



# Developing empirically supported theories of change for housing investment and health



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## ABSTRACT

The assumption that improving housing conditions can lead to improved health may seem a self-evident hypothesis. Yet evidence from intervention studies suggests small or unclear health improvements, indicating that further thought is required to refine this hypothesis. Articulation of a theory can help avoid a black box approach to research and practice and has been advocated as especially valuable for those evaluating complex social interventions like housing. This paper presents a preliminary theory of housing improvement and health based on a systematic review conducted by the authors. Following extraction of health outcomes, data on all socio-economic impacts were extracted by two independent reviewers from both qualitative and quantitative studies. Health and socio-economic outcome data from the better quality studies ( $n = 23/34$ ) were mapped onto a one page logic models by two independent reviewers and a final model reflecting reviewer agreement was prepared. Where there was supporting evidence of links between outcomes these were indicated in the model. Two models of specific improvements (warmth & energy efficiency; and housing led renewal), and a final overall model were prepared. The models provide a visual map of the best available evidence on the health and socio-economic impacts of housing improvement. The use of a logic model design helps to elucidate the possible pathways between housing improvement and health and as such might be described as an empirically based theory. Changes in housing factors were linked to changes in socio-economic determinants of health. This points to the potential for longer term health impacts which could not be detected within the lifespan of the evaluations. The developed theories are limited by the available data and need to be tested and refined. However, in addition to providing one page summaries for evidence users, the theory may usefully inform future research on housing and health.

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## 1. Introduction

Persistent links between poor housing and poor health have been reported in a wealth of cross-sectional studies and point to the potential for housing improvement to lead to health improvement. However, the complex associations between poverty, poor housing, and poor health, make it difficult to ensure adequate control for confounders (Wilkinson, 1999), (Hunt, 1993). This means that, which or how housing conditions cause poor health remains poorly understood. And, perhaps more importantly, it cannot be assumed that investment to improve housing conditions will lead to improved health. Hypotheses around the possible health impacts of

housing improvement need to be empirically tested through evaluations which assess changes in health outcomes following housing improvements.

### 1.1. Empirical evidence on health impacts of housing improvement

At the start of 2013 we published an updated systematic review of evaluation studies which assessed the health impacts of housing improvement (Thomson et al., 2013a, 2013b). This review had broad inclusion criteria, and included studies from any time period, any country, any language, and any design, including quantitative and qualitative studies. Studies which had assessed changes in any measure of illness, health, or wellbeing following a housing improvement intervention were included. The full inclusion and exclusion criteria and the methods are reported in the review published by the Cochrane and Campbell Collaborations (Thomson et al., 2013a, 2013b).

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Following comprehensive searches of 39 bibliographic databases, covering journal publications and grey literature, along with expert consultation, 39 studies reporting quantitative and/or qualitative data were identified and included in the review. Both the quantitative and the qualitative studies were assessed for levels of bias and internal validity using established methods which were tailored to allow application to this topic (Dixon-Woods et al., 2004), (Effective Public Health Practice Project, 2010). Those studies assessed to have a high risk of bias, or where poor reporting prevented assessment of validity, were not included ( $n = 15$ ) in the final synthesis. The included studies were grouped according to broad intervention type and also important contextual differences. The four intervention categories were ( $n =$  included studies at low or moderate risk of bias. NB: numbers do not add up to 39 as some studies reported both qualitative and quantitative data):

- Warmth & energy efficiency: post 1985 (Quantitative  $n = 11$ ; Qualitative  $n = 5$ )
- Rehousing/neighbourhood renewal: post 1995 (Quantitative  $n = 6$ ; Qualitative  $n = 4$ )
- Provision of basic housing in Low & Middle Income Countries (LMIC): post 1990 (Quantitative  $n = 1$ )
- Rehousing from slums: pre 1970 (Quantitative  $n = 1$ )

Few studies reported standardised effect sizes, and the data were not amenable to meta-analysis. The data were, therefore, synthesised narratively and the resulting synthesis focussed on the nature and direction of health impacts rather than calculating an estimated effect size for each outcome. Reports of health impacts were mixed, supporting the earlier assertion that investment to improve housing should not be assumed to lead to health improvements. Although there was no indication of harms to health, few studies reported statistically significant improvements in health following housing improvement. Studies of warmth and energy efficiency interventions suggested that improvements in general health, respiratory health, and mental health are possible. Studies which targeted those with inadequate warmth and existing chronic respiratory disease were most likely to report health improvement (Howden-Chapman et al., 2007; Howden-Chapman et al., 2008). The health impacts following area based programmes of housing-led neighbourhood renewal were less clear. Only one better quality study (low or moderate risk of bias) was identified for each of the LMIC, and the “rehousing from slum” categories, limiting the ability to draw lessons about the health impacts for these categories of interventions. The review concluded that housing improvement which improves thermal comfort in the home can lead to health improvements, especially where the improvements target people living in housing with inadequate warmth and who have chronic respiratory disease. The health impacts of programmes which deliver improvements across areas and do not target according to levels of individual need are less clear. However, where impacts are reported for whole areas the range of impacts may be concealed by the area level mean, and it is possible that some individuals may have experienced significant health impacts.

### 1.2. Underpinning theory for housing improvement and health

Interest in the health impacts of housing improvement assumes that public investment to improve housing conditions has the potential to be part of healthy public policy, i.e. the use of public investment outside health services, to contribute to improved health by addressing one or more socio-economic determinant of health (Milio, 2001). The notion of housing as part of healthy public policy is often implicit within both policy and evaluations of housing

improvements. Policy statements which accompany announcements of housing investment have indicated expectations of health improvement as a result of the investment, but do not specify what type of health impacts might be expected, the timescale for impacts, or how the investment might lead to improved health. For example, in a government document for the UK’s programme of neighbourhood renewal, New Deal for Communities, the programme vision was stated to be ‘to have lower worklessness; less crime; better health; better skills and better housing’ (Social Exclusion Unit, 2001). Similarly, in evaluations of housing improvement there is often an implicit, rather than explicit, assumption that the housing improvement will lead to exposure to improved housing conditions for residents, and that this exposure has the potential to lead to health improvement within the, often short, timescale of the evaluation. We conducted a brief search for published work theorising the potential for improved housing conditions to lead to improved health but found little. Dunn et al. examined the underlying programme theory for a specific policy providing housing for homeless people with severe mental illness, but this did not incorporate consideration of health impacts (Dunn et al., 2013). While Shaw proposed a preliminary theory which took into account the importance of material factors and the “meaning” of housing for health either directly or indirectly, the model does not focus on mechanisms for housing improvement (Shaw, 2004). Most recently, Gilbertson et al., and also Liddell & Guiney have posited the importance of stress as a pathway through which fuel poverty may impact on health (Gilbertson et al., 2012; Liddell and Guiney, 2014).

The near absence of a theory articulating possible mechanisms through which housing improvement might lead to improved health indicates that assumptions about the potential impacts, both positive and negative, of well intentioned interventions have yet to be made explicit. A black box approach to evaluation which only investigates changes in endpoint outcomes is limited with respect to identifying important explanations for a lack of expected impacts, or unintended harmful impacts. Use of theory in developing and evaluating interventions promotes development of explicit hypotheses about the nature of, and routes to impacts following an intervention, as well as identifying potential mediating factors for the intended impacts of the intervention. Using these theories as frameworks to shape and improve subsequent evaluations is valuable and facilitates further testing and refinement of the theory and the intervention, with the aim of maximising the benefits and mitigating identified harmful effects of the intervention (Chen and Rossi, 1983). Social programme theory has been recommended as a tool to help develop interventions and accompanying evaluations which might generate evidence for healthy public policy, like housing improvement for health (Rychetnik et al., 2002), (Craig et al., 2008).

The systematic review outlined above, did not identify consistent or strong support for the hypothesis that housing improvement leads to health improvement. This may be counterintuitive, and challenge the assumption, that a well intentioned investment to improve living conditions will lead to improved health. The lack of a clear and consistent effect across studies suggests that there are important mediating factors which may interrupt the pathway between intervention and impact. Consideration of one key outcome, in this case health, as a measure of “what works?” is inherently limited, perhaps particularly for complex social interventions, such as housing improvement. It may also be unrealistic to expect health outcomes to improve in the relatively short timescale, often a year or less, of an evaluation. Consideration of only one key outcome ignores the important influences of and interactions between context and outcome (Chen and Rossi, 1983) (Pawson and Tilley, 1997). Such an approach is limited in addressing

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