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Exploring complex causal pathways between urban renewal, health and health inequality using a theory-driven approach

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ABSTRACT:

Introduction: Urban populations are growing and to accommodate these numbers, cities are becoming more involved in urban renewal programs to improve the physical, social and economic conditions in different areas. This paper explores some of the complexities surrounding the link between urban renewal, health and health inequalities using a theory-driven approach.

Methods: We focus on an urban renewal initiative implemented in Barcelona, the Neighbourhoods Law, targeting Barcelona's (Spain) most deprived neighbourhoods. We present evidence from two studies on the health evaluation of the Neighbourhoods Law, while drawing from recent urban renewal literature, to follow a four-step process to develop a program theory. We then use two specific urban renewal interventions, the construction of a large central plaza and the repair of streets and sidewalks, to further examine this link.

Discussion: In order for urban renewal programs to affect health and health inequality, neighbours must use and adapt to the changes produced by the intervention. However, there exist barriers that can result in negative outcomes including factors such as accessibility, safety and security.

Conclusion: This paper provides a different perspective to the field that is largely dominated by traditional quantitative studies that are not always able to address the complexities such interventions provide. Furthermore, the framework and discussions serve as a guide for future research, policy development and evaluation.

KEYWORDS:

Urban renewal, theory-driven, health inequality, public space, evaluation

Introduction

Urban renewal policies are large-scale interventions consisting of a combination of projects, and in recent years have expanded beyond physical changes to include actions aimed at social and economic improvements especially in deprived urban areas (Smith & Petticrew 2010; MacGregor 2010). Projects can range from the creation of green spaces, the repair of streets and sidewalks and the improvement of transportation, to the establishment of employment centers, the organization of community wide events and the formation of support groups for vulnerable populations. However, urban renewal policies tend to exclude health considerations and have even been blamed in some cases for contributing to social exclusion or gentrification (Arbaci & Tapada-Bertelli 2013) all associated with poor health conditions (Kearns et al. 2009). Therefore, while physical, economic and social issues continue to be a top priority in these policies, there continues to be few urban renewal projects that actively target health and promote health equity (Egan et al. 2010; Thomson et al. 2006). Furthermore, the complexity associated with these projects and their outcomes arise from the great variability in factors such as, the program planning, the implementation process, context, population composition and their interactions (Kearns et al. 2009; Thomson et al. 2006).

This complexity has resulted in limited evidence available on the effects of large-scale urban renewal on health and health inequalities. The existing research in this field has mostly focused on small-scale interventions such as improvements in housing and transportation and their potential effects on specific physical and mental health outcomes including, asthma, obesity, or depression (Cave & Curtis 2001; Morrison et al. 2003). Until recent

projects such as the GoWell study (Egan et al. 2010), evaluations have generally depended on quantitative analysis, including traditional cost-effectiveness methods, to measure changes in health of populations affected by urban renewal projects (Thomson et al. 2006). Finally, little information has been produced on their impacts on health inequalities. This is possibly due to the limited availability of data linking health and socioeconomic indicators, and the lack of information needed to better design, plan and implement such interventions (Tannahill & Sridharan 2013; Thomson 2008).

In 2001, Cave and Curtis described the usage of a theory based approach, such as realist evaluations, for studying the health impact of urban regeneration schemes while emphasizing the importance of incorporating stakeholders' knowledge in the process (Cave & Curtis 2001). Since then, qualitative approaches such as in-depth interviews or focus groups have been used to achieve a deeper understanding of the perceptions and experiences of urban renewal projects and their effects on wellbeing (Thomson 2008). As mentioned, projects like GoWell in Scotland have recently taken on a mixed-methods approach. They have been successful in detailing the process and implementation of the program with prospects of short term and long term impacts on health once the program has been completed, all of which are needed to better explain the impacts on health and health inequalities (Egan et al. 2010).

Furthermore, there continues to be a lack of conceptual models or programme theories to explain the resources urban renewal interventions offer to recipients, their response, and in what circumstances these responses lead to their anticipated benefits. Such causal

pathways can be thought of as theories. Using a theory based approach, social mechanisms can describe how the intervention causes change, which is useful for future policy decisions and program planning (Dunn et al. 2013; Pawson & Sridharan 2010 pg.44). A program theory should describe the process through which the program is expected to result in change (O'Campo et al. 2009; Sridharan & Nakaima 2011). To develop these programme theories, we can borrow from existing evidence on the urban setting (both physical and social environments) and health (Borrell et al. 2000 & 2013; Northridge & Freeman 2011). From these findings, improvements in any of these two environments through interventions like urban renewal may eventually result in improvements in health and health equity.

Thus, a solution to focusing and developing causal pathways between urban renewal and health is applying a theory-driven approach. The goal of theory-driven evaluations is to explain how such interventions can have an effect on the process and outcome objectives while considering the context in which it was carried out in (Chen 2012).

Theory-driven evaluations can provide a full understanding of the program and its goals while having a constant consideration of the contextual settings in which they are implemented (Pawson & Sridharan 2010; Donaldson & Gooler 2003). They combine the collection of both quantitative and qualitative data helping order to better understand the different mechanisms underlying how and why interventions give rise to outcomes (Donaldson & Gooler 2003; Van Belle et al. 2010). This deeper understanding would then serve to provide guidance for policy planning and implementation.

Theory-driven evaluations have only become more widely used in evaluation and public health since the late 80s (Coryn et al. 2011). They have been successful in explaining the relationship between interventions or policies and specific health outcomes. However, more of these studies are needed to address health inequalities due to the complex systems of interactions occurring between the social determinants of health and the interventions studied (O'Campo et al. 2009; Thomson 2008).

In theory-driven evaluations, complexity is captured by studying how the different theoretical elements that compose them are intertwined (Stame 2004) and by reintegrating the context as a key element in the production of outcomes. The two main branches of this approach include Theories of Change and Realist Evaluations. Both approaches highlight the importance of understanding context, as it is imperative to attributing cause and criticize method-driven approaches (Blamey & Mackenzie 2007). However, they also differ in their application where the Theories of Change approach focuses more on the accumulation of information and less on the refinement of the mechanisms (Weiss 1997). On the other hand, the Realist approach builds on what is known to focus on refining existing theories by describing how, for whom and under what circumstances complex programs work (Pawson 2006).

This paper explores some of the complexities surrounding the link between urban renewal and outcomes in health and health inequalities using a theory-driven approach. To do this, a Realist approach is more suitable as we aim to refine existing theories and to better understand how urban renewal programs affect health and health inequalities. We focus on

an urban renewal initiative implemented in Barcelona, the Neighbourhoods Law. We use two previous studies on the Law and its effects on health and health inequality (Mehdipanah et al. 2013; 2014) along with the literature available to further discuss and develop some of the causal pathways between the initiative and the health outcomes found.

Methods

As explained, this paper uses a Realist approach to better understand the link between urban renewal programs and health outcomes. We present evidence from two studies on the health evaluation of the Neighbourhoods Law (Mehdipanah et al. 2013; 2014), while drawing from recent urban renewal literature, to follow a four-step process to develop a program theory and use two concrete examples to test this theory. In step 1, we introduce the program, the Neighbourhoods Law and provide some discussion on the context in which it was implemented. In step 2, we describe some of the evidence from two previous studies we have conducted looking at the effects of the Neighbourhoods Law on health and health inequalities. In Step 3 we then conceptualize the link between urban renewal, health and health inequalities based on this evidence and related literature and in step 4, we go on to describe one of the specific casual pathways linking intervention to health, the usage and adaptation of residents to the changes produced. Finally, using two examples of specific renewal interventions in the Neighbourhoods Law, we further develop this causal pathway and describe the variability in outcomes attained due to various factors including the context in which the intervention was implemented. The first describes both the positive and negative effects of public open spaces on health and health inequalities, while the

second describes the effects of repaired streets and sidewalks on health and health inequalities.

Step 1: Description of the program, the Neighbourhoods Law

Historically, under the Franco dictatorship (1939-1975), urban planning deteriorated in cities like Barcelona where urban slums grew rapidly, mainly due to internal Spanish migration, resulting in socio-economically deprived neighbourhoods (Garcia-Ramon et al. 2004). It was not until 1979 with the first democratic elections where the Socialist Party elected in Barcelona worked with strong citizen support to improve these neighbourhoods (Degen & Garcia 2012; Gonzalez & Healy 2005). In keeping up with tradition, in 2004, the first coalition of left-wing parties in the Catalan regional government launched the Neighbourhoods Law, the largest urban renewal program to date in Spain (DPTOP 2009). The program aimed to address major social issues by improving physical infrastructure, social integration and economic gains in a neighbourhood (Nel·lo 2010). Projects in each neighbourhood were tailored based on the priorities identified by the local council, consisting of members from the government, community and neighbourhood groups, and taking into account the socio-demographic composition and different socioeconomic indicators (Nel·lo 2010). The program has invested over 1.3 billion Euros in approximately 141 neighbourhoods across the region and about 15 in Barcelona, resulting in 10% of the city's 1.65 million inhabitants being affected by the projects. However, in 2011, the program was suspended by the newly-elected conservative coalition with lack of funds due to the current economic recession as its reasoning. As discussed for other large-scale urban renewal programs, the Neighbourhoods Law consisted of many projects overlapping and

occurring at different times during the four-year program period. Therefore, it is difficult to separate each project within a neighbourhood and its link to one specific outcome, as interactions are multidirectional and non-linear (Van Belle et al. 2010).

Step 2: Evidence from studies on the Neighbourhoods Law and its effects on health and health inequality

Qualitative and quantitative methods were used to study the effects of the Neighbourhoods Law on the health and health inequality of neighbours. This consisted of two published studies with the first using concept mapping, a qualitative method, to explore the perceptions of neighbours in two intervened neighbourhoods (one in the city centre and another in the peripheries). Participants were asked to describe any changes that had occurred in their neighbourhoods in recent years and whether these changes were positive or negative for their wellbeing (Mehdipanah et al. 2013). Although specific projects differed across the two neighbourhoods based on each program proposal, all groups spontaneously identified the majority of urban renewal changes that resulted from the Law and rated them as having important and *positive* effects on their wellbeing. Such projects included the creation or reform of public spaces, parks, and community centers. On the other hand, all groups also identified changes related with economic activity, social integration and security in the neighbourhood, as important but *negative* effects on their wellbeing. These included neighbour relations, the increase of thefts in the neighbourhoods, and the closing of long time establishments (Mehdipanah et al. 2013). Although it is harder to conceptualize how these negative changes are directly associated with the Neighbourhoods Law, we discuss these findings in step 3 as potential factors within *liveability* and *socio-economic makeup*

affecting the outcomes attained. Overall, results from this study complimented some of the findings from the quantitative analysis and each response provided an insight on the mechanisms behind how and why the intervention affected the wellbeing of residents (Mehdipanah et al. 2014), which are further described in the two examples provided in this article.

Our second study used a quasi-experimental design to analyse the potential effects of the Neighbourhoods Law by comparing self-rated and mental health status of two independent samples of individuals living in the intervened neighbourhoods before and after the intervention, while comparing them to a group of non-intervened neighbourhoods with a similar socio-economic status (Mehdipanah et al. 2014). Our results indicate that both women and men living in intervened neighbourhoods had improved self-rated health while these improvements were more notable in manual social class indicating a decrease in health inequalities within the neighbourhoods. On the other hand, poor mental health status remained stable in both women and men in the intervened group while it worsened in men from the comparison neighbourhoods, indicating that the law may have prevented this increase in the residents (Mehdipanah et al. 2014).

Finally, in the context of the Neighbourhoods Law, displacement or gentrification of lower socioeconomic residents was not of great concern due to measures taken parallel to the law that protected and promoted social housing in the intervened areas, and to the fact that in Catalonia, traditionally a larger proportion of households own their properties and have deeper roots within their neighbourhoods neighbourhoods resulting in low mobility rates

(Bayona & Rúbies 2010; Nel·lo 2010). These assumptions were tested in the quasi-experimental study by only including individuals who had lived in the pre and post-phases of the intervention and comparing it to a sample that included everyone. Results indicated no significant health differences between this population and the general sample originally selected, thus permitting the use of the entire sample (Mehdipanah et al. 2014).

In both of the studies we were able to discuss the effects of the Neighbourhoods Law and provide evidence on the positive effects on the health and health equity of residents living in intervened neighbourhoods. A theory-driven approach can be used to combine both of these studies along with the existing literature in order to develop the causal pathways of how specific urban renewal projects can affect the wellbeing of residents as described in later sections.

Step 3: Conceptualizing the link between urban renewal and health

Here we uncover the complexity of the causal pathways involved between these programs and health inequalities. These are presented in the form of a conceptual framework (Figure 1) representing a basic program theory of the steps needed for an urban renewal intervention to impact health and health inequality outcomes. We then focus our attention on two key pathways, as indicated on the map, necessary to achieve those outcomes.

Figure 1. A conceptual framework of urban renewal and its effects on health and health inequality

The model starts with urban renewal interventions addressing the areas of, *physical infrastructure, social integration* and *economic growth* (Roberts 2000; MacGregor 2010). In this model we demonstrate urban renewal programs and changes in the neighbourhood as a whole that do not include housing dimensions, which may consist of relocating neighbours both temporarily or permanently. Projects in these three areas ultimately lead to improvement in *liveability*, which encompasses characteristics that would make people want to live in a neighbourhood including environmental conditions, safety and security, transportation, aesthetics, reputation of the neighbourhood, economic opportunities and social cohesion (Rydin et al. 2012), all potentially linked to positive health and decreased health inequalities.

While liveability is often more associated with the physical conditions of the neighbourhood, the *socio-economic makeup* includes factors that influence the social environment at various levels including employment status, education level and general housing and living costs, all of which have been linked to health inequalities (Bernard et al. 2007). Urban renewal programs are often designed to address some of these issues through projects such as the establishment of employment centres, gender support programs, and policies aimed at protecting property values. Such projects result in increased opportunities that provide resources needed by neighbours and their families to learn, work and benefit from social relationships, all affecting health outcomes (Borrell et al. 2013; Northridge & Freeman 2011).

However, with the improvement of liveability, or quality of neighbourhood, the socio-economic makeup can alter with newcomers being attracted to the new features, while costs associated with housing and lifestyle can increase resulting in the gentrification of individuals (Arbaci & Tapada-Berteli 2012; Kearns et al. 2009). Poor health outcomes have been associated to social network disruptions due to forced relocation because of increased housing values and living expenses due to increasing costs associated with resources and services (Hagan et al. 1996; Kearns & Mason 2013). Displaced residents tend to be of lower socio-economic position and to move to more deprived neighbourhoods resulting in worsening conditions while the average health status of their previous neighbourhoods is expected to improve with the migration of higher income individuals that are able to afford new conditions (Kearns et al. 2009). Therefore, population turnover is an important variable to control for when looking at health and health inequality outcomes post an urban renewal intervention.

Nonetheless, it is important to note that liveability and population turnover do not represent the program itself but rather a chain of events within the program that may modify outcomes (Pawson & Sridharan 2010).

Finally, the importance of *context* in the evaluation of complex interventions has been highlighted by various authors (Dominguez-Berjon et al. 2006; 2014). In respects to urban renewal, context can include various elements such as geographic location, political climate and the economic situation of the city, country or region at the time the intervention was undertaken. In addition, time lag for changes in health outcomes is also critical to consider

where for example, at a one-year post-intervention, the time lag may not be sufficient to see significant changes in health outcomes like obesity or cardio-vascular disease. The consideration of the context in which the intervention was implemented is therefore essential in order to explain potential unintended consequences of the program, as we will discuss later in the examples we have provided.

From our conceptual framework and our experiences with the Neighbourhoods Law study, we highlight (as seen in Figure 1) two potential pathways used to explain how urban renewal programs are connected to health and health inequalities. The first one lies between the urban renewal project areas and liveability and describes how *urban renewal increases access and availability of resources and opportunities in neighbourhoods*. The second one lies between liveability and health outcomes and describes how *neighbours must use and adapt these changes in order to achieve optimal health and health inequality outcomes*.

The first pathway, as previously mentioned, is based on the extensive literature linking social and physical environments to health outcomes and the notion that by improving these factors, urban renewal improves health and health inequality. Evidence to support this includes the links between of improved access to resources and improved wellbeing (Kearns et al. 2009; Northridge & Freeman 2011). For example, initiatives of establishing employment centres not only provide access to job opportunities but they may also provide job training. This in turn, aims to better the social status of both the poor and working class populations by improving education, employment and income levels (Tsui 2010). As a result,

health improves not only through the psychosocial pathways of reducing stress and improving mental health conditions but also through pathways associated with better housing, food options, and in some countries access to healthcare through employer-provided benefits (Tsui 2010). Nonetheless, this is an area that has been studied in the field of urban planning and health and one, which we have addressed in the previous studies on the Neighbourhoods Law.

The second pathway describes the notion that in order for urban renewal programs to attain optimal health benefits and reduce inequalities in health, *usage and adaptation by neighbours is required*. This is an area less studied and thus the focus of the rest of the paper where we study the mechanisms that help answer the how, why and whom.

Step 4: Usage and adaptation of urban renewal interventions

Not all populations benefit equally from urban renewal projects. Firstly, some targeted interventions may only be of interest to selected sub-populations including parks for children, employment centers for the unemployed and parking spaces for motorists. Through the qualitative study we saw that within the younger populations, children's parks, youth centers and the activities they provide, were more often mentioned than changes perceived by the older populations including senior centers and mobility issues affected by age (Mehdipanah et al. 2013).

Secondly, not all populations are similarly place-bound (the frequency or degree of interaction with the neighbourhood) (Bernard et al. 2007). For example, research has shown that children, seniors and homemakers are also more likely to spend more time in their neighbourhoods (Robert & Li 2001). Furthermore, some groups depend more on local resources because of their lower capacity of displacement due to limited or no access to private transportation, low income or poor health (Bernard et al. 2007; Morenoff & Lynch 2004). Therefore, such neighbours would be most impacted by changes to their environment. This was seen in our studies where in the intervened neighbourhoods, a decrease in social class inequalities in self-rated health was observed as a result of greater improvement in poor self-rated health in the manual social classes compared to the non-manual classes (Mehdipanah et al. 2014). On the contrary, when contextual factors or features within the intervention are not adequate, barriers in the usage and adaptation of the program emerge and result in negative health impacts and increase health inequalities, especially affecting those we classify as being more place-bound (Mehdipanah et al. 2013).

To further investigate these pathways, we use two specific examples within the Neighbourhoods Law common to the majority of urban renewal initiatives: the creation of public open spaces (green spaces and plazas) and the improvement of walkability throughout the neighbourhood (sidewalk and street repairs, and the removal of physical barriers) (Rydin et al. 2012). We begin each example by describing the existing literature on this link and then use the two interventions to compare and analyse what each project was to do and how it was expected to work, to what was actually done and why it differed from the plans.

Example 1: The effects of public open spaces on health and health inequality

Public open spaces are defined as areas that allow residents to participate in public space, promote social interaction and are accessible by all compared to private areas (Borja & Muxi 2001; Garcia-Ramon et al. 2004). Studies have shown that public spaces are used optimally when they establish a relationship directly with people who live and work around it (Borja & Muxi 2001; Thompson 2002).

Researchers have established the link between public open spaces to increased opportunities for physical activity among more vulnerable populations including children and elders (Leslie & Cerin 2008; Rydin et al. 2012; Thompson 2002). Applying a health inequalities perspective has led to studies like Mitchell and Popham (2008), who have described social inequalities in all-cause and circulatory disease mortality are significantly lower amongst populations who live in greener neighbourhoods than those who do not.

In addition, other researchers have demonstrated that features and facilities within the public open spaces differ across neighbourhoods based on their socio-economic position. A study by Crawford et al. (2008) showed that in more affluent neighbourhoods, public spaces tended to have more features including picnic tables, drinking fountains and more updated playgrounds making them more attractive to users compared to poorer neighbourhoods. Possible explanations for this include the location of these neighbourhoods tending to be in higher density inner city areas not leaving much room for such features. However, such reasoning may not be adequate for neighbourhoods located on the peripheries of the city

(Crawford et al. 2008). Another explanation discussing socio-economic neighbourhoods is that affluent neighbourhoods have more resources to lobby and change policies, whereas in less affluent neighbourhoods, fewer resources including the inability to hire experts to formalize documents and dedicate time to such issues, result in limited efforts to pressure policy makers for change (Travers 1997).

Researchers have described the features in the public spaces, such as benches and play areas, as facilitators of social interaction amongst neighbours (Borja & Muxi 2001; Garcia-Ramon et al. 2004). In a 2007 study, Pinkster describes another social mechanism of social interaction, as one that improves opportunities and resources of lower-income populations by interacting with more "affluent and educated" people that can advise and inform them in various aspects, including the labour or housing markets, in order for them to improve their social status. This in turn, has been linked to positive self-rated health and life expectancy while social exclusion has been linked to higher risks of morbidity and mortality (Berkman & Syme, 1979, Northridge & Freeman 2011). Therefore, based on the first pathway, the creation of public open spaces and the features they provide, offer more opportunities and resources for physical activity and social integration, all associated with positive health outcomes.

However, the mechanisms between neighbours using and adopting of public open spaces is one that has been discussed roughly. Some explanations on perceived safety and security have been provided including its impact on health due to its effects on behaviour, crime or fear of crime or the social environment (Lorenc et al. 2012). To further explain this, we

present one of the projects within the Neighbourhoods Law, the 3.4 million Euros investment in the creation of a large central plaza the Santa Caterina neighbourhood.

This traditionally deprived neighbourhood located in the city centre, consists of a population mix including one of the highest young immigrant population in the city mostly of manual class and an older, predominantly middle-class Spanish population who has been living in the neighbourhood for many years (Mehdipanah et al. 2013). In recent history, the area where the central plaza was to be built has become the centre of controversy between neighbours who wanted a green space and the government who wanted to build a parking lot (Ruiz 2006). The Neighbourhoods Law, the project would bring more light into the neighbourhood, create a play area for all ages with soccer and basketballs courts, a child's play area would be constructed in addition to a community garden and benches. In Figure 2 we present the refined program theory and show the causal pathways in which these *interventions* would decrease health inequality. These will also improve health *outcomes* through *mechanisms* including the creation of a safe and secure place, accessible to all. This would provide the opportunity for neighbours to interact with each other. In addition, *contextual* factors including the socio-demographic characteristics of the population and the history of this area leading to this intervention, as described, all influence both the mechanisms and the outcomes attained as described below.

Figure 2. Causal pathways for the renewal of a neighbourhood central plaza.

Despite the creation of the public open space the neighbours had fought for, the project had unintended consequences that could lead to negative health outcomes. While the project was able to provide new opportunities and resources that would essentially improve health outcomes, the poor usage and adaptability of the plaza was due to the interventions failure to improve the plaza's reputation and perceptions of safety and security in the older population. This was due to predominantly two factors, the physical barriers found in the plaza and the interactions between neighbours as explained below. In addition, like other areas in the neighbourhood, benches were reduced within the plaza as explained by the senior group "*A decrease in benches throughout neighbourhood plazas*" and larger benches were replaced with individual seats that were located fairly separate from one another and located on the borders of both courts. This location discouraged interactions between neighbours and resulted in risks of injury from park users and disrupted their long tradition of social interaction in open spaces like plazas (Mehdipanah et al. 2013). Finally, although the plaza was generally recognized as positive for the wellbeing of younger neighbours as it contained various sports facilities and was directly situated across a youth centre, however they went on to state that "*the sandy floor of the soccer and basketball courts (in the plaza)*" had negative effects on their wellbeing (Mehdipanah et al. 2013). This was discussed during the interpretation section of the study where the youth claimed that the flooring used was slippery resulting in serious injuries while playing, therefore, not as ideal for sports use (Mehdipanah et al. 2013).

While these are issues more relevant to physical safety, there is also a dimension of mental wellbeing associated with sense of security where crime and perceptions of crime including

fear have been linked to various health outcomes including mental and overall wellbeing (Lorenc et al. 2012). The Neighbourhoods Law aimed to address such social issues and in the case of this neighbourhood it was the strains in the interaction and exchange amongst neighbours making conviviality difficult (Nel·lo 2010). Perceptions of acceptability or safety are influenced by factors like cultural beliefs (Thompson 2002). Both of the populations studied agreed that the sense of insecurity arose from clashes of attitudes and beliefs between immigrants and local neighbours including the statements "the sense of intimidation transmitted by some of the new neighbours" and "an increase in the sense of insecurity among neighbours" (Mehdipanah et al. 2013). Since the younger foreign population predominantly used the plaza, the older non-immigrant population felt the plaza was a negative factor for their wellbeing.

Nonetheless, the perception of neighbours and the reputation of a neighbourhood take time to change and although the evaluation is based on short-term variables, a follow-up study with longer time lag could identify some of the benefits to health identified through improvements in physical accessibility, better visibility and the promotion of physical activity in a neighbourhood that previously had no such development (Lorence et al. 2012).

Example 2: The effects of repaired streets and sidewalks on health and health inequality

Another example of how urban renewal initiatives could affect health and health inequalities is the repair of streets and sidewalks resulting in improved walkability. Walkability is described as the extent in which the built environment supports and promotes walking for various purposes including physical activity and transportation (Gebel et al.

2009; Saelens & Handy 2008). A large body of literature has linked *walkable* neighbourhoods to improved physical activity resulting in reduced obesity amongst adolescents (Slater et al. 2013), reduced BMI in adults (Hirsch et al. 2014) and improved psychosocial status (Van Dyck et al. 2013).

Through an equity perspective, evidence has shown that the urban poor tend to walk as a means of transportation compared to the urban rich who tend to walk for leisure and physical activity (Rydin et al. 2012). In addition, improved walkability can decrease health inequalities by addressing various factors including age, gender, disability, and income. Studies have shown that children, seniors, individuals with disabilities and low-income households tend to face the greatest barriers in mobility and displacement on foot both within and outside of the neighbourhoods (Thompson 2002; Mitchell & Popham 2008). Furthermore, in the Barcelona context, women from lower income households are more likely to walk or use public transportation as a form of transportation compared to men and women from higher income households (Olabarria et al. 2013). Therefore, in the context of less affluent neighbourhoods, improved walkability can lead to improvements in health outcomes while promoting health equity (Garcia-Ramon et al. 2004; Gebel et al. 2009).

Researchers have also explored potential social mechanisms, including those that have shown how walkability improvements are linked to increased accessibility to resources such as food outlets, health services and other resources throughout the neighbourhood (Chung et al. 2011). Furthermore, it can increase perceptions of safety, access to pedestrian friendly areas and reduce the risks associated with walking mobility through better traffic control,

usually areas of concern in deprived neighbourhoods (Jacobsen 2003; Morrison 2004). In addition, increased street lighting has been associated with an increase in pedestrian activity in both women and men (Painter 1996; Gebel et al. 2009).

In Figure 3, we have refined our initial theory again to incorporate some of this information, and illustrate the causal pathways from the Neighbourhood Law's repair of streets and sidewalks, to health through improved walkability. Based on the literature we describe, this would then have positive effects on health outcomes and reduce health inequality in the neighbourhoods. The *intervention* consisted of projects that included traffic calming schemes, wider sidewalks and increased street lighting. As mentioned, the *mechanisms* to achieve this would include improved walkability but also increased accessibility around the neighbourhood, and more perceptions of safety and security. In order to better explain the concept of *context* we focus on the Roquetes neighbourhood in Barcelona, a peripheral neighbourhood distinguishable for its geographical features including barriers such as steep hills and mountains. Furthermore, the neighbourhood consists of a larger older population mostly in the manual class and a growing younger immigrant population.

Figure 3. Causal pathways for the repair of streets and sidewalks

In our previous study, street conditions were an area of concern for residents in this neighbourhood, and they perceived this intervention as having very positive and important effects on the wellbeing of residents (Mehdipanah et al. 2013). Neighbours from Roquetes agreed that one of the top most important and positive changes in their neighbourhood in

recent years had been the *installation of outdoor escalators and elevators* that connected areas that were difficult to access by pedestrians. This had not only improved walkability but it also increased their physical access to stores and services that were once inaccessible due to physical barriers like steep hills or cracked sidewalks, as discussed by neighbours (Mehdipanah et al. 2013). Furthermore, this increase in flow of pedestrians throughout these areas and together with projects like the installation of streetlights, could eventually lead to an increased sense of security and a decrease in crime (Jacobsen 2003; Lorence 2012).

Another potential mechanism in which the health inequalities may decrease is based on the notion that women are more likely to walk for transportation in Barcelona and thus sidewalk conditions would be a factor in their mobility (Olabarria et al. 2013). Our results from the discussions with women from a manual working class in this neighbourhood were consistent with these findings. They claimed that sidewalks and streets prior to the Neighbourhoods Law were hazardous due to unstable street tiles and unsafe traffic conditions throughout their neighbourhoods, while post-intervention the repair of sidewalks to make them wider and anti-slide, along with traffic control, were recognised as positive and important changes for their wellbeing (Mehdipanah et al. 2013).

Discussion

In this paper we explore the relationship between urban renewal, health and health inequalities through two causal pathways: one, urban renewal programs increase access to resources and opportunities, and two, in order for health improve and health inequality

decrease, neighbours must use and adapt to changes produced. We focus our research on the second causal pathway and recognize the great complexity associated with this link. By using two common intervention examples in urban renewal programs, we combine existing evidence and our own findings from researching the Neighbourhoods Law initiative to further explore this link. In the creation of public spaces like plazas and parks, we discussed some of the factors that were considered as barriers in the usage and adaptation of these areas, resulting in negative effects on health. These included contextual factors such as the neighbourhood's socio-demographic makeup and the history of the neighbourhood, along with features of the intervention that influenced the accessibility, safety and security in these areas (Crawford et al. 2008; Pinkster 2007). Our results confirmed these factors and further discussed dimensions of neighbourhood relations that may influence the usage and adaptation to such areas (Mehdipanah et al. 2013). In the example of improved streets and sidewalks, research has linked this intervention with improved walkability leading to positive health outcomes (Gebel et al. 2009; Saelens & Handy 2008). Furthermore, such changes could decrease health inequalities by improving conditions for the urban poor who tend to use walking for transportation more than the urban rich (Rydin et al. 2012). Our findings were in parallel with these where individuals were more easily able to travel distances on foot, especially those with disabilities and old age (Mehdipanah et al. 2013; 2014). Such examples provide a deeper understanding of how and for whom these initiatives work and serve as a strong tool for policy makers to prioritize each neighbourhood's needs.

Strengths and Limitations

One of the strengths of this paper is that it serves as an initial attempt to provide explanations of the mechanisms through which urban renewal programs affect health and health inequality using two case studies to illustrate this. Up to now, the majority of research on the relationship between urban renewal and health and health inequalities has focused on answering whether an effect exists or not rather than finding the *cause* (Pawson & Sridharan 2010).

Another strength of this study is its emphasis on the need to acknowledge heterogeneity in evaluations of complex health interventions. We discuss how urban renewal programs do not affect all populations equally and thus the potential effects of such interventions on these subpopulations may not be captured in general population samples.

Although we present only two examples in this study, we recognize that each project within urban renewal programs proposes its own causal pathways with contextual effects influencing its expected outcomes. However, the purpose of this study was to initiate discussion on a different approach to research in this field that would provide a deeper understanding focused on causation while recognizing the complexities associated with large interventions like the Neighbourhoods Law. Future research could concentrate on these links by collecting data to test each of the theories further.

Finally, studies have shown that community participation in program planning and intervention can empower neighbours to make decisions on the status of their neighbourhoods (Fuertes et al. 2012; Matheson et al. 2009). While this could be a mediating step between our two causal pathways, empowerment and the degree of neighbourhood

involvement measurements go beyond the scope of this paper. However, future studies should consider other aspects and indicators such as number of associations and neighbourhood groups, party voted, and number of demonstrations or manifestations in an area, and the effective representation of neighbours during the project planning.

Conclusions

Urban renewal programs aim to improve the physical, social and economic aspects of a neighbourhood resulting in potential improvements in health of residents and reduce health inequalities. A theory-driven approach to research can provide a deeper understanding required for policy development. In this paper we have done this by discussing the relationship between urban renewal, health and health inequalities through the usage and adaptation of the intervention. By discussing the different mechanisms and contextual factors that could result in positive or negative health outcomes, we can better address issues in the program planning, implementation and evaluation of policies.

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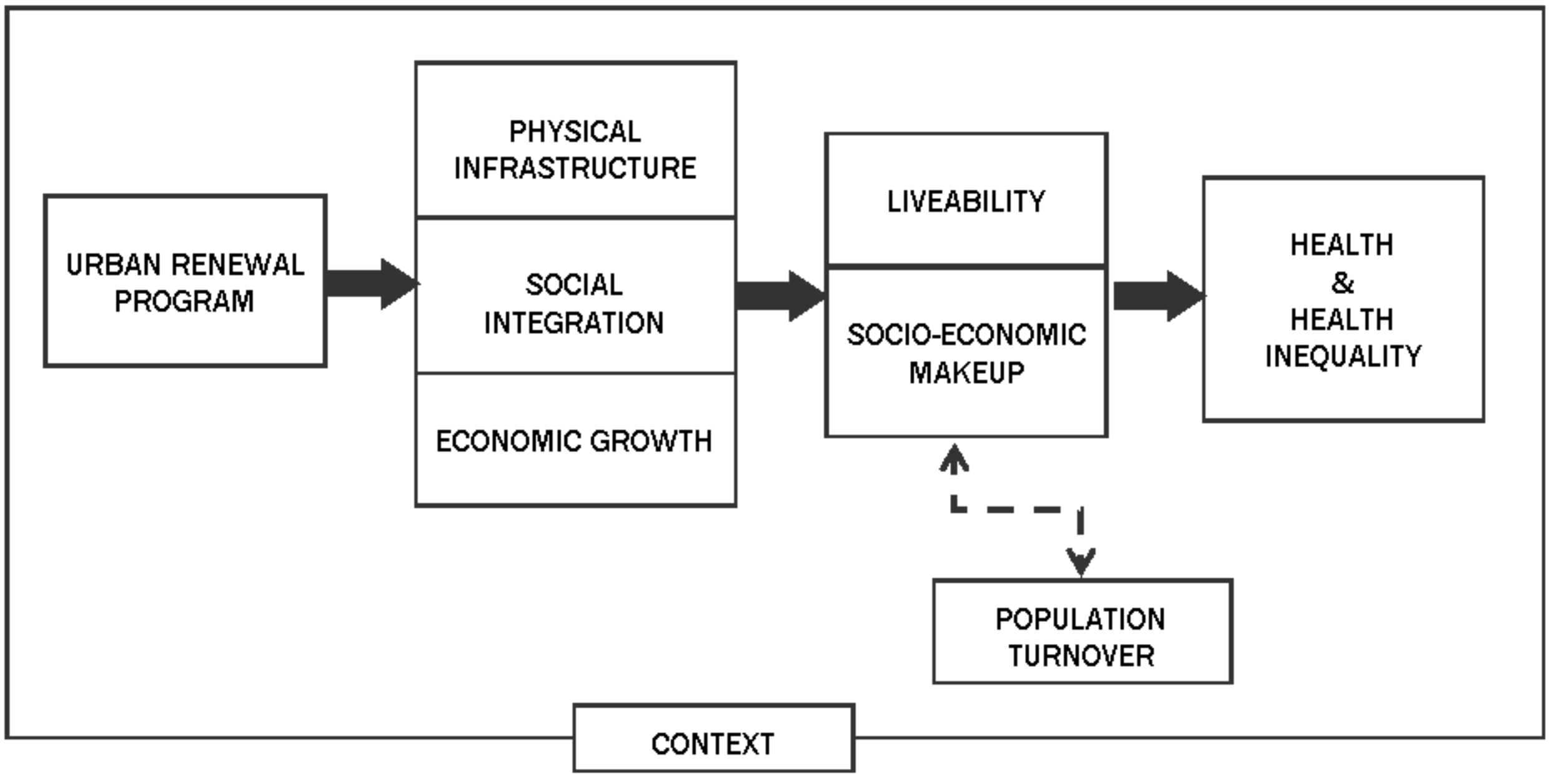
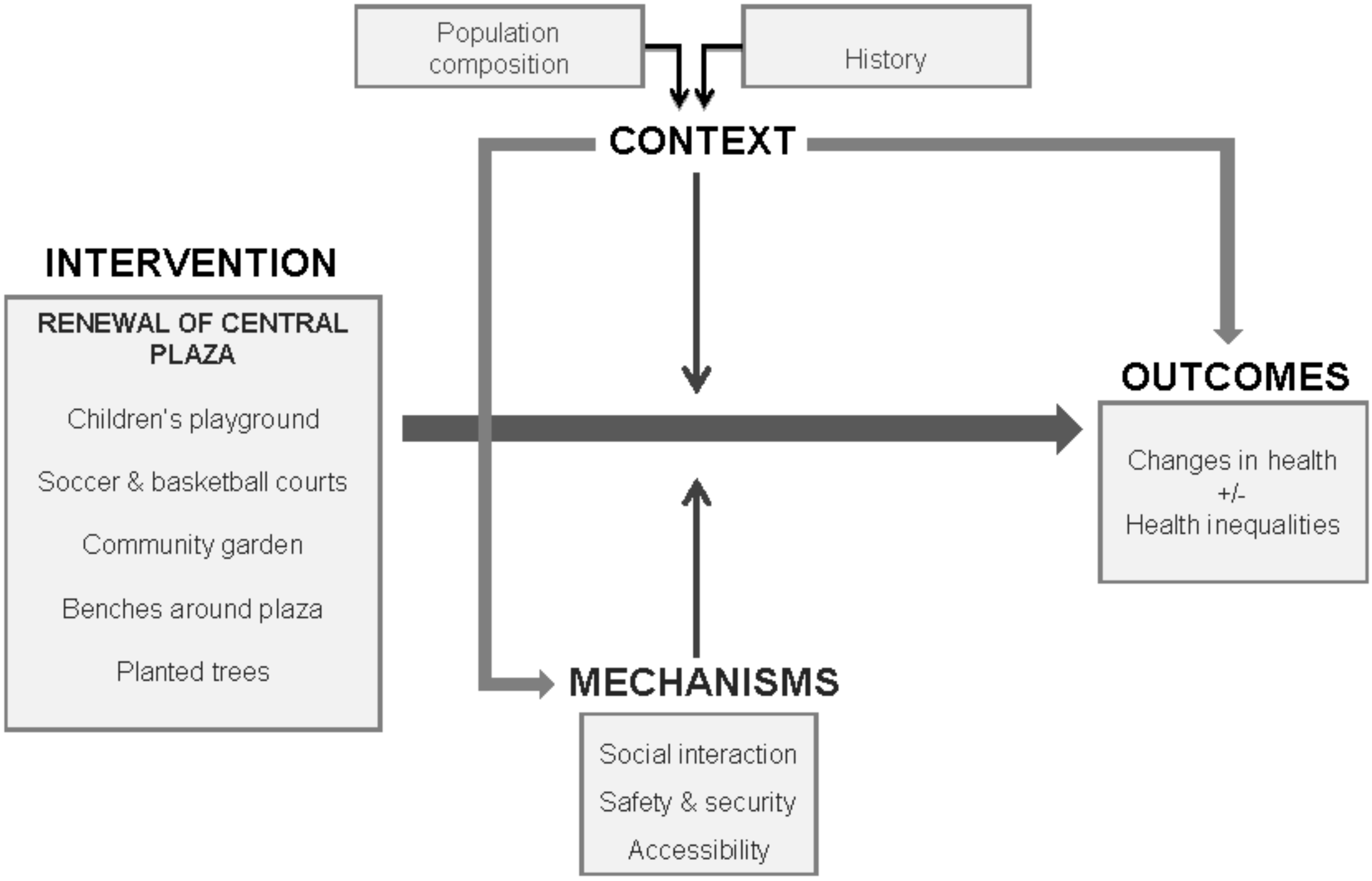
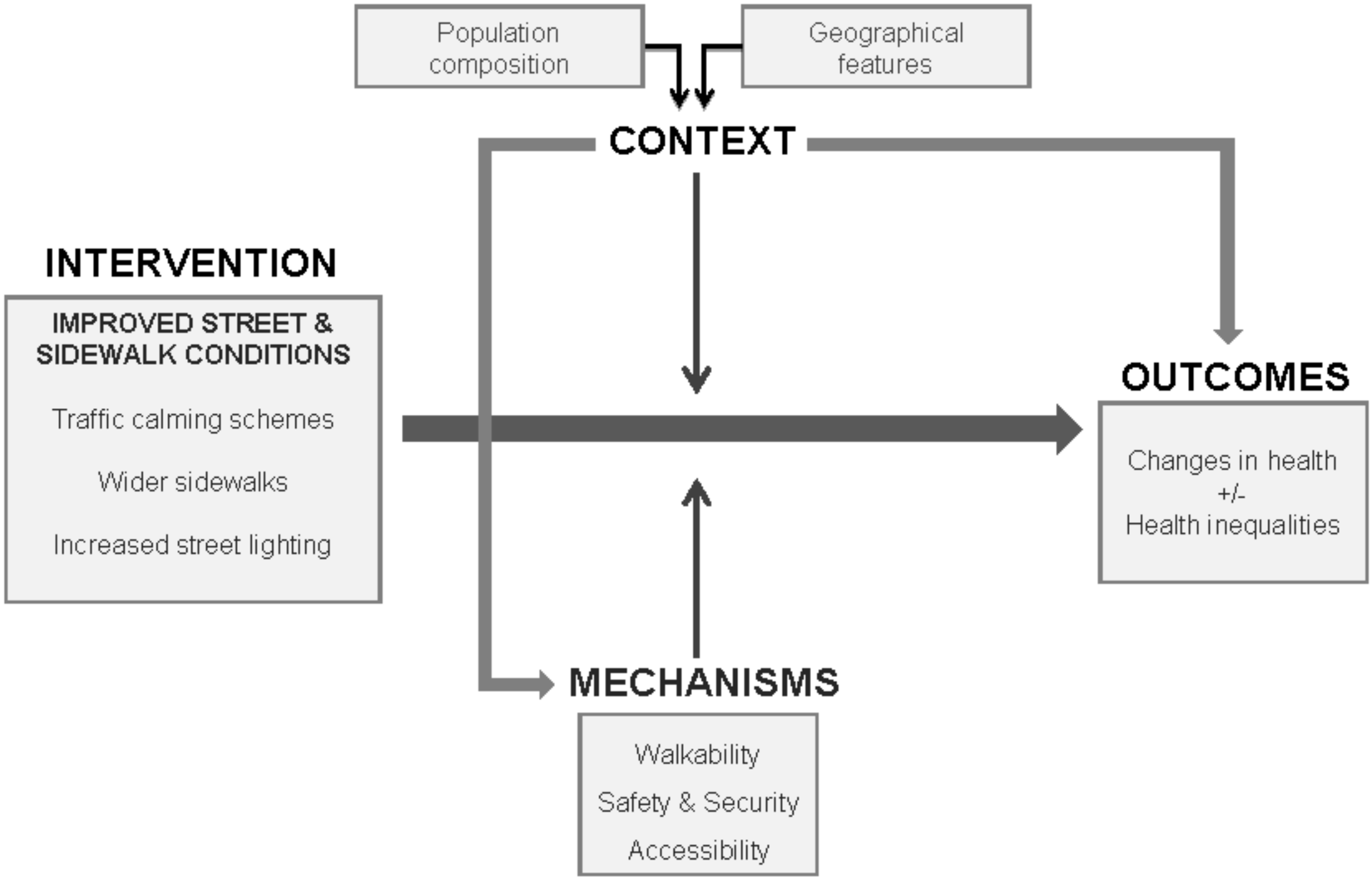

URBAN RENEWAL PROGRAM
PHYSICAL INFRASTRUCTURE
SOCIAL INTEGRATION
ECONOMIC GROWTH
LIVEABILITY
SOCIO-ECONOMIC MAKEUP
HEALTH & HEALTH INEQUALITY
POPULATION TURNOVER
CONTEXT


Population composition
History
CONTEXT
INTERVENTION
RENEWAL OF CENTRAL PLAZA
Children's playground
Soccer & basketball courts
Community garden
Benches around plaza
Planted trees
OUTCOMES
Changes in health
+/-
Health inequalities
MECHANISMS
Social interaction
Safety & security
Accessibility


Population composition
Geographical features
CONTEXT
INTERVENTION
IMPROVED STREET & SIDEWALK CONDITIONS
Traffic calming schemes
Wider sidewalks
Increased street lighting
OUTCOMES
Changes in health
+/-
Health inequalities
MECHANISMS
Walkability
Safety & Security
Accessibility

Statement EA not required

This study did not require ethical approval. In addition, the qualitative study used as reference had previously met all ethical requirements.