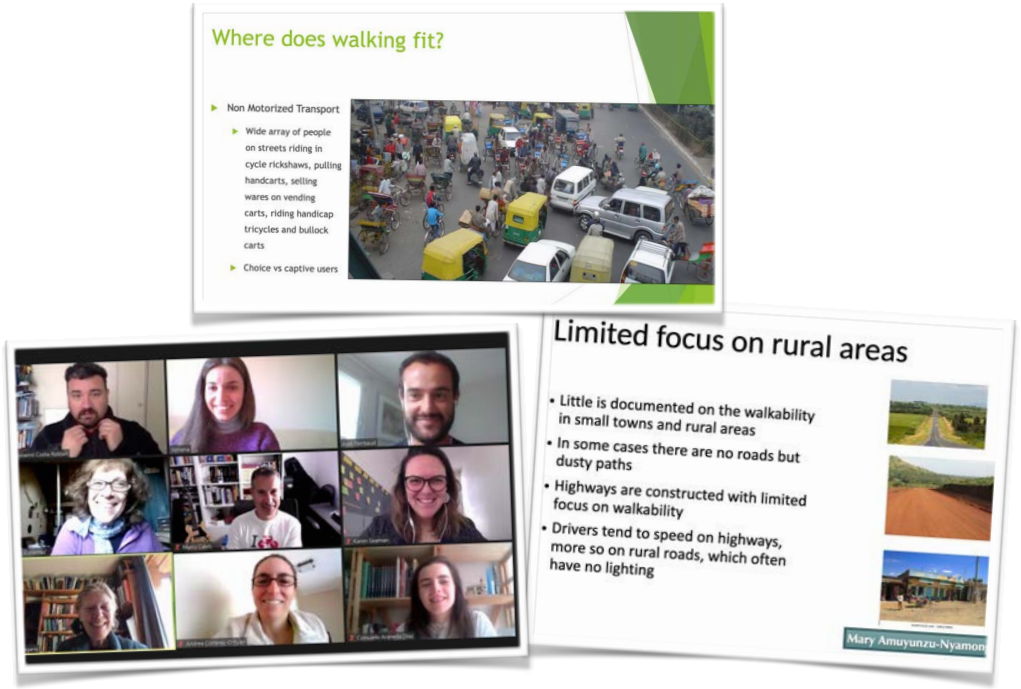

In December 2020, the VREF Board made a formal decision to initiate a VREF program for supporting research and education in the area of Walking as a mode of transport. The program started with an initial phase in 2021-2022 that consisted of both internal and external activities to strengthen the motivation and direction for the program, formulate concrete goals for the program, and develop the program's "architecture".

During the preparatory work and the initial phase, VREF has commissioned four preparatory studies carried out by leading scholars and experts in the field, as well as organized and led several workshops with researchers and other experts. This review is one of those preparatory studies.

ABSTRACT

To expand its "Future Urban Transport" (FUT) program, the Volvo Research and Educational Foundation (VREF) engaged the Laboratory for Social Change (Chile) to map current scientific knowledge about walking for transport, as part of contributing new ideas and solutions for sustainable transportation systems in cities. Walking, which is the majority mode in most cities in the Global South, is under-studied and particularly relevant to the challenge, which VREF has set itself of finding "urban transport solutions that will provide accessibility for all groups while at the same time radically reducing transportation's negative local and global environmental impacts."

Indeed, a recent longitudinal study of seven European cities (Brand et al. 2021) concluded that "changes in active travel have significant lifecycle carbon emissions benefits, even in European urban contexts with already high walking and cycling shares. An increase in cycling or walking consistently and independently decreased mobility-related lifecycle CO_2 emissions, suggesting that active travel substituted for motorized travel – i.e. the increase was not just additional (induced) travel over and above motorized travel." Thus, improving our knowledge of walking and walkability can significantly improve strategies to reduce greenhouse gas emissions, but also to improve quality of life, health and, as discussed in this report, social inclusion.

The key products presented here are: An informed discussion of possible subject definition, scope and delineation; a bibliometric study; a mapping of university and research teams working on walking for transport. To produce these three products and understand how they reflect existing research and potential gaps, we applied a dual perspective based in the Global North, where the main research publications are located, and in the Global South, where most people in most places rely on walking for daily transport. We triangulated our quantitative results from the bibliometrics search with results from specific desk searches and two participatory workshops, one in Spanish and one in English.

We worked with two co-researchers, one based in South Africa and one, a native-French speaker, based in Europe and with experience in Latin America. This allowed us to consider research not included in major journals listed in Web of Science and Scopus. Despite their efforts at universality, both reflect the predominance of English and the substantially greater resources of English-language and European researchers to publish scientific papers in these highly competitive journals. Our study offers some insights on the implications of these imbalances and how to offset this potential blindspot.

Bibliometric results provide an overview of what is being studied with regard to walking, and revealed gaps in its treatment. Desk research, interviews and participatory workshops revealed that researchers from the Global South may publish research of interest in more local and national journals, and languages. French-language researchers underlined the importance of language itself — and its almost infinite variations — in shaping conceptual frameworks and therefore how we think about walking. Key gaps included walking in rural areas, advocacy, and governance, with an evident link between the socio-political exclusion of low-income and diverse populations, including a large proportion of women, and the low policy priority assigned to walking in transport and city planning, and research itself.

Key recommendations include looking more closely at funding sources and seeking ways to level the gaps between research teams in the Global South and North. Encouraging North-South-South partnerships, as is a tradition within VREF, seems a particularly promising strategy for generating more equity within research communities. It can encourage a greater focus on walking within governance, sustainability transitions, social equity, advocacy and health research, which could help to place walking higher on both research and sustainable transport planning agendas.

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With thanks to MOVISAL, an alliance of researchers in the global south and north, which explores synergies of transport, health and, in Latin America, issues of equity and democratization, the BRT Center for Excellence and the Centro de Estudios de Desarrollo Urbano Sustentable (CEDEUS) at the Pontificia Universidad Católica de Chile, with funding from Conicyt, FONDAP No. 15110020.

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1 Introduction: North-South contrasts highlight strengths and gaps

1.1 Background

To expand its "Future Urban Transport" (FUT) program, the Volvo Research and Educational Foundation (VREF) requested a proposal for a study to scope to map current scientific knowledge about walking for transport, as part of contributing new ideas and solutions for sustainable transportation systems in cities. Walking is particularly relevant to the challenge that VREF has identified of finding "urban transport solutions that will provide accessibility for all groups while at the same time radically reducing transportation's negative local and global environmental impacts."

Over the past 8-10 years, the FUT programme has supported research in thematic areas such as urban freight, bus rapid transit, political leadership in the transformation of urban transport, and financing urban access. In its final year, it now sought more information on walking as a transport mode, for addition to the FUT programme. VREF had initially identified the following thematic areas as priority areas for future research:

- Equity and active transport - including gender, children and people living with disabilities
- Recognizing walking as a transport mode
- Data collection and tools
- The economic benefits of walking and cycling
- Safety and security
- Walkability (pedestrian and cycling infrastructures)
- Policy
- Changing behaviour.

Although understudied, as this report reveals, walking is particularly — perhaps uniquely — crucial to multiple strategies in very diverse disciplines. Understanding, planning and building better cities for walking is particularly important given its powerful potential for addressing multiple challenges influencing equity, democracy, social participation and strategies to best address global climate crisis, loss of biodiversity and the threat of pandemics resulting from habitat loss, as has occurred recently with Covid19. Advocates have argued for paying more attention to both walking and cycling for many years. Recent research drives this home: a longitudinal study of European cities (Brand et al. 2021) concluded:

> changes in active travel have significant lifecycle carbon emissions benefits, even in European urban contexts with already high walking and cycling shares. An increase in cycling or walking consistently and independently decreased mobility-related lifecycle CO_2 emissions, suggesting that active travel substituted for motorized travel – i.e. the increase was not just additional (induced) travel over and above motorized travel (p. 1, Brand et al. 2021).

Indeed, "Even if not all car trips could be substituted by active travel the potential for decreasing emissions is considerable and significant" (Brand et al. 2021). Thus, improving our knowledge of walking and walkability can significantly improve strategies to reduce greenhouse gas emissions. Indeed, given the substantial evidence on walking's valuable and essential contribution to health, through physical activity but also spatial orientation, road and social safety (Mindell et al. 2012, Rydin et al. 2012); livability (Appleyard et al. 2020); social justice (Agyeman 2013, Lucas et al. 2016, Sagaris et al. 2020) and its importance to vulnerable groups particularly low-income, rural, women, children and older adults (Herrmann-Lunecke et al. 2020, Sagaris et al. 2020), assigning a higher priority to research on walking and improvements to planning, social and design-related practice could also significantly improve quality of life, health and social equity.

1.2 Purpose of this study

While there were shifts and adjustments to these terms as our study went through several iterations, these remain key terms and we discuss them in more detail in the rest of this report. The key products requested were:

- An informed discussion of possible subject definition, scope and delineation;
- A bibliometric study, including a research library using the Zotero data base;
- A university/research team/researcher mapping.

These three products were necessary to contribute to the overall objective of further strengthening the foundations of this long-term VREF programme through identifying and mapping state-of-the-art knowledge and research in the area.

A trilingual glossary of key research terms emerged as a fourth product, as we advanced in our consideration of terms and research in the Global South. We quickly discovered one problem with doing this kind of global mapping search is that there is no generally recognized set of key terms to capture the different aspects of walking, depending on the perspective, discipline and research location. We hope this glossary will help to generate a more consistent set of terms for researchers, making it easier to build a solid foundation and better connections among the different kinds of research, all important to this topic.

1.3 Why distinguish between Global North and South?

We opted to examine our results from a dual Global North/Global South perspective to make the most of our positionality as researchers in the Global South, who constantly interact with those of the Global North. We find there are enough similarities between the two to make fruitful exchanges possible, and enough differences for these contrasts to illuminate new ways of looking at our issues, challenges and, above all, potential solutions. Indeed, "automobility" as a socio-political phenomenon (Beckmann 2001):

- is global, but its impacts are very different: in the North, 80% cars, 20% other modes; in the South, often the opposite, with walking the majority mode (where it is studied at all) and cars a minority mode, despite their domination of urban landscapes.
- Most societies in the Global South are much less equal, economically, socially and politically. While car-choked roads may look similar everywhere, very few families actually have access to cars, making transport justice a cutting issue.

Many of the most walkable and cycle-inclusive cities are in countries with strongly democratic cultures. But we seldom talk about institutions and how we plan.

One key difference is modal split: with some exceptions, such as New York and London, cars tend to hold large majority modal shares in the Global North, whereas walking is the primary transport mode for most trips in the Global South (table 1). Within thinking about health and mobility, these differences receive little attention. In the Global North, walking is part of "active transport", important due to the well documented benefits of physical activity. For individuals, it is key to health, while for cities it is key to reducing emissions, and for public services, it can slash health care costs.

Figure 1: Where does walking fit? Even studies of public transport, which is mainly accessed by walking trips, seldom consider this part of the trip chain. In this way walking has become invisible as a central social and mobility phenomenon. Source: Laboratorio de Cambio Social (Parvesh Sharawat).

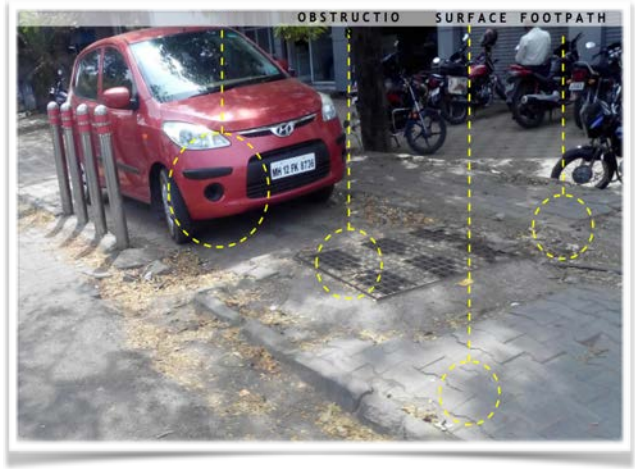


Figure 2: Design strategies are often the main approach to redressing walking for transport in cities in the Global South. Sometimes this leads to aberrations such as cages and gates that force pedestrians to make long detours to cross streets, in order to avoid disturbing cars. Source: Laboratorio de Cambio Social (Parvesh Sharawat).

Table 1, Modal share* in selected cities Global North and South, %					
City	**Walk**	**Cycle**	**Bus/public transport**	**Total sustainable**	**Total car / motor-cycle**
La Paz, Bolivia	20	0	72	92	9
Shimila, India	42	1	49	92	9
Habana, Cuba	57	2	21	80	16
Freiburg, Germany	29	34	16	79	22
Bogotá, Colombia	31	4	42	77	22
San Miguel de Allende	34	1	41	76	24
Lima-Callao, Peru	24	0	51	75	30
Buenos Aires, Argentina	25	1	48	74	21
Mexico City, Mexico	1	1	71	73	27
London, UK	25	6	40	71	30
Curitiba, Brazil	20	5	45	70	27
Madrid, Spain	34	1	35	70	40
Sao Paulo, Brazil		32	37	69	31
Santiago, Chile	34	4	30	68	32
Quito, Ecuador	14	0	53	67	40
Rosario, Argentina	20	5	40	65	35
Kochi (Cochin), India	12	3	49	64	35
New York, US	28	3	31	62	35
Burgas, Bulgaria	1	3	37	41	58
Portland, US	6	7	13	26	65
Los Angeles, US	7	1	11	19	78
Kaohsiung, China	5	5	7	17	82
Toronto, Canada	5	1	24	30	68

* Some rows do not total 100% due to percentage or methodological differences that include other modes, not reported here.

Source: Own elaboration based on the following sources, *Table 1, Herrmann et al. 2020, prepared using data from (i) Tirachini (2019), Havana (CIMAB 2015), La Paz (GAMLP, 2012), Santiago (SECTRA, 2012, http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm, public transport includes the category "combined"), Bogotá (AMB, 2016), Sao Paulo (https://brtdata.org/location/latin_america/brazil/sao_paulo_-_metropolitan_area, Note: SP combines walking and cycling, figure included under walking), Quito (SGP, 2015), Lima and Callao (MTC, 2013); (ii) Buenos Aires (shared mobility accounts for the missing 5.4% to total 100), Burgas, Curitiba, Freiburg, Kaohsiung, Kochi, Mexico, Portland, Rosario, San Miguel, Shimila (ICLEI, 2017, retrieved from https://sustainablemobility.iclei.org/wp-content/uploads/2017/10/REPORT-2017_Final_web_.pdf Motorcycles account for 5% of the total for car & motorcycle. The numbers total slightly under100%, reflecting other modes.* Figures for London: *London Report 9 (2016) http://content.tfl.gov.uk/travel-in-london-report-9.pdf; New York: New York Mobility Report (NYC-DOT, 2018), http://www.nyc.gov/html/dot/downloads/pdf/mobili- ty-report-2018-screen-optimized.pdf; and Madrid, Encuesta de Movilidad de la Ciudad de Madrid 2018, https://www.crtm.es/media/712934/edm18_sintesis.pdf. Los Angeles (https://www.transformative-mobility.org/publications/urban-transport-and-morphology-los-angeles) Toronto: Canada, Government of Canada, Statistics. "Census Profile, 2016 Census – Ottawa – Gatineau [Census metropolitan area], Ontario/Quebec and Ontario [Province]". www12.statcan.gc.ca. Archived from the original on 2021-08-31. Retrieved 2018-04-16.*

In the Global South, meanwhile, both walking and cycling are crucial transport justice issues, as most people already walk or cycle, but in extreme, high-risk conditions that lead to exclusion from education, culture, policy and decision-making. Thus, to understand walking as crucial to sustainable transport, even within the same discipline, such as health, we need to consider not only physical activity, but also the social determinants of health, established by the World Health Organization (WHO 2008, 2010).

This becomes even more apparent when we apply a cross-cutting gender focus. Considering gender, and particularly women's travel for care purposes (Sanchez de Madariaga 2013), is an effective way of studying exclusion and other social issues as they relate to mobility. Women's "double burden" of work is well understood: more recent studies from Latin America have found that when it comes to mobility, they suffer from a "triple burden", of violence (Allen et al. 2017). Like men, their mobility is strongly influenced by the presence of petty and major crime in the spaces through which they must move, but girls, women and transgendered people suffer the additional threat of gender violence (harassment and rape). They are also strongly impacted by road risk and related violence, not only for themselves, but also for the disabled, children, elderly and other people for whom they are often primary care givers (Sagaris et al. 2016, Sagaris et al. 2017, Sagaris et al. 2020, Sagaris et al. 2020).

Thus, the issue of "Where does walking fit?" within mobility systems, which tend to focus mainly on motorized modes, becomes central to research on walking for transport (figure 1), sustainability and equity. This is often addressed mainly through design strategies (figure 2) that may attempt to redress inequities using standards developed in the Global North, which have not been tested and may not adjust to social patterns and ways of using space in the Global South.

The next section (2) summarizes the methods applied to generate this report. The following sections present the main results of the workshops, interviews and desk reviews (3), the bibliometrics search (4), and key actors and research hubs (5). Section 6 considers trends and gaps, and possible action to redress them. The final bibliography is available online. We have also included an Appendix (2) with the trilingual glossary of terms that could help researchers to make connections more easily between authors, methods and specific sub-areas of walking studies.

2 Methods: Participatory Action Research to analyze bibliometric search

To produce the products defined for this study and understand how they reflect not only existing research, but also potential gaps, we opted for working from a dual perspective based on the Global North and South, as discussed in the previous section. This perspective was addressed by triangulating our mainly quantitative results from the bibliometrics search with desk searches and two participatory workshops, one in Spanish and one in English. These workshops also greatly enriched the first required product: An informed discussion of possible subject definition, scope and delineation of walking for transport.

2.1 Participatory Action Research

We used an adapted Participatory Action Research (PAR) approach, because we have considerable expertise and have achieved excellent results using PAR, particularly when seeking to mobilize interest and diverse knowledge from inter-disciplinary and trans-disciplinary sources.

Interdisciplinary knowledge stems from more conventional academic research traditions, particularly in the case of walking for transport: transport engineering, planning and geography, psychology of individual and social practice, architecture, landscapes, design, and public health.

For our purposes, which focus on sustainable transport solutions, transdisciplinary knowledge arises primarily among advocacy and practitioner groups, and is often retained or documented in non-scientific journals. This "grey" literature can, of course, be very anecdotal, but often it contains some of the most sophisticated knowledge to date, particularly manuals, handbooks and guides, which typically summarize years, even decades, of experience. Similarly, key global conferences also generate substantial and relevant knowledge, particularly Walk 21, but also the International Conference on Transport and Health, and, to a lesser degree, the annual meeting of the Transportation Research Board, or Active Living seminars, to name a few.

To mobilize key knowledge we held two workshops, in which we presented the study purposes and initial results, and received feedback on where to look, key articles and authors to include, and important issues from the perspective of participants. Participants were recruited from within the global and Latin American networks of the Laboratory for Social Change, including a network of researchers focusing on transport and equity issues (INTALINC), the UK-based Transport and Health Science Group and its Latin American network Movisal, and colleagues in Spain, Argentina, Canada, US, South Africa and Kenya. We sought a blend of representatives from the hardy minority of researchers, post-graduate students, municipal planners and advocacy groups who are grappling with walking-related issues in their own research or practice.

The first workshop was in Spanish, and focused on emerging research in Spain and Latin America, that may or may not be captured in a bibliometrics search. We had an excellent mix of seasoned and new researchers, particularly those just doing PhDs, so very up-to-date on emerging trends. Similarly, advocates and local government officials contributed from their own experience, both using and generating specific kinds of knowledge (advocacy and practice) and also needs.

The second, global, workshop, held in English, brought together a similar group of key researchers, advocates and practitioners and generated a similar set of reflections, new articles, data and suggestions for further research. During these workshops we brainstormed on the basis of the initial list of terms provided for this study (table 2), finding them essentially robust.

Table 2, Initial and Brainstorming Terms, August-September 2021		
	KEY TERMS	**Related terms**
1	**Equity and active transport, including gender, children and people living with disabilities**	Older adults, aging, Safe Routes to School, Kool Routes to School, health, physical health, mental health, social determinants of health, active living
2	**Recognising walking as a transport mode**	Walking and walkability, active transport, active mobility, complete streets, streets for all, woonerfs, traffic calming
		Citizen participation, collaborative governance
3	**Data collection and tools**	Action Research and Participatory Action Research
		Transport and other forms of modeling
		METREC Gender walking audits, Community Audits, similar tools
		Living Laboratories
		University-Community collaborations
4	**The economic benefits of walking and cycling**	Health, infrastructure, education, schools
5	**Safety and security**	Gender, road, crime-related violence, harassment, rape, public spaces, neighbourhoods, age, crime, inequality
6	**Walkability (pedestrian and cycling infrastructures)**	Design, social function of public spaces, complete streets, traffic calming, woonerfs, school and play zones, co-design, project for public spaces, the 15-minute city
7	**Policy**	
8	**Changing behaviour**	Behaviour change, behavior modification, theory of planned behaviour, fostering behaviour change (McKenzie-Mohr)
9	Social movements, agency, advocacy, activism	
10	Governance, participation, civil society, collaborative planning	
11	Neighborhood planning, community development	
12	Barrier effect, community severance	

Source: Own elaboration based on terms of reference, with some consideration of "hidden terms" that disguise walking, which we explored in subsequent iterations of the bibliometrics search. Laboratorio de Cambio Social.

2.2 Co-researchers and desk reviews of French-language, South African and Indian studies

We also worked with three co-researchers, two based in Africa, and one native French-speaker, with strong ties in Latin America. This allowed us to consider journals not listed in Web of Science and Scopus. As discussed under results, despite their efforts at universality, both of these indexing systems reflect the predominance of English as the main language and the substantially greater resources of English-language and European researchers to produce work and publish scientific papers in these highly competitive journals. Our study confirmed this tendency and sheds insight on how to achieve a better balance.

Because the specific methods are so closely related to findings, we have included more details under each region in the next section (3). Each desk researcher defined their own methods according to the their subject matter, language and culture. Because these searches are designed to complement and contrast with the bibliometrics search, which is extremely consistent, more variable methods were considered suitable for this aspect of our study.

2.3 Bibliometric approach

The bibliometrics search, which included generation of a collective reference library using the Zotero software and collaborative platform, provided considerable insight into what is being studied with regard to walking, and revealed many gaps and elipses in its treatment in most research communities.

The iterations between the workshops, team meetings and the bibliometrics search produced an initial set of terms, time periods and iterations (table 3). Upon analysis of these results (October), we chose to focus on the time period 2000-2021 as particularly relevant, because of its recency but also because several key articles and books at the start of this period set off growing interest in both walking and cycling, with a significant rise in publications (see results, below). We also excluded the disciplines of chemistry, astrophysics and computing, because they were generating a large number of articles that used terms such as transport, node or path in ways not related to mobility or transportation.

We chose Scopus and related tools for the bibliometric search, because it is considerably larger and contains more social science journals than Web of Science. Scopus and related tools (Bibliometrix and VoS Viewer) include almost 40,000 journals (39,758), compared to just 13,600 for Web of Science, with a much higher percentage of journals from the social sciences, which we considered of particular interest for better understanding the current status of research on walking for transport. Our initial harvest of documents searched title, abstract and keywords for the terms: mobility, walk, public spaces. We found 5,762 articles (table 3), ranging from very few in 1925 through 2000, and rising substantially from 2003 onward. Our filtered, second-round search found 2089 articles, versus 11,147 for transportation generally. We discuss these trends further under results.

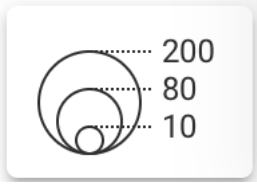
The bibliometrics search was conducted in two main rounds, the first previous to the two workshops and the second upon revision of a selection of the articles found during the first round. The All Science Journal Classification (ASJC) disciplines of Computer science; Mathematics; Physics and Astronomy; Biochemistry, Genetics and Molecular Biology; Energy; Earth and Planetary Sciences; Chemistry; Agricultural and Biological Sciences; Materials Science; Chemical Engineering; Pharmacology, Toxicology and Pharmaceutics; Inmunology and Microbiology; and Veterinary were excluded from the final round, as they generated considerable noise — findings unrelated to walking for transport — and we focused on the key terms most prominent in our initial searches and confirmed by the workshops. Upon completion of these iterations, we excluded several key terms: "Urban Transportation, "Motor Vehicle", "Car Driving" , "Mass Transportation" and "Motor Vehicles".

Table 3, Iterations of bibliometric search with included/excluded terms					
Round (main ID)	**Included terms**	**Excluded terms**	**Field**	**Time span**	**Documents**
1	mobility walk public spaces		Keywords	1925-2021	5,762
2 (Walking)	non-motorized transport non motorized transport mobility sustainability walk walkability pedestrian	Public Transport Urban Transportation Motor Vehicle Car Driving Mass Transportation Motor Vehicles	Abstract -Keywords - Title	2000-2021	2,089
3 (Transport)	Public Transport Motor Vehicle Urban Transportation Car Driving Mass Transportation Motor Vehicle urban people communte transport		Abstract -Keywords - Title	2000-2021	11,147
Source: Bibliometrics methodology, Italo Costa-Rodan, Lake Sagaris, applied September to November 2021. The transport search was conducted to contrast a rise in specific research about walking, with general trends in transportation research. © Laboratorio de Cambio Social.					

We processed the records using R-Studio bibliometrix, generating a cluster analysis with VoS Viewer, based on csv files downloaded from Scopus.

For desk análisis all search results were uploaded and classified in a Zotero group, using Zotero reference manager, for general access.

For the clusters, presented under results, we set the counting method as fractional counting, threshold 10 occurrences, with the size of the circle reflecting the occurrences of a Key word within the sample. The colour of each cluster reflects the weight assigned to terms and links within the sample, with Red reflecting most, and Green, Blue, Yellow and Purple descending.



3 Findings: Workshops and desk reviews

Workshops and desk reviews were conducted mainly from August to September, as planned, with some followup consultation are our analysis and final report advanced, during October-November. Key research gaps included walking in rural areas, advocacy, governance and other issues, in which the socio-political exclusion of low-income and diverse populations, including a large proportion of women, is rooted in social inequalities, which interact with and lead to the low priority assigned to walking in transport and city planning, and research itself.

3.1 PAR workshops and desk reviews

The desk research found that researchers from the Global South have more limited access to the indexed publications included in major indices, such as Web of Science and, in this case, Scopus. They often publish research of interest in their own more local and national journals or languages, given that English, while considered "universal" is, in fact, widely taught in Europe, but less accessible to scholars elsewhere in the world.

The question was raised about whether the "quality" of universities in the Global North could also be a factor. This is difficult to answer and beyond the scope of this study, given the pertinence of funding and resources, which may be weighed against issues such as embeddedness in specific places and cultures. We also see a somewhat tautological dynamic where universities in the Global North, particularly the US and some European countries, have access to more funding and/or are located more centrally in terms of power over editorial and other pertinent decisions. They thus become better known, which brings in additional resources, including recognition and higher ranking in surveys and other mechanisms used to define and compare "quality".

Table 4, Key observations from participatory workshops, September 2021
▪ Beyond impact factors, impacts on real world planning need to be studied and documented
▪ Cultural beliefs and the social imaginary of walking (eg. associated with poverty or good health) require deeper understanding
▪ We need better ways of weighting new research, as knowledge advances, new publications, rather than those with higher impact factors, may be more relevant.
▪ Examining how research on walking is funded could be highly relevant, although beyond scope of this study.
▪ How drastic should the line between walking for pleasure and walking for transport? Eg We don't distinguish driving habits in this way.
▪ Beyond infrastructure, which has been the focus of much research to date, access and right to the city is key, especially within feminist studies and walking in small towns
▪ In climate change research, walking is often overlooked because it generates very low emissions.
Source: Own elaboration based on workshop summaries, from the Spanish-language workshop (10 September 2021) and the Global Workshop (26 September 2021). © Laboratorio de Cambio Social.

What is relevant to this study is the reality that these places in the Global North with the most resources tend to correlate with cities where walking is a minority mode, rather than a majority mode as occurs in most Asian, Indian, African and Latin American cities. The history and configuration of cities also varies enormously across the globe, with the car-centered version of automobility, reflecting particular conditions in the US after World War 2, which have been copied onto the underlying morphologies of cities with very different histories and configurations. These contextual factors shape research questions

and findings, in ways that may be more or less pertinent to understanding walking for transport in diverse global contexts.

Workshop participants (table 4) emphasized the importance of going beyond impact (h-factor) to evaluate real-world planning as it related to walking. In the area of planning for cycle-inclusion, advocacy, citizen and technical expertise interacted to effectively transform urban spaces, and this later became the object of academic research. This was particularly the case in the Netherlands, where many planners and advocates went on to post-graduate degrees, and the decade-long Interface for Cycling Expertise (I-CE) program actually created scholarships and programs for PhDs in cycling. I-CE played a powerful role in mobilizing cycling for transport in the Global South, as it ran important programs with civil society partners in Latin America, India and several African countries.

On research methods, the studies tended to mix both quantitative and qualitative approaches and included some modeling, although less than for other modes. There was less focus on gender and equity issues, which are central to walking conditions. We found some mapping, Origin-Destination surveys, trip chaining and travel surveys in general, although walking is often under-represented in OD surveys, which can focus primarily on motorized modes.

The rest of this subsection provides key data from the desk searches regarding India, Africa and literature published in French (France, Quebec and some French-speaking countries). This relatively brief overview reveals the wide variance in terms used in different cultures, even those with a common language, English (see also Appendix 2, the trilingual glossary based on these searches). These searches also drove home how often walking as a phenomenon is taken for granted and appears between the lines, rather than receiving specific attention from researchers.Our mapping of key researchers and research hubs in these desk searches revealed considerable differences with the bibliometric method used in the next section. These results are contrasted with the bibliometrics tables and maps in section 4.

3.1.1 Overview Desk Search on India (Lake Sagaris)

A Scopus search seeking articles on "India and Walking" found 132 titles, with research relatively evenly distributed among Behavior & road safety (33%); Equity, planning & governance (32%) and the final third consisting of the two additional categories, infrastructure & design (24%), and modeling (11%, table 5). The vast majority of articles (figure 3) are from the discipline of engineering (56%), with just 20% coming from architecture, planning and geography, and a rather surprisingly small number from health (9%), just slightly more than gender (7%), humanities (6%) and economics (2%, figure 3). Most were generated by researchers located in Indian institutions, although the US, the UK, Japan, Australia, Europe, China, Ireland and Canada all hosted some studies of walking in India.

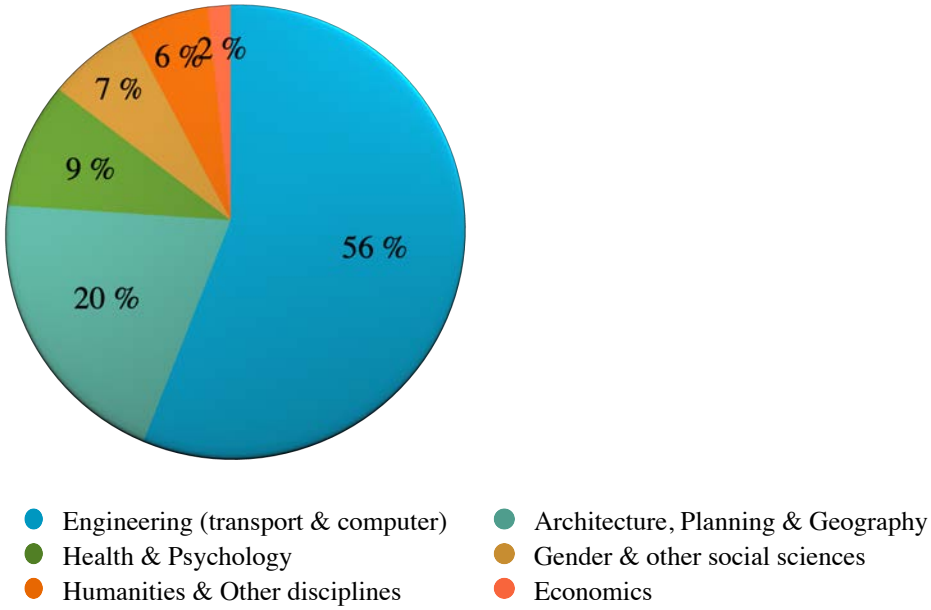


Figure 3. Main disciplines doing research on walking for transport in India. Source: Desk search, September to November 2021. Laboratorio de Cambio Social.

Outlier terms were significant and rather unexpected, with "trip distance", "disabled persons", "trips by foot", "footpaths" and "pro-poor" appearing as terms referring indirectly to walking. Many studies, where walking might be expected to appear, examining issues such as access to railway stations, public transport and transport oriented development made no mention of walking, at least in the key terms and abstracts, which was the degree of detail that we defined for these searchers.

Table 5a, Key concept categories, Desk Review India and Walking		
Lake Sagaris, September-October 2021		
Area of interest	**N (articles)**	**%**
Behaviour & road safety	**44**	**33 %**
Equity, planning & governance	**42**	**32 %**
Infrastructure & design	**32**	**24 %**
Modelling	**14**	**11 %**
	132	**100 %**
Search procedures *Equity: Search for* ***Equity*** *(only 2 articles), then women (9), girls (1), men (0), male (1), just/justice/fair (0), car-restrictive policies (1);* ***Infrastructure & Design****: Search for infrastructure (2), then design (7), public space (4), walkability (4), accessibility (8), ageing and neighborhood design (2), NMT (2), visually challenged (1).* ***Behavior & Road Safety****: Pedestrians (30), Behaviour/behavior (7), safety (4), older adults (1), vulnerable road users (1), physical activity.* ***Modelling****: Search for modelling/modeling (5), sidewalks (2 came up on search, sustainable transport (1), plus 1 upon revising article).* *Unclassified terms revised manually, examining abstracts for walking or walking related terms.*		
Source: Desk review, search for Walking and India, Scopus data base, September 2021.		

Table 5b, Outlier terms: used to classify unclassified articles	
Lake Sagaris, September-October 2021	
	Term
1	**Trip distance**
2	**Disabled persons**
3	**Trips by foot**
4	**Footpaths (pollution monitoring)**
5	**Pro-poor**
Source: Desk review, search for Walking and India, Scopus data base, September 2021.	

3.1.2 Overview desk search on South Africa and Kenya (Gail Jennings)

Our search of walking studies in Africa focused mainly on South Africa, Kenya, and Ghana (see also the French section, for French-language countries in Africa), finding 175 articles examining walking for transport. These included several World Health Organization studies, which focused on technical aspects of planning, within which walking received specific treatment.

We conducted a high-level key-word searches of literature in South Africa and beyond, and carried out searches on particular authors that emerged from the South African work but also do research outside of South Africa. Key authors were Roger Behrens (University of Capetown), Marianne Vanderchuren (University of Capetown), Rahul Jobanputra (formerly University of Capetown) and Hubrecht Ribbens. This led to the inclusion of work particularly from Ghana, Nigeria, Kenya, and Tanzania

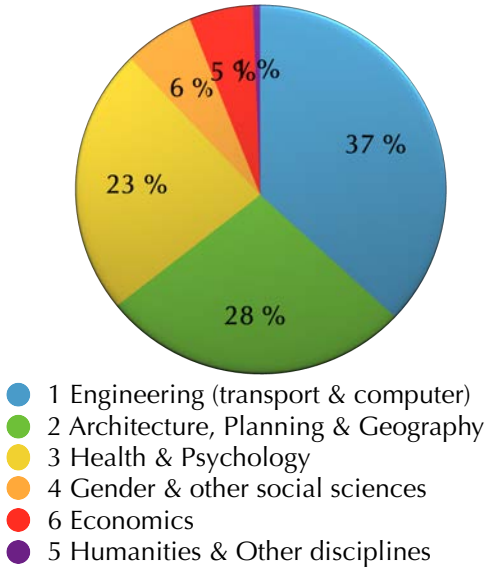


Figure 4. Main disciplines doing research on walking for transport in South Africa and other selected African countries. Source: Desk search, September to November 2021. Laboratorio de Cambio Social.

Table 6, Key words used in desk search, S. Africa, Kenya and some other African countries
○ NMT
○ Walking and cycling
○ Non-motorised transport
○ Pedestrian
○ Walkability
○ Walking
○ Africa
○ South Africa
○ Accessibility
Searches were refined using the key words:
○ Safety
○ Infrastructure
○ Mobility
○ Fatalities
○ Design
○ Guidelines
○ Planning
○ Universal Design
○ Modelling
○ Road traffic injuries
○ Morbidity
Source: Gail Jennings, methodology applied in desk search, Google Scholar; Science Direct; CODATU; Southern African Transport Conference for triangulation with bibliometrics search. © Laboratorio de Cambio Social.

The search focused on English language scholarly publications, or non-academic publications (such as development agency reports or manuals) from 2005 on, if they had significant information pertaining to walking in Africa, specifically: Google Scholar; Science Direct; CODATU; Southern African Transport Conference.

In terms of research disciplines, most research is situated within either Transport Engineering or Health disciplines. Independent research (including the World Wildlife Federation, WWF) is situated within social sciences. Overall, there

is very little qualitative or social science work published about walking, and the overwhelming majority of work relates to infrastructure, engineering, policy, or modelling.

Key concept areas followed the general pattern noted for other regions/countries (tables 6 & 7).

As with other regional searches, engineering (37%) was the primary discipline for research on walking (figure 4), followed by Architecture, planning and geography (28%), then health and psychology (23%).

Table 7a, Key concept categories, Desk Review selected African countries		
Gail Jennings, September-October 2021		
Behaviour & road safety	**61**	**35 %**
Infrastructure & design	**51**	**29 %**
Equity, planning & governance	**40**	**23 %**
Modelling	**23**	**13 %**
	175	**100 %**
Source: Desk review, search for Walking in South Africa, Kenya and other literatures, as described in text. September 2021.		

Table 7b, Key Authors, South Africa, Kenya and Uganda (desk search)	
Author	**Publications**
Roger Behrens	13
Hubrecht Ribbens	11
Marianne Vanderschuren (Prof)	9
Gail Jennings	7
Rahul Jobanputra	6
Melecki Khayesi	7
Winnie Mitullah	6
Gina Porter	12
Margie Peden	
**Total papers 140.*	

3.1.3 Overview desk search of French-language research

The French language search covered more countries but found fewer articles (46) than the other regional searches (table 8). This search was done using Scopus, using French terms reported in the trilingual glossary (appendix 1) but also other scientific websites, in search of articles not available in Scopus. The smaller number probably reflects the fact that French-speaking authors are nonetheless publishing in other languages, particularly English. Interestingly, while infrastructure & design were significant (16.4%), behavior and road safety (44.3%), and equity, planning and governance (36.1%) were the main areas of interest, while modeling also weighed in (17%).

Table 8, Key concept categories, Desk Review Publications in French about Walking		
Axel Rimbaud, September-October 2021		
Behaviour & road safety	**27**	**44 %**
Equity, planning & governance	**22**	**36 %**
Infrastructure & design	**10**	**16 %**
Modelling	**2**	**3 %**
	61	**100 %**
** Procedure: French-language search, using Scopus with terms, "marchabiliité", "pieton", "marche a pied" (see also the trilingual glossary, appendix 1) and the website https://www.academia.edu/, to check for articles not available in Scopus*		
Source: Desk review, September-October 2021.		

In terms of disciplines, architecture, planning and geography formed by far the largest category, accounting for almost two-thirds (62%) of studies (figure 5), with health following (20%), then engineering (18%) and no work from a gender or economics perspective.

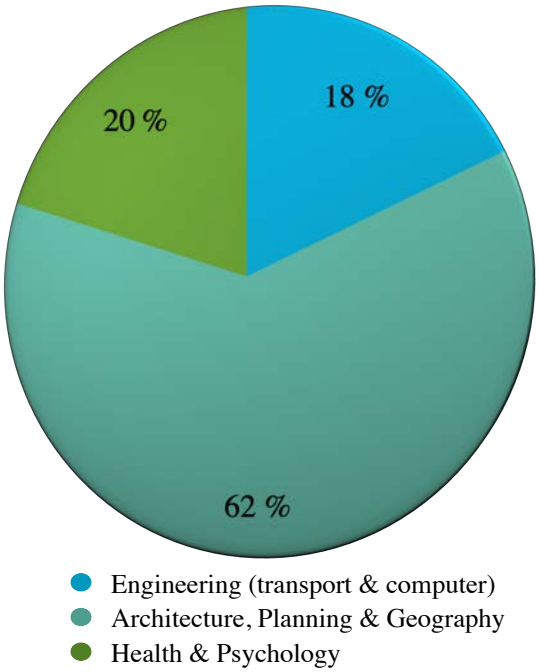


Figure 5. Main disciplines doing research on walking for transport in French-speaking countries. Source: Desk search, September to November 2021. Laboratorio de Cambio Social.

Related to these areas of interest, *risque*, *pied*, *potentiel de marche*, *exclusion* and *âge* were all outlier terms in our search for walking. Countries publishing in French included France (57%), Québec (Canada, 22%), Luxembourg (9%), Algeria (5%), Switzerland (3%), and Greece and Senegal (2% each).

We found many articles about the relationship between infrastructure and walkability. Many studies also focus on users (older adults, children, people with special needs). We also found studies contrasting levels of walking, high in city centres and lower in suburbs and beyond.

As with Kenya and South Africa, in French-speaking Africa the pattern of cities neglecting pedestrians remains, despite this being the majority mode. This raises barriers to travel beyond specific neighbourhoods and communities, and perceptions of insecurity, particularly for those walking alone or waiting for public transport, a phenomenon that combines with gender violence in the case of women.

This part of our study included three interviews (summarized in table 9) with eminent French researchers, to explore differences between French- and English-language research, including conceptual frameworks pertinent to walking for transport. These were: **Jérôme Monnet**, professor, Université Gustave Eiffel: Senior Researcher at LVMT (Laboratoire Ville Mobilité Transport), co-director of Paris School of Urbanism (Ecole d'Urbanisme de Paris) and founding member and coordinator of the Research Group on Urban Pedestrian Mobilities (Mobilités urbaines pédestres, Labex Futurs Urbains); **Marie-Axelle Granié**, Director of Research in the "Aménagement, Mobilité, Environnement" (AME) department and the "Dynamique des Changements de Mobilité" (DCM/MODIS) team of the Université Gustave Eiffel (Lyon, France); and **Marie-Soleil Cloutier**, Associate Professor, Director of the LAPS (Laboratoire piéton et espace urbain) and Co- Director of the VIP (Laboratoire Ville Intelligente Piétonne) in the Institut national de la recherche scientifique (National Institute of Scientific Research, Montreal, Canada).

These interviews brought out important nuances regarding language that helped us to better understand our bibliometric and other results. Monnet, for example, took an historical approach, noting the importance of walking from transport from the 17th century to the present. As a multilingual (French, English, Spanish) speaker, he noted the different terminologies used by different languages, in themselves, but also within the same countries and language. The trilingual glossary, presented in Appendix 2, reflects this exploration, but should not be taken as absolute. Rather, it is an indication of how widely concepts, and therefore, terms, vary among contexts, languages and specific places. This may also provide some insights into why walking is such a "between-the-lines" phenomenon, as noted earlier.

Monnet considers walking "a total social phenomenon", which means it is part of everything in society, making it difficult to visualize. Pedestrians have zero inertia: they can change direction and purpose (social walking, walking for health or recreation, walking for transport) in an instant. It is hard to distinguish between walking for transport and other kinds of walking or other transport-related issues that are the object of considerable research. In road safety, for example, pedestrians are mainly studied as they interact with motor vehicles, and strategies for improvement typically seek to segregate them, often resulting in measures that favor cars over people who walk. Conditions for walking in our cities suggest that these approaches may be overused and lead to neglect of research into strategies, whether social, design- or infrastructure-related, to make walking a pleasurable, attractive and popular form of transport.

Children's autonomy and its impact on their social, mental and physical development is another important area for research, with walking (and cycling) limited, often severely, by parents fears for their children. In French legislation, while there are more than 100 definitions related to vehicle type and characteristics, there is only one category of pedestrian, despite the widely varying needs and capabilities of children, older adults, blind people, those with limited mobility, etc.

Monnet emphasized the importance of better understanding the *space* available for walking (walkable space). Usually, only roads are studied as part of the transport system. but we also need to integrate and plan for green spaces (parks, medians, etc.), and shared private spaces, such as malls, alleyways between or behind buildings. We know very little but these last two categories.

Granié, meanwhile, noted that grey literature, that is reports, evaluations, indications, manuals and similar practice-oriented publications that do not appear on Scopus, contain valuable information that should be integrated into our knowledge about walking for transport. The UK Department for Transport and the Transport Research Laboratory have published significant research on children's walkability, but these results have not been included in scientific research.

To check for publications in French, which may not appear in SCOPUS, she recommended CAIRN,1 and deeper searches within specific disciplines particularly sociology and geography. In some contexts, "walker" may prove a better search term than"pedestrian", as emerged within the global workshop discussion too.

For Marie-Axelle Granié, teenage behaviour should be studied in more detail. There are a lot of studies about children under 10 years, but little about teenagers (10 to 18 years old), who walk a lot, and are, moreover, affected by two peaks in fatality statistics. The first can be observed for young teenagers (11-12 years old), when they enter junior secondary school. In primary school they did not walk alone to school, and they are not competent as pedestrians (even if they feel they are). Notwithstanding, they are placed in new environments and expected to walk competently. A second peak affects teenagers at around 15 years when they enter secondary school. Young teenagers explore and discover new walking routes, expanding their limited autonomy. They also walk more in groups and at night, which is a risk factor.

Cloutier noted the differences in focus between Europe and North America walkability studies. In North America, the goal is to fight obesity (especially among children) and people researching walkability often come from public health. In Europe, the focus is more on pollution (air and noise), with engineering being the main discipline represented among researchers.

In French-Canada (Quebec), *marchabilité* and *potentiel piétonnier,* different terms from those used in France, are used to refer to walkability, underlining the important nuances that should be considered in research reviews and when considering different conceptual frameworks.

For road safety in Canada, walking was "trendy" in the 2000s but the number of studies have fallen off over the past 10 years. Thus, the initial look at trends in transport research detected in this study could merit further development. In Canada, mortality peaks associated with junior and senior high school change less than in France, which may reflect the persistence of walking to school and/or the combination with school bus systems used to move students from increasingly low-density suburbs to schools.

Echoing Garnié's mention of the grey literature, Cloutier recommended a UNICEF method for children in the city – Child-friendly Cities.[2] She also emphasized that, far from being an absolute, measurable quality, "walkability" depends on the age of the pedestrian, based on her participation in the MAPISE project, which studied walking for older adults. It found (Huguenin-Richard et al 2014[3]) that walkability varies significantly for older adults. Moreover, their needs are different, as they require benches, toilets, water, and shade, and they have to avoid steps and difficult crossings. Interestingly, they found that Montreal was better for walking for older people than many European cities, while the opposite was true for younger pedestrians

In her own studies, Cloutier, like many researchers worldwide, is increasingly concerned about walking for transport and its relationship with equity. In the US, the concept of "arrested" mobility, that is racial or other forms of discrimination that add police detentions and sometimes brutality to the transport

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[1] https://www.cairn.info/

[2] https://childfriendlycities.org/

[3] La marche à pied pour les séniors : un mode de déplacement durable ? http://www.bv.transports.gouv.qc.ca/mono/1180593/01_Rapport.pdf

experience, require more study, both there and elsewhere in the world. This reduces their mobility and therefore their access to job and education opportunities.

Finally, the French-language desk review found few studies of walkability and walking in small and mid-sized towns and rural areas. There was also little research in French in French-speaking African countries and even less from African universities. This may reflect a preference to publish in English, but it is also very likely that there is little research about walking for transport in these countries

Table 9, Key observations from interviews in French, October 2021
Different languages use different terms, but these also vary among countries. This means that any multilingual glossary will not apply to every single country.
Children's autonomy is an important research subject. Parents fear for their children and restrict their movement, which makes them less autonomous and generating significant risks for teenagers.
French law defines only one category of pedestrian, despite the many kinds of people walking (children, older adults, people with sight or mobility disabilities) and the more than 100 vehicle classifications, suggesting pedestrians become generic or even invisible in planning processes.
Grey literature (reports, manuals, evaluations, and so. on) do not appear on Scopus, but can be highly relevant to better understanding walking for transport. Researchers mentioned the UK Department for Transport (DfT) or the Transport Research Laboratory (TRL), which has studied children's walkability extensively.
Research from North America reflects the central goal of fighting obesity, especially among children, with many working on walkability located in disciplines closely related to public health. In contrast, European researchers have focused more on air and noise pollution, with most researchers in engineering disciplines.
Age is central to understanding walking and walkability. The MAPISED project found older adults' needs were significantly different from pedestrians in other age groups: they need benches, toilets and shade along their routes and facilities to reduce crossings and distances covered. A significant finding was that Montreal was better for walking for older people than many cities in Europe, vice versa for younger pedestrians
At the other end of the life cycle, it is central to research children's walking, physical activity, health and educational results more thoroughly, as patterns in early life often hold throughout the life span.
Source: Own elaboration based on interviews with Jérôme Monnet (11 October 2021), Marie-Axelle Granié (15 October 2021) and Marie-Soleil Cloutier (22 October 2021) © Laboratorio de Cambio Social.

4 Bibliometrics search Rounds 1 & 2

Our refined search focused on the years 2000-2021 (figure 6), and compared walking-for-transport studies with transport studies in general. The search terms used were non-motorized transport, safety, transport, mobility, walk, walkability and pedestrian.

Figure 6: Output of research on walking (bottom line) compared to trends in general outputs from transport research (2000-2021), considering key terms walking and transport. Research on transportation soared during this period, with research on walking rising, but much more slowly. Measured as a percentage of total transport articles, research articles on walking have risen relatively steadily, but remain at 19% of total transport articles, less than might be expected for such a crucial transport mode.

For this search, we found 2,089 articles referring to walking for transportation, and noted a steady rise from 2000 onward (figure 6, table 3). Notwithstanding, transport articles overall soared during this same period, while articles on walking for transport, as a percentage of total transportation articles each year, ranged from as low as 16% (2014, 2015) to as high as 24% (2012, 2021).

Social sciences, followed closely by engineering, are the main disciplines publishing research about walking for transport, with medicine, health professions and other disciplines following with smaller percentages. This partly reflects the fact that public health is spread across several fields, including the social sciences themselves (figure 7).

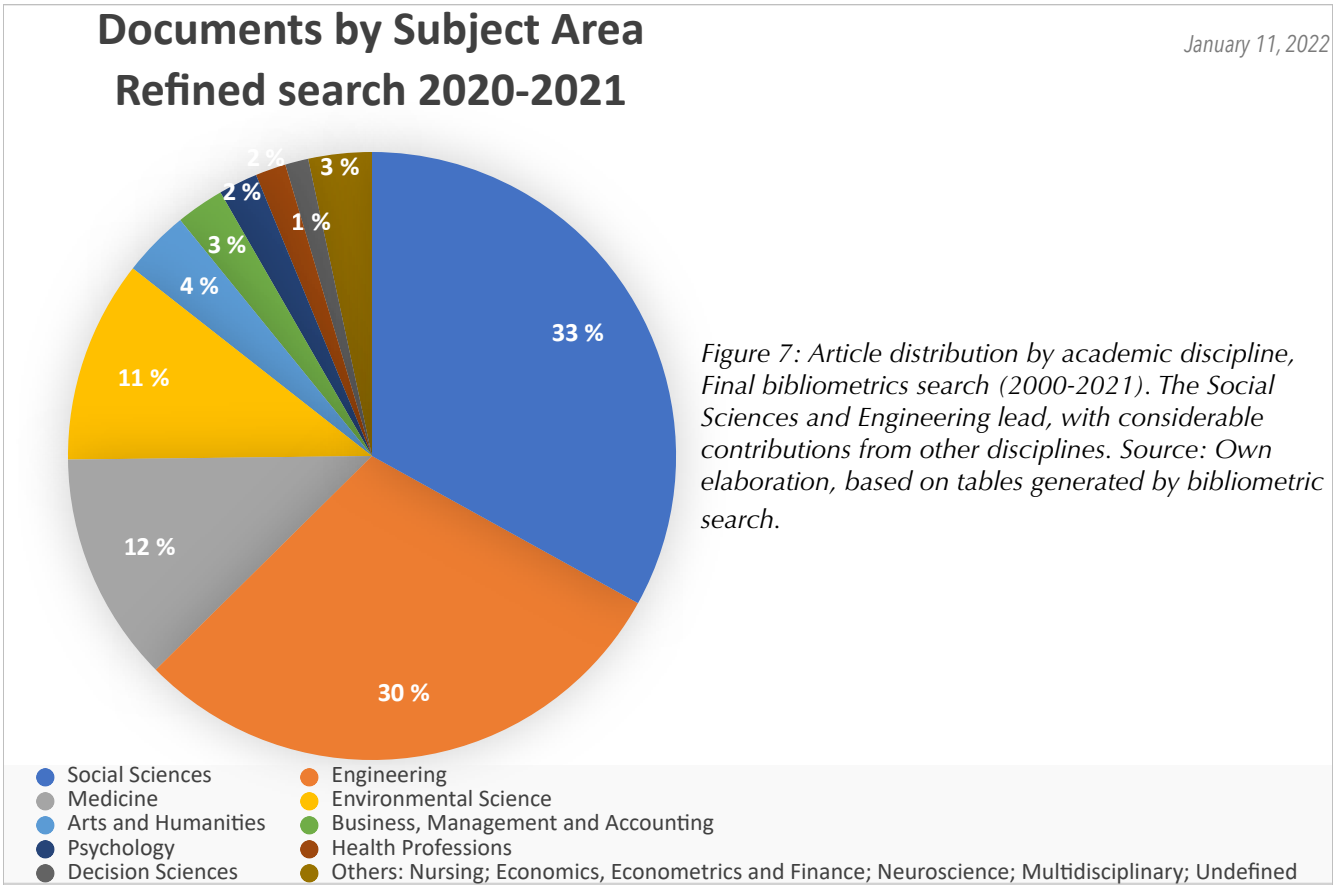

Figure 7: Article distribution by academic discipline, Final bibliometrics search (2000-2021). The Social Sciences and Engineering lead, with considerable contributions from other disciplines. Source: Own elaboration, based on tables generated by bibliometric search.

4.1 Keyword clusters

Keyword clusters were useful to identify key terms, but revealed how little consistency there is to date. "Pedestrian", "walking", and "mobility" showed up as key terms, with "walkability", a relatively new term emerging with some importance, along with urban planning and pedestrian mobility. Land use, which is central to walking and walkability, remained relatively minor within the cluster, while accessibility, public transport, and generic terms such as urban areas, country names, and sustainability also appeared with some importance.

For the clusters, we set the counting method as fractional, threshold 10 occurrences, with the size of the circle reflecting the occurrences of a Key word within the sample. The colour of each cluster reflects the weight assigned to terms and links within the sample, with Red reflecting most, and Green, Yellow, Blue and Purple in descending order.

4.1.1 General cluster for the entire bibliometric data base (2000-2021)

To visualize how key terms interact in walking research, we developed a general cluster for the whole bibliometrics data base, which established that crucial terms were (figure 8). In these clusters, the size of the bubbles reflects number of mentions/articles, while colors distinguish among different fields, such as pedestrian safety, a subset of pedestrian and walking studies. Lines indicate the density of connections among sets and subsets of key terms.

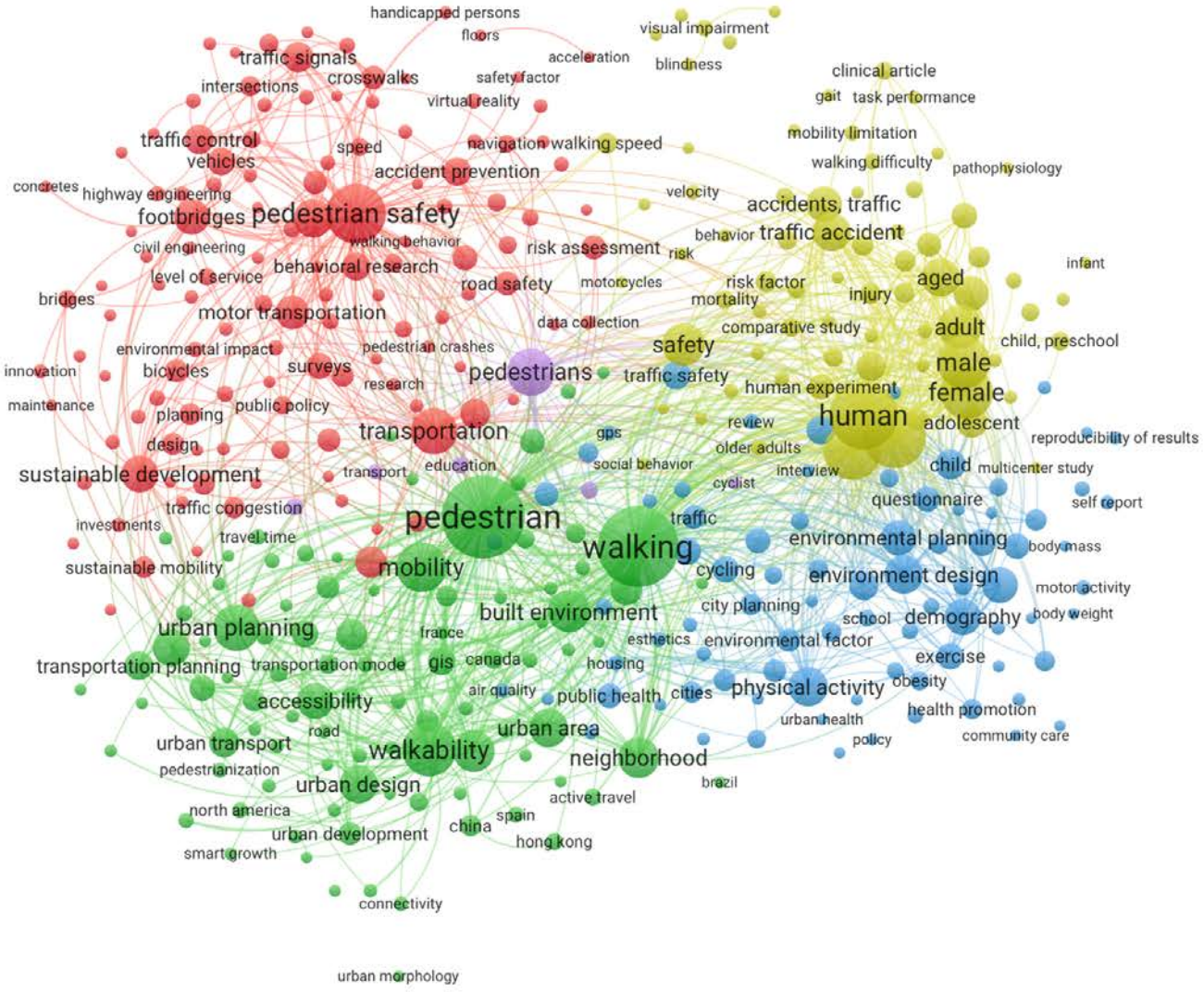

Figure 8: Cluster from filtered sample (final bibliometrics search), with pedestrian, pedestrian safety, walking and generic terms such as human, adult, male and female standing out as key terms. This reflects a lack of systematization of key terms related to walking for transport. © Laboratorio de Cambio Social.

Table 10 provides a list of the number of articles mentioning each term represented in the previous figure. The contrast between **index terms** and **author terms** reveals that indexation systems are lagging far behind authors, in terms of the precision of search terms in use. Authors key terms reflect the current state of walking research more accurately than the indexation system, a problem for generating substantial research based on previous and concurrent findings. The large number (100) of terms and frequencies of mention (ranging from a high of 679 for the term “walking”, through “exercise” and “mobilities” with 10

mentions, highlights the variety of terms, some of the most common, such as “female”, “male”, “human” and “humans”, are very generic and offer little insight into a significant aspect of walking for transport.

Table 10, Keyword clusters using Index versus Authors’ terms

	Index terms			Author keywords	
Rank	**Terms**	**Frequency**	**Rank**	**Terms**	**Frequency**
1	walking	679	*51*	walkability	203
2	pedestrian	500	*52*	walking	150
3	female	368	*53*	pedestrian	141
4	male	366	*54*	mobility	106
5	human	357	*55*	built environment	104
6	humans	306	*56*	pedestrians	97
7	article	252	*57*	physical activity	68
8	pedestrian safety	250	*58*	accessibility	64
9	adult	235	*59*	sustainability	64
10	aged	201	*60*	urban design	47
11	safety	183	*61*	safety	44
12	middle aged	165	*62*	road safety	39
13	urban planning	156	*63*	pedestrian safety	33
14	transportation	152	*64*	gis	26
15	united states	147	*65*	transportation	26
16	adolescent	131	*66*	public space	25
17	neighborhood	130	*67*	active transportation	22
18	child	125	*68*	active travel	22
19	urban area	122	*69*	traffic	21
20	mobility	117	*70*	children	20
21	environment design	115	*71*	environment	20
22	pedestrians	115	*72*	public health	20
23	roads and streets	114	*73*	urban planning	20
24	traffic accident	113	*74*	neighborhood	19
25	demography	106	*75*	pedestrian mobility	19
26	sustainable development	104	*76*	older adults	18
27	residence characteristics	101	*77*	space syntax	18

Table 10, Keyword clusters using Index versus Authors' terms					
	Index terms			Author keywords	
Rank	Terms	Frequency	Rank	Terms	Frequency
28	accidents traffic	98	78	bicycling	17
29	footbridges	95	79	sustainable mobility	17
30	environmental planning	94	80	traffic safety	17
31	exercise	90	81	transport	17
32	perception	90	82	bicycle	15
33	decision making	89	83	perception	15
34	urban design	89	84	sidewalks	15
35	motor transportation	86	85	urban mobility	15
36	physical activity	86	86	land use	14
37	built environment	79	87	connectivity	13
38	young adult	73	88	cycling	13
39	accessibility	72	89	obesity	13
40	accident prevention	72	90	sustainable development	13
41	traffic signals	69	91	gender	12
42	land use	67	92	mode choice	12
43	travel behavior	67	93	pedestrian behaviour	12
44	urban population	67	94	transit-oriented development	12
45	urban transport	66	95	urban environment	12
46	traffic and transport	65	96	urban form	12
47	traffic control	65	97	pedestrian flow	11
48	controlled study	64	98	planning	11
49	transportation planning	64	99	exercise	10
50	behavioral research	62	100	mobilities	10

Source: Own elaboration based on workshop summaries, from the Spanish-language workshop (10 September 2021) and the Global Workshop (26 September 2021). © Laboratorio de Cambio Social.

4.1.2 Specific cluster for “mobility” as it relates to “walking” and “walkability”

For a closer look, we examined keyword clusters for relationships among terms, particularly **mobility (298 links)**, as it linked to terms, **walking and walkability** (figure 9). In this case, pedestrian safety and mobility, along with navigation, accident prevention, risk assessment, roads and streets appeared, along with generic terms, particularly motor transportation, navigation, carrier mobility, accidents and accident prevention. Perhaps most disappointingly, the terms in the more socially oriented set of articles were extremely generic, focusing on human and humans, female, adult, male, article, and overlapping with safety and traffic accident.

The cluster (figure 9) reveals links between these most common terms. Within the clusters, however, the demographic terms reveal how generic the human characteristics under consideration often remain, at least when studying walking. This perspective contrasts with the rich variety of human experience with walking, simply associated with age — adolescents versus older adults, children versus adult men or their caregivers, adult women — as pointed out by the interviews with the French researchers.

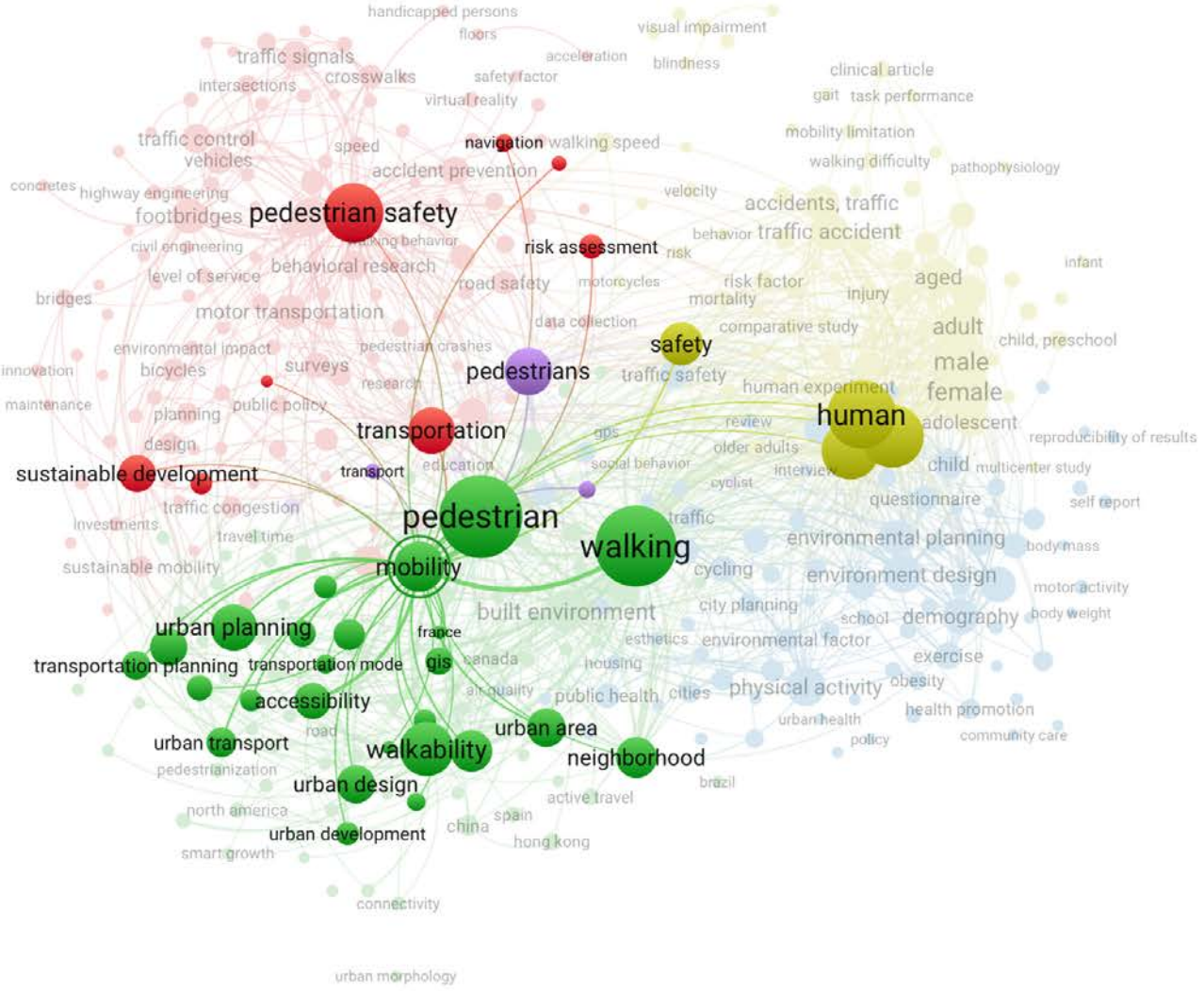

Figure 9. ***Analysis of mobility, walking and walkability*** *clusters and links among terms used by authors. Input data bibliometrics search 2000-2001. The colour of each cluster reflects the weight assigned to terms and links within the sample, with Red reflecting most, and Green, Yellow, Blue and Purple in descending order. © Laboratorio de Cambio Social.*

4.1.3 Specific cluster for "walking" as it relates to "mobility" and "walkability"

Similarly, we analyzed **walking** (361 links) as it lined to the terms mobility, walkability (figure 10).

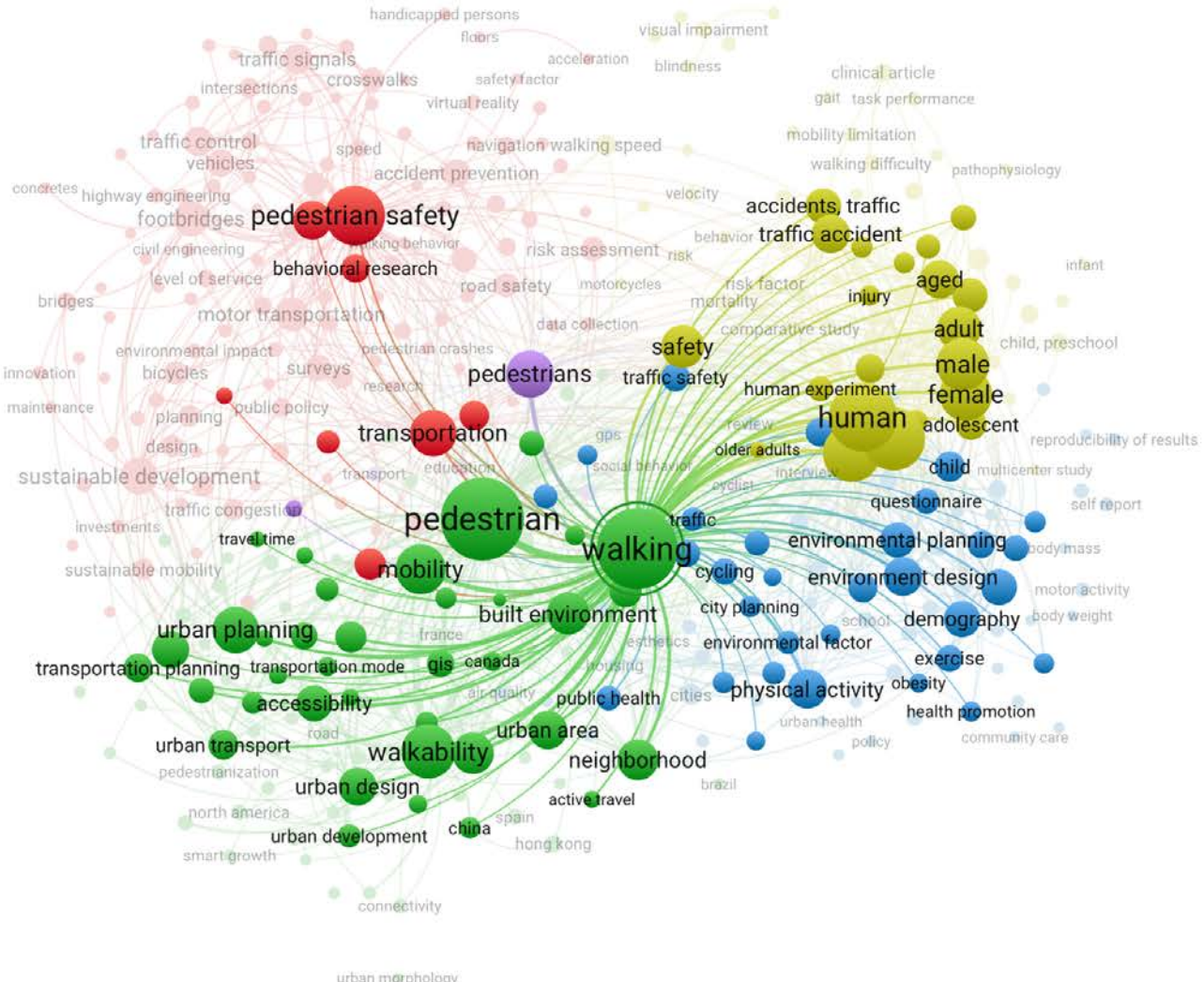

Figure 10. ***Analysis of walking as it linked to mobility and walkability*** *clusters and links among terms used by authors. Input data bibliometrics search 2000-2001. The colour of each cluster reflects the weight assigned to terms and links within the sample, with Red reflecting most, and Green, Yellow, Blue and Purple in descending order. © Laboratorio de Cambio Social.*

4.1.4 Specific cluster for "pedestrian" as it relates to "mobility" and "walkability"

We repeated this exercise for the term **pedestrian (361 links),** as it linked to mobility, walk and walkability revealed perhaps the richest ecology of terms, bringing in pedestrian, walking and mobility, with some focus on walkability, pedestrian mobility and urban planning. Although the generic terms of human and humans remained, references to traffic accidents, age, experimental and residential characteristics also emerged, and neighbourhood/neighborhood also emerged, since these are key sites for walking and walkability (figure 11).

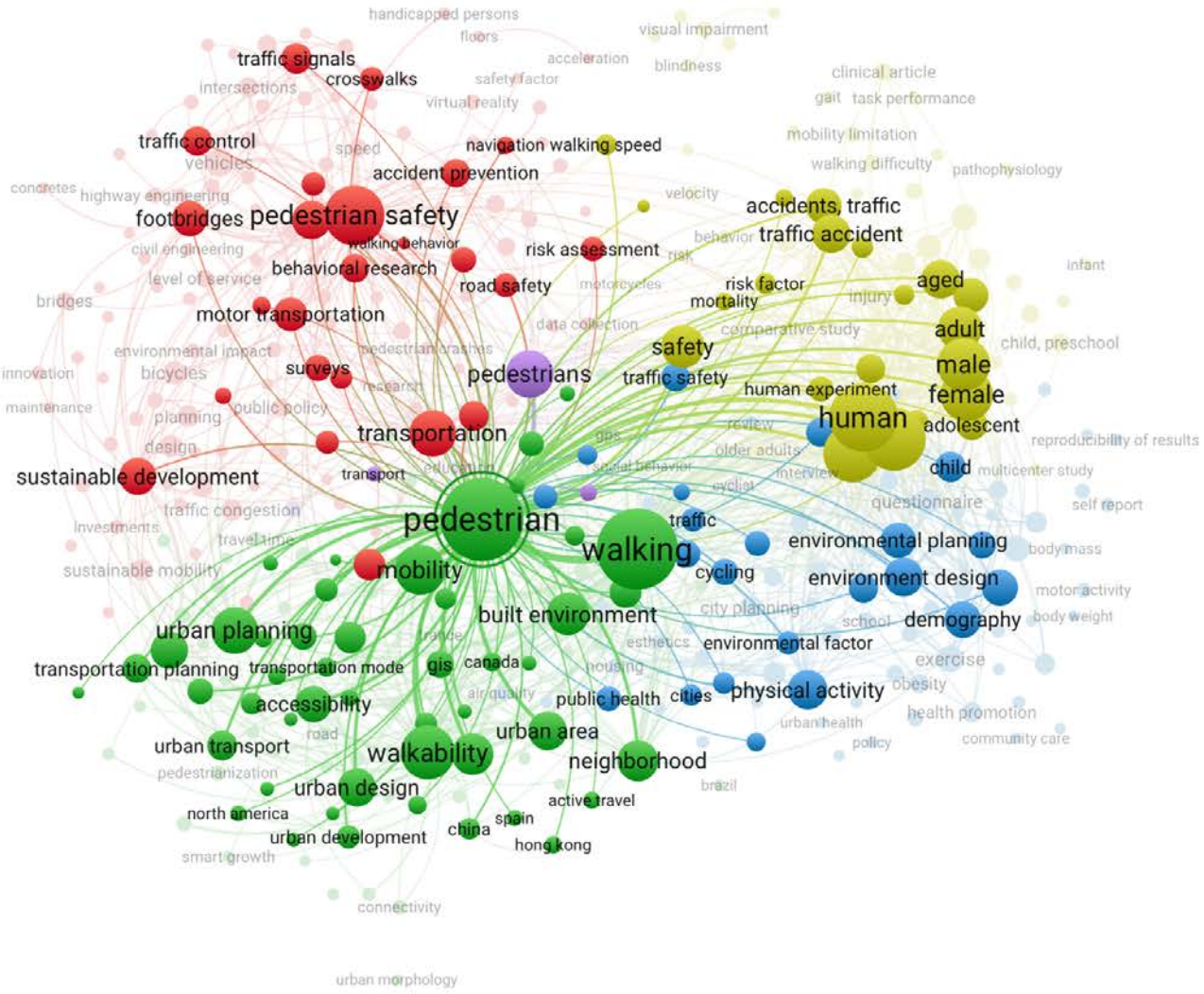

*Figure 11. Analysis of **pedestrian as it linked to mobility and walkability**, clusters and links among terms used by authors. Input data bibliometrics search 2000-2001. For the clusters, we set the counting method as fractional, threshold 10 occurrences, with the size of the circle reflecting the occurrences of a Key word within the sample. The colour of each cluster reflects the weight assigned to terms and links within the sample, with Red reflecting most, and Green, Yellow, Blue and Purple in descending order. © Laboratorio de Cambio Social.*

Altogether, this bibliometric mapping points to the need for more profound theoretical and conceptual work, grounded in empirical, ethnographic and quantitative studies, to develop a much clearer framework for studying and understanding walking, particularly as a socio-cultural phenomenon. Socio-cultural aspects of human practice tend to be central to any effort to reinforce positive and discourage negative practices, such as the tendency to switch from walking to driving (or being driven) to school, or to use a car to travel very short distances (under 2 km), which would be better suited by walking or cycling.

4.2 Cluster analysis, word clouds and tables to analyze additional search terms

An additional round of bibliometric analysis involved going back to our initial list of potential terms and generating both clusters and word clouds to get a sense of their relevance. For presentation here we have used a table (table 11), which proved to be the best way to summarize the most information in a comprehensible format.

Table 11, Additional bibliometric analyses and results

	Walking and…	Additional term	5-6 most frequent terms	Mentions, most frequent term	Variety (No. of different terms)	Total occurrences
1	Neighborhood	(Transport)	Walking, female, male, human, adult, humans, aged	1,363	3,609	**31,734**
2	Children	Non-motorized transport	Walking, pedestrian, mobility, pedestrians, walkability, sustainability	492	7,340	**22,363**
3	Policy	(transport)	Walking, female, human, male, humans	789	3,432	**19,128**
4	Public transport	Mobility	Mobility, walking, pedestrian, sustainability, accessibility, walkability	277	5,656	**15,856**
5	Advocacy	(transport)	Human, walking, humans, article, female, male, child	80	1,157	**3,065**
6	Transport	Behaviour change	Walking, female, male, adult, human	97	738	**2,170**
7	Genders	Women	Female, male, walking, adult, middle aged	65	584	**1,696**
8	Participation	(Transport)	Physical activity, walking, built environment, exercise, active transport, cycling	61	699	**1,202**
9	Gender	Equity	Walking, pedestrian, human, male, female	129	20	**1,073**
10	Children	Public transport	Walking, children, physical activity, barriers, walkability (active transport)	65	311	**970**
11	Economic benefits	(transport)	Walking, female, adult, male, human	25	248	**510**
12	Governance	(transport)	Governance approach, sustainable development, transportation planning, urban transport, walking	10	280	**444**

Table 11, Additional bibliometric analyses and results						
	Walking and…	**Additional term**	**5-6 most frequent terms**	**Mentions, most frequent term**	**Variety (No. of different terms)**	**Total occurrences**
13	Transport policy	Planning	Sustainable development, transportation planning, urbanization, climate change, governance approach	7	148	**216**
14	Transport justice	Equity	Public transport, transportation planning, urban transport, Canada, mobility, Ontario (Canada)	4	62	**78**
15	Community severance	(Transport)	Pedestrian, walking, mobility, public health, risk assessment	3	66	**77**
Source: Own elaboration based on bibliometric iterations, January 2022. © Laboratorio de Cambio Social.						

This summary reveals that walking is mentioned the most in the context of different kinds of neighborhood studies, with more than 30,000 occurrences. As found with our other searches, generic terms such as “human”, “female” or “walking” tend to dominate, suggesting that walking is often taken for granted, rather than receiving specific, finely tuned analysis using the different qualitative and quantitative methods involved. While gender, participation and equity receive over 1,000 occurrences apiece, the number of articles (mentions) is relatively small, despite the enormous importance of socio-cultural characteristics in determining how, why, where and when people walk.

At the end of the table, governance, transport policy and planning, transport justice and equity, and community severance are the most complete terms used to consider the complexities of walking from a systemic perspective. Mentions are few, however, as low as 66 for that very comprehensive term, “community severance”, and relatively low even for “governance”, at 280. This is even more striking as we find that these only represent 10 articles or fewer. Similarly, for economic benefits, children, gender, advocacy and behavior, the actual number of articles ranges in the low hundreds, or even fewer. Yet these are arguably the fields where solid foundations of knowledge are most required, as these are the issues involved in planning, co-creating, designing and achieving neighbourhoods and other inhabited areas where people love to walk.

5 Key authors and research hubs

Figure 12. World map of production of research on walking, generated by Bibliometrix and the filtered record string (2000-2021). Source: Laboratorio de Cambio Social.

Of general interest as part of the bibliometrics search, but also key to our third product, a map of key researchers and research hubs, this analysis was particularly revealing in terms of our interest in both the Global North and South. Our initial harvest of authors (figure 12), found a substantial list of key authors, evaluated by number of articles published, most well known for their contributions in this field.

The bibliometric search also generated a map of collaborations (figure 13) among these hubs, with most occurring between the English-speaking countries of Canada, the United States and Australia and between these countries and Asia.

Figure 13. World map of collaborations involving research on walking, generated by Bibliometrix and the filtered record string (2000-2021). Source: Laboratorio de Cambio Social.

5.1 Leading authors worldwide, by impact (h-factor)

Figure 14. Leading authors in the world, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

5.2 Leading authors in Canada and the United States

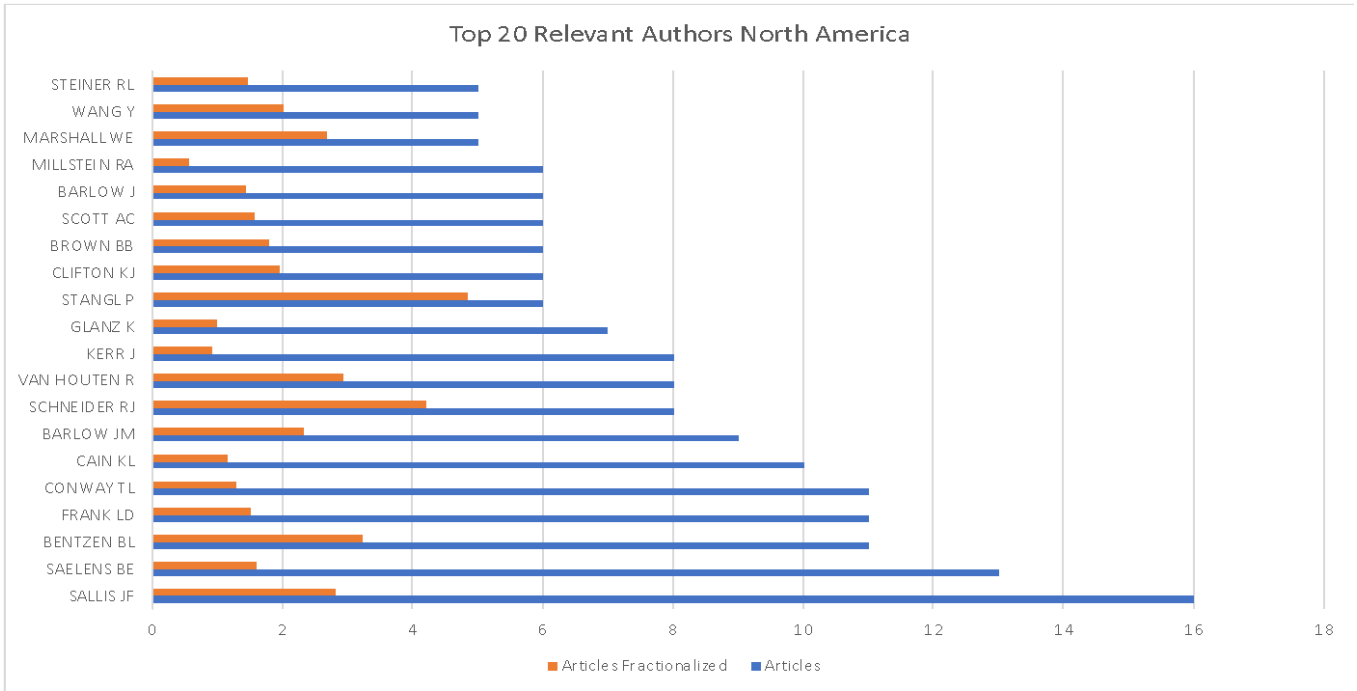

Figure 15. Leading authors in North America, by number of articles, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

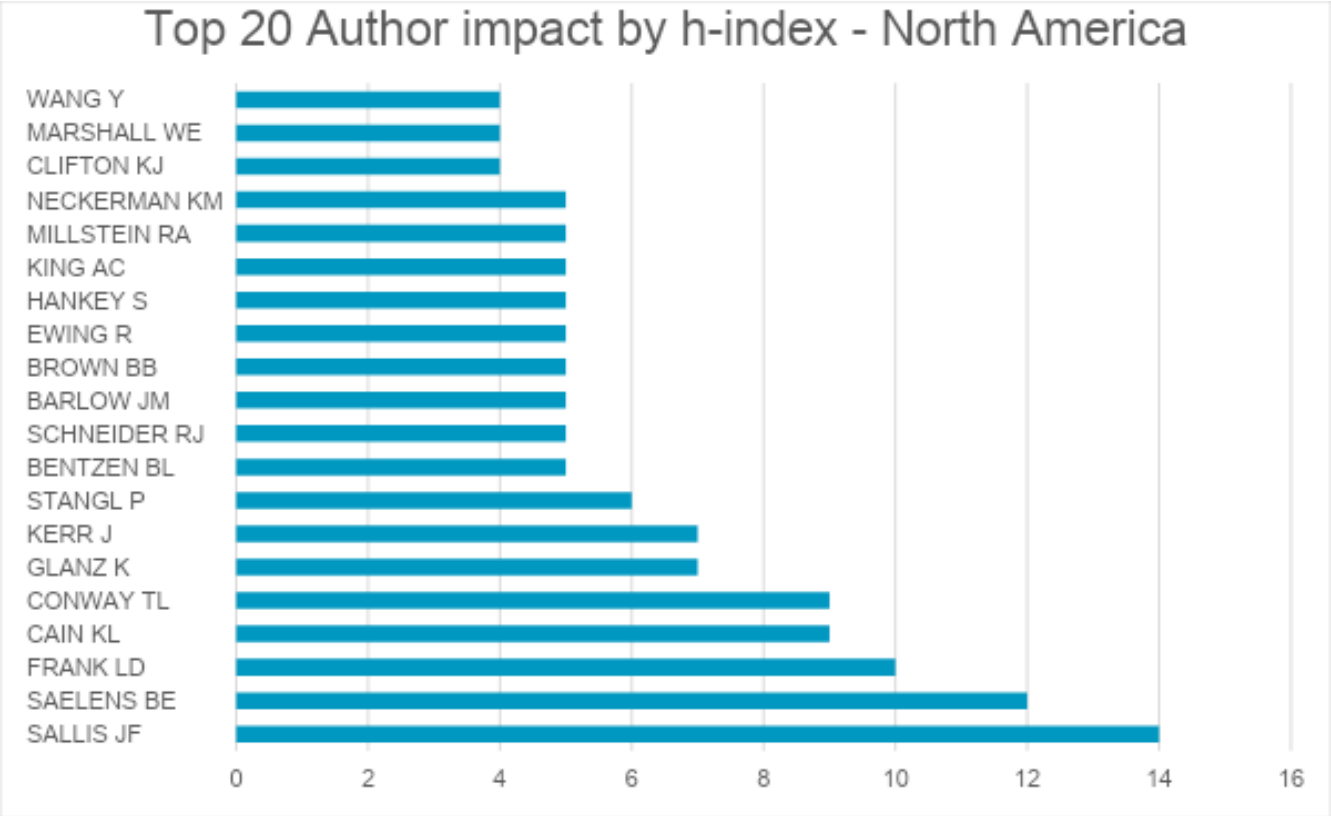

Figure 16. Leading authors in North America, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

5.3 Leading authors in Africa

Similarly, for the African countries considered (South Africa, Kenya, Ghana, with some additional countries appearing in our searches, the bibliometrics search found a list of articles that also included some of those from Asia, which may indicate overlap in fields of study. Several key authors identified in our desk search (table 7b), however, did not come up in the bibliometrics search, particularly Gina Porter who has written extensively about walking in sub-Saharan Africa, often in rural settings. This is of particular concern since the bibliometrics search found authors with just one article, whereas Porter has published 11 studies, primarily in the fields of development studies and geography.

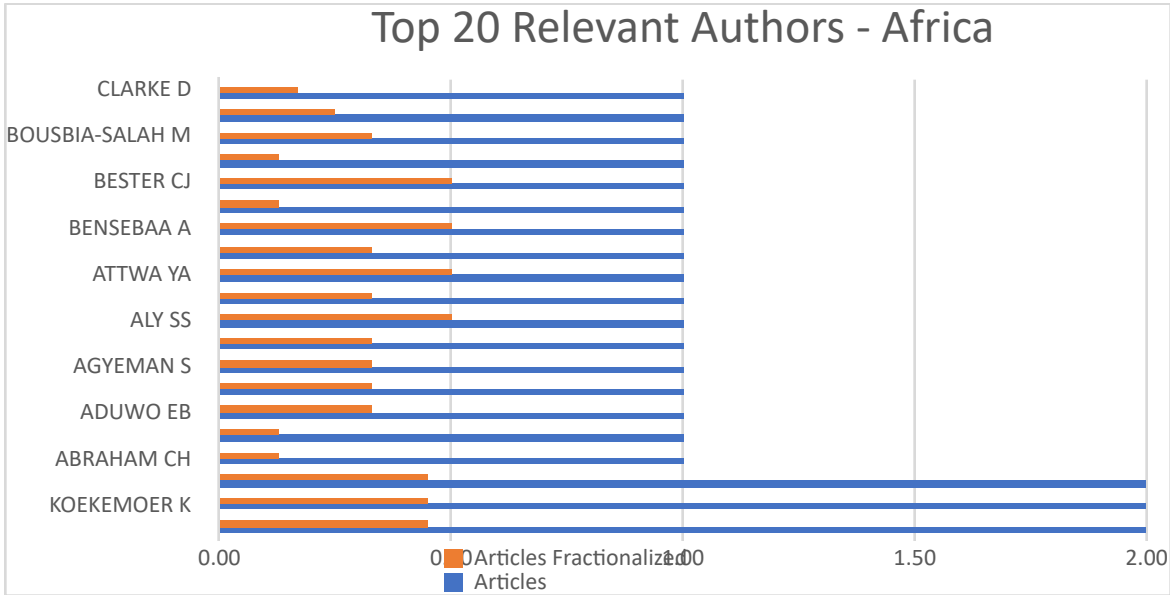

Figure 17. Leading authors in Africa, by articles published, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

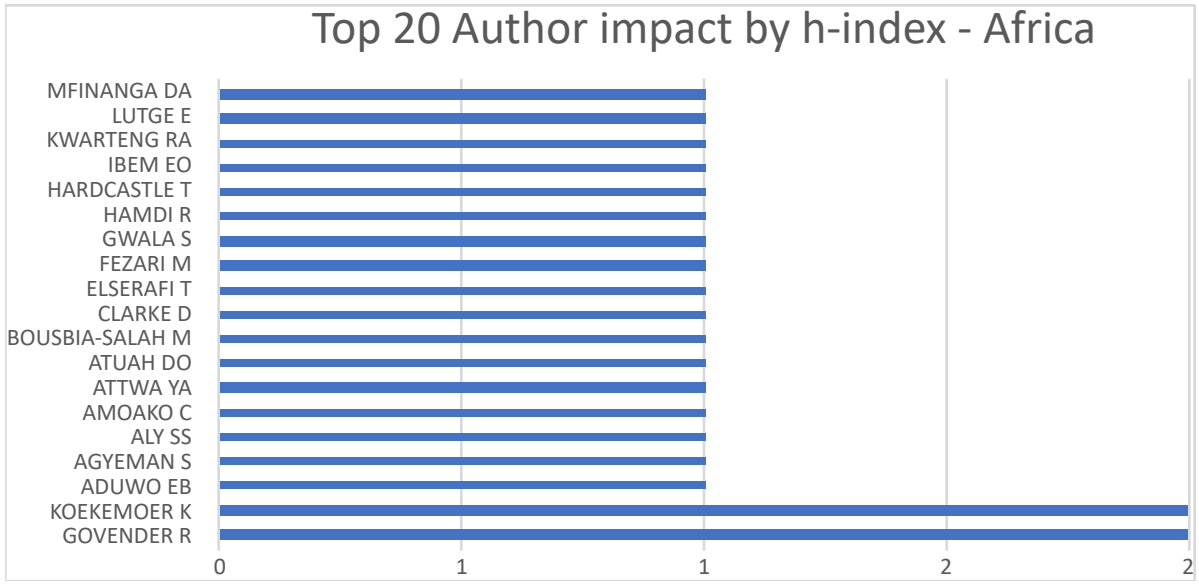

Figure 18. Leading authors in Africa, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

5.4 Leading authors in Latin America and the Caribbean

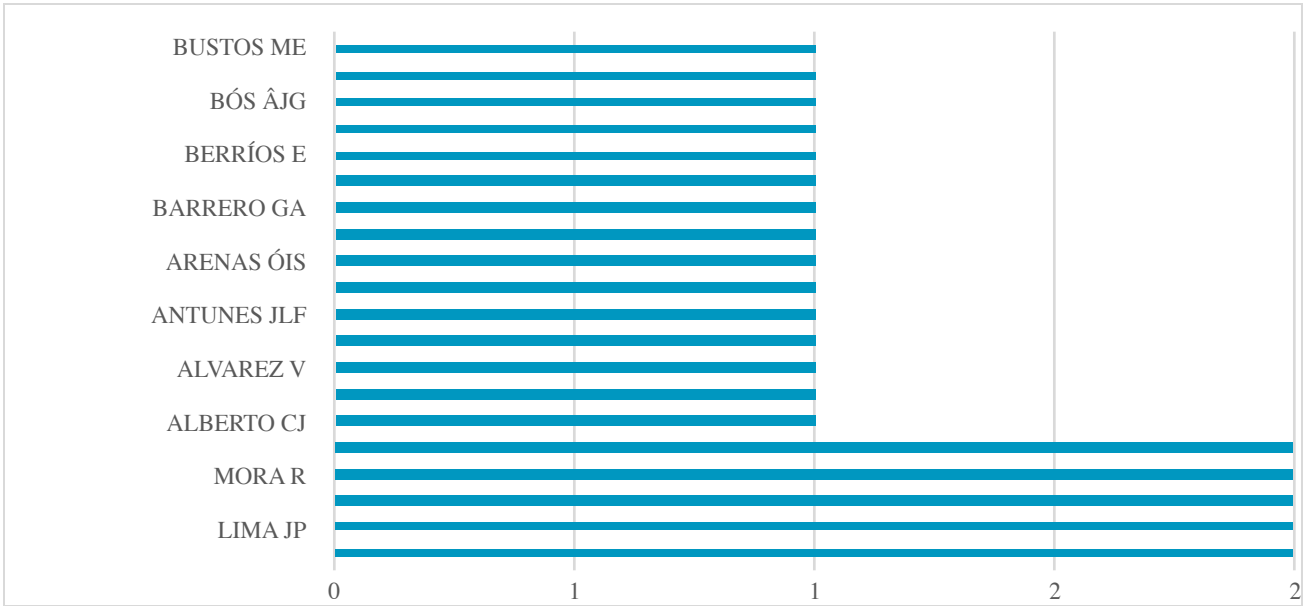

Figure 19. Leading authors in Latin America and the Caribbean, by articles published, bibliometrics search

Figure 20. Leading authors in Latin America and the Caribbean, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

5.5 Leading authors in Asia

For Asia, India and South Africa, with some attention to Kenya and Ghana, we contrasted the bibliometrics findings with our own desk searches. While Asia is much larger than India alone, we found no authors based in India in the bibliometrics analysis, despite the results of the Scopus search on India and walking, which did turn up several authors with four or more publications (table 12), whom we might have expected to see in the bibliometrics analysis.

Figure 21. Leading authors in Asia, by articles published, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

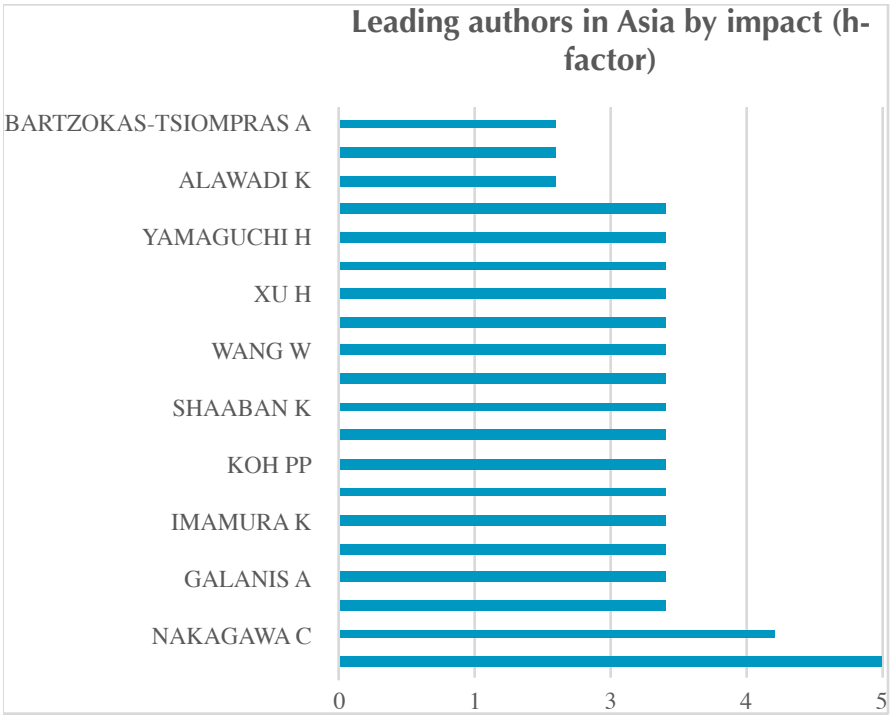

Figure 22. Leading authors in Asia, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

Table 13, Leading authors, Desk Review India and Walking		
	Author	**N (articles)**
1	Rastogi, R.	6
2	Tiwari, G.	5
3	Bivina, G. R.	5
4	Yamamoto, T.	5
5	Patil, G. R.	5
6	Ann, S.,	4
7	Jiang, M.	4
8	Parida, M.	4
9	Dave, S.	4
10	Jiang, M.	4

Source: Desk review, search for Walking and India, Scopus data base, September 2021.

5.6 Leading authors in Europe

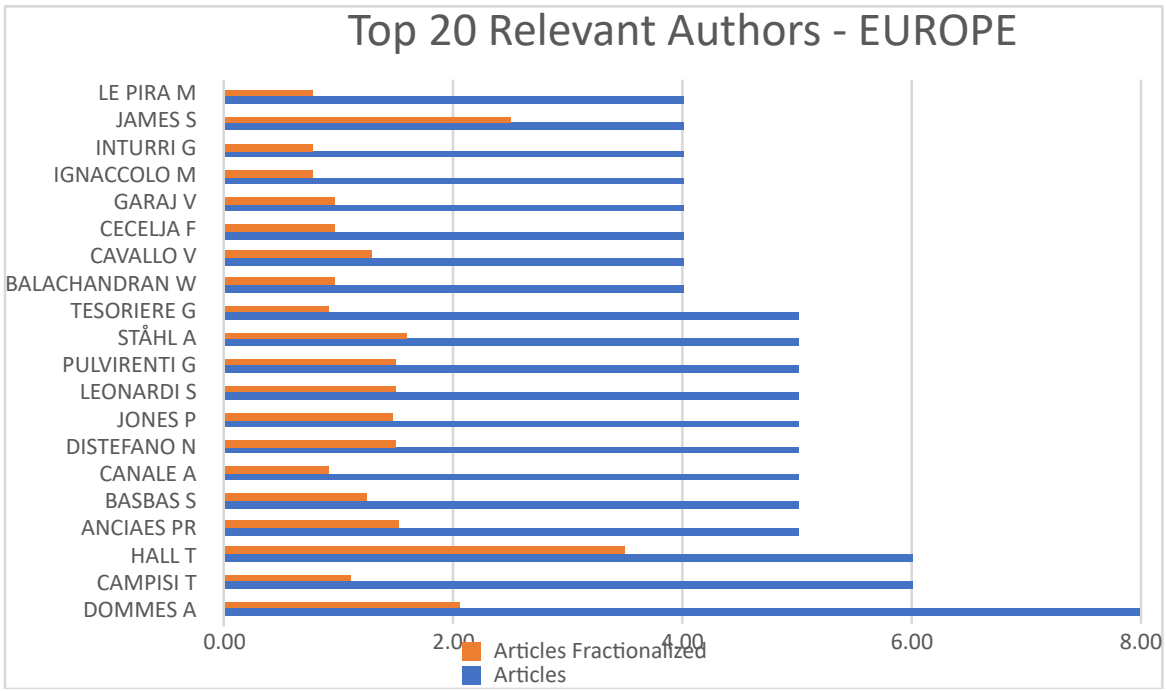

Figure 23. Leading authors in Europe, by articles published, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

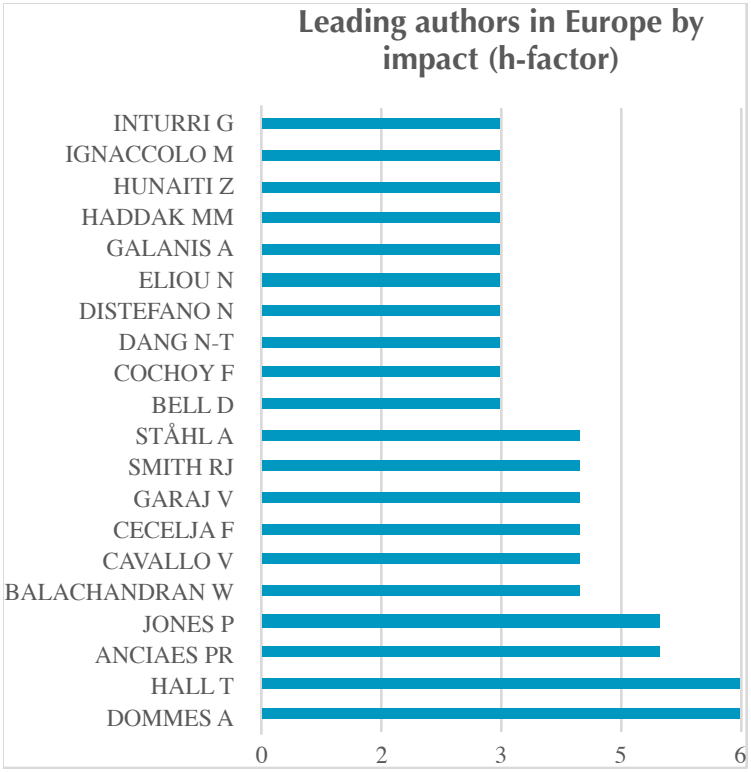

Figure 24. Leading authors in Europe, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

5.7 Leading authors in Australia and New Zealand

For Australia and New Zealand, results of the bibliometrics search raise some questions, since Billi Giles Corti, a very prolific and well known researcher, does not appear on that list, although several of the US authors are repeated here.

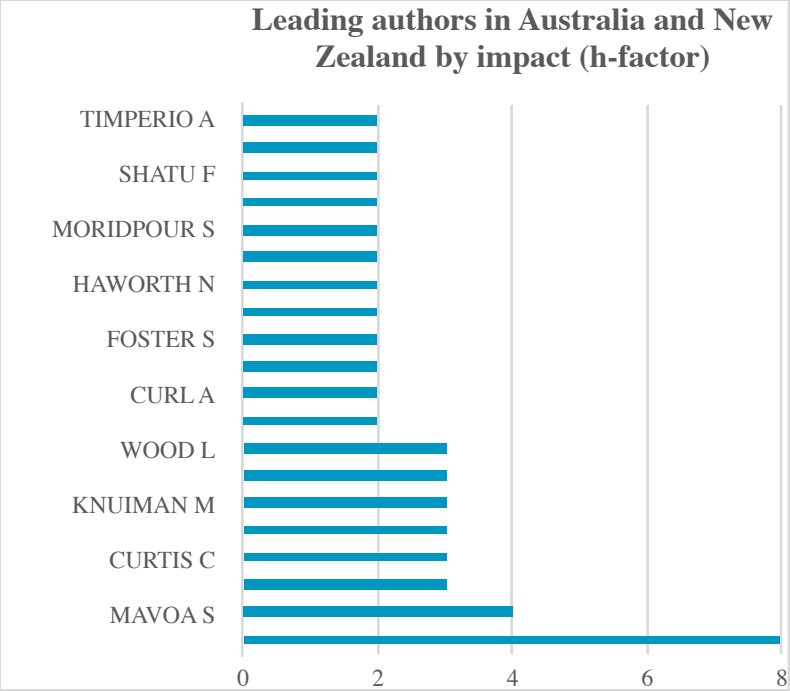

Figure 25. Leading authors in Australia and New Zealand, by articles published, bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

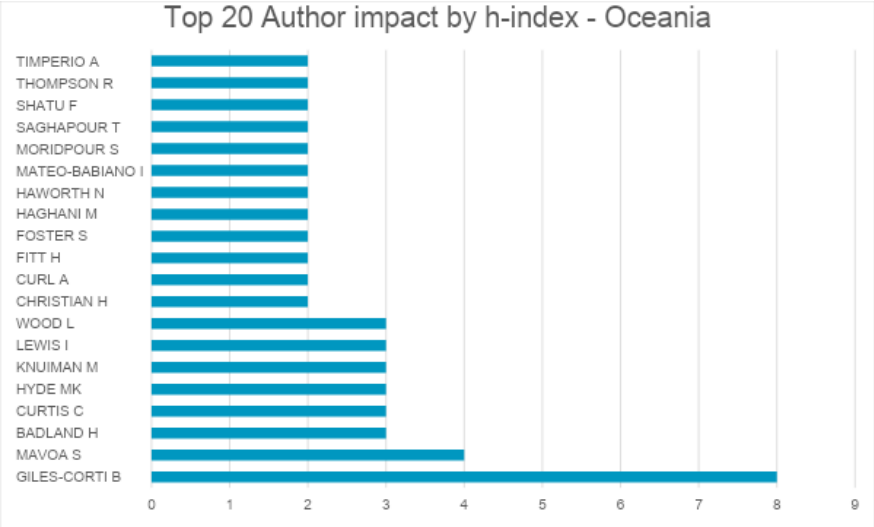

Figure 26. Leading authors in Australia and New Zealand, by H-factor (impact, measured by citations), bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

6 Trends & gaps: discussion and observations

As detected by earlier studies and particularly the precursor to this one, by Heather Allen (2021), despite its crucial importance worldwide as a major transport mode, walking for transport received minimal attention. There are some signs this may be changing, but barriers remain high and difficult to overcome without strategic assistance. The way research is funded and the predominance of journals and research from the Global North, where walking's modal share is substantially lower and issues play out rather differently are key factors in these conditions.

Perhaps the most striking example of this is the list of articles per country (due to its length, it is included in Appendix 5): we did not do a detailed examination of modal distribution for each country, but can see that the general rule that emerges from the list is that the more people walk in the country, the less walking is studied.

Participants in both workshops recommended seeking ways to level the enormous gap between research teams in the Global South and North. Encouraging North-South-South partnerships, as is a tradition within VREF, seems like a particularly promising strategy for generating for equity within research communities themselves. This also appears like a good strategy for addressing more of the governance, social equity, advocacy and health issues required to put walking high on both research and sustainable transport planning agendas. While beyond the mandate for our study, many participants in the workshops recommended looking more closely at funding: this information is often included in basic article information and would provide considerable insight into why current trends are occurring, and some strategies for introducing a better balance in terms of both research and researchers from the Global South and North, South-South-North collaborations, and other promising strategies.

Open Access journals make it easier for people in poorer countries to be able to access the scientific literature, but for researchers, this policy makes it far more expensive to publish. This means that the equity benefits of Open Access are extremely uneven, and in terms of knowledge production by researchers in the Global South, can be highly problematic.

In the Global South, moreover, equity issues play a much larger role in the treatment — and neglect — of walking. Although it is a majority modal share accounting for many and sometimes most daily trips in many cities, walking is neglected in both planning and research. Advocacy, moreover, which has served issues of cycle-inclusion so well, has been less active, although this is changing in many countries, often thanks to the convening effect of Walk 21 and /or local rebellions against the poor conditions offered to those who work.

The table in Appendix 2 illustrates the wide variety of terms used, even in English, which varies significantly by region. The gap between the way research indices define key terms for walking and the way researchers themselves do this reveals another limitation to building a solid foundation for research on walking for transport. Walking is so ubiquitous that its appearances in our research can be extremely vague and between-the-lines. This occurs in pollution studies that examine conditions on walking routes without mentioning this transport mode, or the many, many studies of public transport, which ignore walking completely, despite the fact it is the main ingress and egress mode for trains and bus systems around the world. Similarly, transport-oriented-demand (TOD), which calls for modifications to improve the social, economic and environmental aspects of public transport projects, often rests on studies that do not mention walking directly. There were moments in this process where we considered including key articles of this nature that excluded all mention of walking, at least among key terms, title and abstract, which was the degree of detail to which we worked.

The bibliometric study indicates that the current status of walking for transportation, as both the object of research and public policy, remains extremely elusive and difficult to define. The predominance of engineering and design study methods, developed in the Global North, has further obscured the nature of walking within cities and societies where cultures vary substantially, and walking remains a crucial,

typically majority mode. Its neglect indicate a classic wicked problem (Rittel et al. 1973), which requires going beyond simplistic solutions. We need to better understand walking and position it more centrally in strategies for environmental preservation, climate change adaptation/mitigation, health and other urgent human and environmental needs. Our experience as a university-community collaboration based primarily in the Global South suggests that "successful" strategies to improve research on walking for transport should:

- Encompass the South-South-North collaborative approaches mentioned at the top of this section and consider less conventional participatory action research or other, more society-based approaches to research, which involve well established social and advocacy organizations, working with university researchers in a transdisciplinary and interdisciplinary environment;
- Consider a much larger focus on governance barriers, advocacy, social movements and other catalysts of socio-political change, particularly as they are starting to generate success for walking (Walk21) or as they have worked for cycling (VeloCity, Foro Mundial Bicicleta, World Cycling Alliance, etc.);
- Give priority to a better understanding of how walking can contribute to improving equity democracy and democratization in authoritarian or extremely excluding socio-political environments; and how these can similarly improve the status of walking in both planning and cities themselves;
- In terms of more quantitative methodologies, modeling and similar approaches, generate substantial evidence on how neighborhood and city design and forms that give priority to walking can generate substantial health benefits, as the PASTA and other WHO efforts have done for health and cycling in Europe (Raser et al. 2018); avoiding or reducing greenhouse gas emissions (Brand et al. 2021); social, behavioral and communicative strategies to reduce debates and improve uptake of these kinds of measures, beyond the research centres of the Global North (Anable 2005, Whitmarsh et al. 2011, Schwanen et al. 2012, Shove et al. 2012); governance arrangements for improving the participation of vulnerable road users in decision-making in innovative and effective ways, relevant to major walking areas in both the Global North and Global South.

As the previous sections, and particularly table 11, reveal, based on this available research, it seems likely that real-world design experiments such as those pioneered by Jan Gehl, originally inspired by Jacobs (1961) and Whyte's studies (1979) of the life that thrives in micro urban spaces, might never have occurred if they had depended on formal academic research. Gehl himself and his creative, interdisciplinary teams have generated profoundly innovative spaces based on walking as their main transport mode, typically accessed by walking or quality cycling and public transport, where distances are longer. They have documented their methods in an excellent resource on methods for practitioners (Gehl et al. 2013) and other semi-biographic and reflective works (Gehl 2001, 2010). These efforts are echoed in social and historical studies by Kunstler (1998), Alvord (2000) and Ladd (2008), whose literary non-fiction has taken "automobility" out of the academic world and into real-world American cities. These concepts also emerge in some of the better manuals (Godefrooij et al. 2009), journalism and guidelines (Speck 2013, 2018).

In the academic world, however, as our analysis reveals, there is less research and therefore less evidence regarding the vary diverse experiences of walking by specific groups within the general population, whether we consider the contradictions noted in the interviews with French researchers, who note some cities are highly walkable for some age groups, but not others; the overly vague characterizations of the people who walk, as revealed in the clusters and word clouds, and the confusion of walking amongst related issues, denoted by generic terms such as "pedestrians", road safety, and so on.

The result of these gaps is that although we have a lot of design standards and ideas from the practitioner and grey literature, we don't really have well-tested evidence of what works, in terms of generating environments that encourage people to walk more in the widely varying conditions that cities, rural and intermediate areas offer them, in very different climates and geographies around the world.

This suggests that conducting specific research into practice, practitioners, and advocacy by citizens and social movements, could identify important lessons regarding "what" works, but above all, the "how", of successful planning, participatory, design and decision-making processes that generate the best impacts, not only in terms of transport per se, but also for health, social equity, inclusion, poverty reduction and improving democratization.

This requires moving away from the universalization of specific experiences and studies in very specific places, particularly the high-consumption countries of the Global North. Perhaps the greatest challenge facing our world today is how to improve equity and democratize power and resource distribution, within the very clear limits of a planet that is collapsing under the weight of overconsumption by a minute but highly privileged percentage of the world's population. Within this wicked dilemma, in Rittel and Webber's sense (1973), walking should cease to be treated as an obvious or obsolete mobility option and take centre stage as a powerful force within sustainable and just planning of new, low-consumption modes of living that nonetheless provide social connection, health and happiness to the world's population.

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Note: The bibliography includes all works cited in the main text, but does not constitute the complete bibliography developed during the bibliometrics search.

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Appendix 1, Trilingual glossary of key terms in English, Spanish, French

Table A1, **Glossary of key terms for walking for transport, in English, French, Spanish**

	DESCRIPTION OF KEY CONCEPT(S)	ENGLISH	SPANISH	FRENCH
1	BASE TERM, this term should be on any search string with an AND	transport; mobility; walkability ; pedestrian	Transportes, Movilidad, Caminabilidad, peaton	Transports, Mobilité, Marchabilité (Quebec), Marche (France), Pieton
2	Gender and walking	Women, elders, older adults, children, girls and boys, teenagers, secure public spaces	Mujeres, Personas mayores, Niñes, Niños y Niñas, adolescentes, espacios publicos seguros	Femmes, Personnes âgées, enfant, garçons, filles, adolescents, espace public sûr
3	**Equity and active transport, including gender, children, elders, older adults and people living with disabilities**	Older adults, aging, Safe Routes to School, Kool Routes to School, health, physical health, mental health, social determinants of health, active living, transport justice, transport equity, transport poverty, Trip chaining, Care-related trips, multipurpose trips	Personas mayores, Rutas Seguras a la Escuela, Rutas Bakanes a la Escuela, Salud, fisical salud, salud mental, determinantes sociales de la salud, vida activa, transporte justo, transporte equitativo, pobresa del transporte, viajes de cuidado (Ines Sanchez de Madariaga), viajes multipropósitos, viajes encadenados	Personnes âgées, Routes sûres à l'école, Routes Cools à l'école, Santé, santé physique, santé mental, Déterminants social de santé, vie active, justice des transports, équité des transports, pauvreté des transports, déplacements secondaires, déplacements enchaînés
4	**Recognising walking as a transport mode: Walking, (walkability), active transport, non-motorized transport (NMT)**	Walking and walkability, active transport, active mobility, complete streets, streets for all, woonerfs, traffic calming	Caminata y caminabilidad, transporte activo, movilidad activa, calles completas, calles para todos, calles para todes, woonerfs (patio viviente) ,tránsito calmado	Marche pied, transport actif, mobilité active, rue complète, rue pour tout le monde, woonerfs, Apaisement de la circulation
5		Citizen participation, collaborative governance	Participación ciudadana, Governance colaborativa	Participation citoyenne, gouvernance colaborative
6	**Data collection and tools**	Action Research and Participatory Action Research, Origin-destination surveys, big data, cartography, spatial analysis, maps, origin-destination survey	Investigación-Acción y Investigación-Acción Participativa, cartogafria, analysis espacial, mapas, Encuestas de movilidad domiciliaria, Encuesta origen-destino	Recherche-action et recherche-action participative, enquêtes origine-destination, big data, cartographie, analyse spatiale, cartes, enquête origine-destination

7		Transport and other forms of modeling, acitivty-based models, agent-based models	Modelos de transportes y otros tipos de modelos, modelos basados en actividades, modelos basados en agentes	Modèles de transport et autre type de modelés, modèles basés sur les activités, modèles basés sur les agents
8		METREC Gender walking audits, Community Audits, similar tools	Método de las auditorías de seguridad de mujeres, auditorías comunatorias	Méthode d'audits de sureté des femmes, audits communautaires
9		Living Laboratories	laboratorios vivientes	Laboratoires vivants
10		University-Community collaborations	Colaboraciones entre universidades y comunidades	Collaborations entre universités et communautés
11	**The economic benefits of walking**	Health, infrastructure, education, schools, cost-benefit analysis, transport assessment, health assessment, HEAT (WHO)	Salud, Infraestructura, educación, escuelas, análisis costos-beneficios, evaluación del transporte, evaluación de la salud, HEAT (OMS)	Santé, infrastructures, éducation, écoles, analyse coûts-bénéfices, évaluation des transports, évaluation de la santé, HEAT (OMS)
12	**Safety and security**	Gender, road, crime-related violence, harassment, rape, public spaces, neighbourhoods, age, crime, inequality, vulnerable road users, VRU, traffic accidents, since accidents, crashes, car accidents, road crashes, Road Traffic Injuries, Safety in numbers	Genero, Transito, Género, tráfico, violencia relacionada con el crimen, acoso, violación, espacios públicos, barrios, edad, crimen, desigualdad, usuarios vulnerables (viales o de la via), VRU, accidentes de tráfico (espana) accidente de trasito, hechos viales, siniestros viales, choques, Traumatismos causados por el tránsito, Seguridad en numeros	Sexe, route, violence liée à la criminalité, harcèlement, viol, espaces publics, quartiers, âge, criminalité, inégalités, usagers vulnérables de la route, VRU, accidents de la route, accidents de voiture, accidents de la route, Blessures de la route, Sécurité en Nombre, sureté et sécurité

13	**Pedestrian infrastructures**	Design, social function of public spaces, complete streets, traffic calming, woonerfs, school and play zones, co-design, project for public spaces, the 15-minute city, pedestrianized streets, inter modality, connective, the 3 Ds, the 5 Ds, proximity, accessibility, accessibility planning, universal design, Walkable Route, Walkable neighborhood, Pedestrian, Cul de sac, tactical urbanism, Placemaking, Livable streets, Built environment	Diseño, función social de los espacios públicos, calles completas, tránsito calmado, woonerfs, zonas escolares y lúdicas, codiseño, proyecto para los espacios públicos, la ciudad de los 15 minutos, calles peatonales, intermodalidad, conectividad, las 3 D, las 5 Ds, proximidad, accesibilidad, planificación de accesibilidad, diseño universal, Ruta caminable, Barrio caminable, Peatones, Movilidad pedestre, fondo de saco, urbanismo tactico, zonas de encuentro , calles para todes, compartir el espacio, movilidad pedestre	Design, fonction sociale des espaces publics, rues complètes, apaisement de la circulation, woonerfs, zones scolaires et ludiques, co-conception, projet d'espaces publics, la ville des 15 minutes, rues piétonnes, inter modalité, connectivité, les 3 D, les 5 Ds, proximité, accessibilité, planification de l'accessibilité, conception universelle, Parcours piéton, Quartier piéton, Piéton, Cul de sac, urbanisme tactique, mobilité pédestre, déplacements pédestre, Amenagements Piétons, cul de sac, zone de rencontre, partage de l'éspace
14	**Policy**	Transport policy, spatial planning, urban and regional planning, transport and land use	Política de transporte, planificación del territorio, planificación urbana, uso del sistema de transporte y uso del suelo	Politique des transports, aménagement du territoire, planification urbaine et régionale, transports et aménagement du territoire
15	**Changing behaviour**	Behaviour change, behavior modification, theory of planned behaviour, fostering behaviour change (McKenzie-Mohr), modal choice, transtheoretical model (Prochaska), Ecologic Model (Sallis)	Cambio de comportamiento, modificación del comportamiento, teoría del comportamiento planificado, fomento del cambio de comportamiento (McKenzie-Mohr), elección modal, modelo de cambio, transtheoretical model (Prochaska), Ecologic Model (modificado por sallis), cambios con COVID	Changement de comportement, modification du comportement, théorie du comportement planifié, promotion du changement de comportement (McKenzie-Mohr), choix modal, modèle transthéorique (Prochaska), modèle écologique (Sallis)
16	Social movements, agency, advocacy, activism			

17	Governance, participation, civil society, collaborative planning			
18	Neighborhood planning, community development			
19	Barrier effect, community severance	Barrier effect, community severance	Fragamentación del espacio	Aménagement du territoire, fragmentation, coupure urbaine
20	Subjective aspects	Self-selection, preferences, attitude, well-being	Autoselección, preferencias, actitud, bienestar	Auto-sélection, préférences, attitude, bien-être

Appendix 2, Word clouds illustrating regional/cultural differences

Author keywords are considerably more precise than the generic terms used by indices, but could still benefit from a more widely shared set of terms to address walking and walkability, in their social, environmental, technical, design and other dimensions. Generic terms such as male, female, human, for example, tend to mask rather than identify and link studies whose main focus may vary widely. Terminologies also reflect how language and thinking is evolving, with walkability in particular coming to the fore (among authors but not indices) as a key term for understanding the many different dimensions of walking.

Table A2 Descriptor gap, contrasting Author versus Index key terms

Location	Author keywords	Index keywords
World		
Africa		
Asia		

Table A2 Descriptor gap, contrasting Author versus Index key terms		
Location	**Author keywords**	**Index keywords**
Europe		
North America		
Oceania		
South America		

Source: Own elaboration using bibliometrix and the filtered record string from our bibliometrics search (2000-2021). Source: Laboratorio de Cambio Social.

Appendix 3, Full country and article list

Table A3, Full country and article list		
	Country	Articles
1	USA	1865
2	CANADA	437
3	CHINA	436
4	UK	375
5	AUSTRALIA	345
6	JAPAN	280
7	ITALY	261
8	SPAIN	201
9	GERMANY	152
10	INDIA	151
11	FRANCE	144
12	BRAZIL	124
13	NETHERLANDS	107
14	SOUTH KOREA	98
15	MALAYSIA	91
16	TURKEY	82
17	SWEDEN	81
18	PORTUGAL	75
19	GREECE	74
20	SINGAPORE	73
21	NEW ZEALAND	68
22	ISRAEL	63
23	COLOMBIA	49
24	CHILE	48
25	IRAN	46
26	SOUTH AFRICA	44
27	BELGIUM	42
28	AUSTRIA	41
29	DENMARK	35
30	FINLAND	34
31	NORWAY	34
32	CZECH REPUBLIC	32
33	MEXICO	31
34	SWITZERLAND	25
35	POLAND	24
36	ROMANIA	22
37	NIGERIA	20
38	QATAR	20
39	IRELAND	17
40	ALGERIA	16
41	CROATIA	16
42	INDONESIA	16
43	ARGENTINA	15
44	GHANA	14
45	PAKISTAN	13
46	BANGLADESH	12
47	CYPRUS	11

Table A3, Full country and article list		
	Country	Articles
48	EGYPT	11
49	UGANDA	11
50	SERBIA	10
51	SLOVENIA	10
52	GEORGIA	9
53	SAUDI ARABIA	9
54	THAILAND	9
55	JORDAN	8
56	LEBANON	8
57	PERU	8
58	PHILIPPINES	8
59	IRAQ	7
60	MALTA	7
61	BENIN	6
62	ECUADOR	6
63	KUWAIT	5
64	LITHUANIA	5
65	LUXEMBOURG	5
66	HUNGARY	4
67	OMAN	4
68	ESTONIA	3
69	MOROCCO	3
70	SRI LANKA	3
71	ALBANIA	2
72	NEPAL	2
73	SLOVAKIA	2
74	BOTSWANA	1
75	COSTA RICA	1
76	KENYA	1
77	TANZANIA	1
78	TUNISIA	1
79	URUGUAY	1
80	VENEZUELA	1
		6432

Source: Bibliometrics Search, November 2021, © Laboratorio de Cambio Social.