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REVIEW ARTICLE

Housing Disadvantage and Poor Mental Health: A Systematic Review

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Context: This study reviews collective evidence on the longitudinal impact of housing disadvantage (based on tenure, precarity, and physical characteristics) on mental health. It is focused on temporally ordered studies where exposures preceded outcomes, a key criterion to establishing causal evidence.

Evidence acquisition: A systematic review of evidence on housing disadvantage and mental health was performed. The literature search used six electronic databases including MEDLINE (PubMed and Ovid platform), Embase, PsycINFO, Web of Science, SciELO, and Sociological Abstracts. Population-based longitudinal studies where exposure to housing disadvantage (excluding exposure to homelessness) preceded mental health were included. Methodologic quality of selected studies was examined using the Newcastle–Ottawa Quality Assessment Scale. Because of definitional and methodologic heterogeneity among studies, narrative synthesis rather than meta-analysis was used to summarize research findings.

Evidence synthesis: Of the 1,804 unique titles identified in the literature search, 12 met the selection criteria for inclusion in the systematic review. Housing disadvantage was measured by overcrowding, mortgage delinquency, housing mobility, housing tenure, subjective perceptions of inadequate housing, eviction, and physical housing conditions. Mental health was measured as depression, psychological impairment, anxiety, allostatic load, mental strain, and psychological health. Study sample sizes ranged from 205 to 16,234 people, and the follow-up period ranged from within 1 year to 34 years. Each study indicated a positive association between housing disadvantage and mental health for at least one housing disadvantage measure and mental health outcome.

Conclusions: This systematic review confirms that prior exposure to housing disadvantage may impact mental health later in life.

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CONTEXT

Housing has a central role among the social determinants of mental health.[1–3] Individuals and families spend a substantial amount of time at home during their lives, making housing a critical context for health.[2–6] A large body of both historic and current evidence has established that inadequate housing, predominantly with poor physical characteristics, is associated with worse mental and physical health outcomes.[5,7–9] More recently, financial insecurities related to housing (such as unaffordable housing, foreclosures, and high mortgage or rental costs) have also received considerable attention as determinants of poor mental health, particularly in high-income countries.[5,10–16] It is argued that in countries that have observed increased living standards over time, financial aspects of housing are

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key determinants of mental health.[17] What is not well understood is how different forms of housing disadvantage affect health outcomes across the course of life; to do so requires an understanding of how exposure to inadequate housing affects health into the future.

Previous systematic reviews have summarized evidence on different aspects of housing disadvantage, housing interventions, and their relationship with multiple health outcomes.[8,9,18–27] These include reviews on housing status and HIV,[18] influences of foreclosures and eviction on multiple health outcomes,[21,26] residential mobility in early life and health outcomes,[28] effectiveness of housing interventions in improving health,[8,9,23] and housing arrangements and mental illnesses.[25,29,30] Poor mental health effects (depression, anxiety, and behavioral morbidities) resulting from financially insecure housing are also confirmed in two systematic reviews.[21,26] In addition, two systematic reviews have established evidence on the relationship between homelessness and mental health.[31,32] However, existing systematic reviews, with the exception of those on intervention studies,[8,9] have approached the literature on housing disadvantage and health generously for their inclusion criteria on study designs.[8,9,18–27] Many studies do not provide information on the sequencing of exposures and outcomes, thereby inadequately addressing temporality, which is important for examining causality.

Longitudinal studies with sufficient follow-up periods provide unique opportunities to carefully examine the causal relationship between different forms of housing disadvantage and mental health.[33,34] First, the temporal sequence between housing disadvantage and mental health can be established.[1,35–37] Second, well-designed longitudinal studies with sufficiently large representative sample sizes, long-term follow-up, and rich baseline covariate data can help in minimizing bias. Life-course epidemiology theorizes how exposures throughout life, especially during biologically or socially vulnerable periods, influence health at later ages.[38–41] A key motivation is to model mechanisms linking exposure at each life-course period to subsequent health outcomes.[41] Housing needs and aspirations, regarding price, space requirements, preferences in location, housing type, and the duration or stability of residence, vary at different life stages.[1] Long-term follow-up studies, for instance birth cohorts, offer opportunities to examine the mental health impact of early life exposures to housing disadvantage across the life course.[1,40,42] Such longitudinal studies also provide the opportunity to test the adequacy of different life-course theoretic explanations such as critical/sensitive period and accumulation of risk, which may provide important policy insights for addressing long-term ill effects of housing disadvantage.[38–40] Furthermore, longitudinal studies have the capacity to inform lagged and period effects of housing disadvantage on mental health,[43] which cross-sectional and intervention studies with short-term follow-up may not. Therefore, existing systematic reviews without a specific focus on longitudinal studies prevent the examination of life-course impacts of housing disadvantage on mental health, a gap identified previously in a widely cited review of housing and health inequalities research.[1] This paper examines relative mental health and relative housing disadvantage. Studies focused on severe mental illnesses, such as schizophrenia, have been excluded necessarily from this review because they are diagnosable conditions where the causes may not reflect the stress- and anxiety-related pathways of interest. To address the critical gap identified in the literature, this systematic review focuses on evidence from longitudinal studies on housing disadvantage and mental health.

EVIDENCE ACQUISITION

A systematic review was performed to identify, collate, and synthesize evidence from longitudinal studies on the impact of housing disadvantage on mental health. The research question was as follows: *Is prior housing disadvantage associated with poor mental health?*

Subobjectives of this systematic review were to examine the duration of follow-up between exposure to housing disadvantage and mental health and the life-course effects of early life exposures to housing disadvantage. This systematic review was registered in the International Prospective Register of Systematic Reviews (PROSPERO: CRD42017080099).

Inclusion and Exclusion Criteria

Eligible papers included population-based longitudinal studies where exposure to housing disadvantage preceded the outcome of mental health. Both prospective and retrospective cohorts were eligible for inclusion. Studies were not restricted by definitions adopted for housing disadvantage. However, studies that examined homelessness as an exposure were excluded on purpose. Only studies that addressed common mental health problems such as depression and anxiety were included in the systematic review.[44] No time limits or geographic boundaries were applied as exclusion criteria. Only studies published in the English language were included.

Search Strategy

A three-step search strategy for identifying relevant studies was developed. An initial search of MEDLINE (PubMed platform) was undertaken to identify index terms and Medical Subject Heading terms. Once a detailed search strategy was developed for PubMed using

identified keywords and index terms, the search was adapted across additional six electronic databases using Ovid and Web of Science platforms: MEDLINE/Embase/PsycINFO (Ovid platform) and Web of Science Core Collection/SciELO/Social Sciences Citation Index (Web of Science platform). Each data source was checked individually for availability and usage of controlled vocabulary for indexation through the use of hierarchically defined and periodically updated thesauruses. The search was conducted on October 27, 2017. Finally, the reference lists of selected studies were searched to identify any relevant studies. The detailed search strategy is presented in Appendix Table 1 (available online).

Study Selection

Titles and abstracts of relevant studies identified in the search were retrieved and managed on the bibliographic software Endnote, version x8. Duplicates were removed using an Endnote function and manually removed during the title and abstract screening. Title and abstract screening, based on set inclusion and exclusion criteria, was conducted by two reviewers (AS and LD) independently to reduce any individual bias. Any disagreements on the selection of studies for full-text review were resolved through discussion or through the intervention of remaining reviewers. The full texts of selected studies were retrieved post-screening for thorough examination against the eligibility criteria for the selection of studies. The full-text reviews were also conducted independently by AS and LD, and disagreements were resolved through discussions. Reasons for exclusion of studies after full-text review were recorded and are summarized in Figure 1, consistent with PRISMA guidelines for reporting of systematic reviews.

Data Extraction

Data extraction forms were developed based on study objectives and the inputs from EB and RB, who have substantial expertise in housing and health research. Information collected in the data extraction form included study characteristics such as author names, year of publication, population focus, exposure and outcome definitions and measurement tools, time lag between exposure and outcomes, and sample size. Additional information related to the key findings such as measure of RR or risk difference, uncertainty around central estimates, assessment of potential bias within studies using sensitivity analyses, study limitations, and key conclusions was also extracted. When the same study examined associations between multiple forms of housing disadvantage and mental health outcomes, data were extracted separately for each of the associations tested within the study. Developed data extraction forms were piloted on 10% of the selected studies independently by AS and LD and modified as appropriate (Appendix 3, available online). Data extraction was conducted by AS and crosschecked for accuracy by LD.

Quality Assessment

Quality assessment of selected studies to account for the risk of bias was conducted using the Newcastle–Ottawa Scale for cohort studies.[45] Each study was scored based on criteria in the domains of selection bias, comparability, and outcome/exposure assessment. Studies were considered to be of good quality when they scored 3 or 4 dots in the selection domain, 1 or 2 dots in the comparability domain, and 1 dot in the outcome/exposure domain. Slight adaptations to the Newcastle–Ottawa Scale were necessary for this systematic review. Given that summarizing evidence on the time lag between exposure to housing disadvantage and mental health was one of the subobjectives of the study and there being no clear evidence on this topic, none of the selected studies were scored on the adequacy of follow-up as per the Newcastle–Ottawa Scale criteria in outcome assessment. Similarly, outcomes of depression and anxiety could be measured only using psychometric tools rather than clinical equipment; studies that used standard and contextually validated tools for assessment of outcome scored 1 dot for assessment of outcome. The quality assessment of selected studies was conducted independently by AS and LD to reduce potential bias, and disagreements were resolved through discussions.

Evidence Synthesis Method

A narrative synthesis of evidence by prevailing themes was selected over a meta-analysis to integrate findings because of the differences in exposure definitions of housing disadvantage, outcomes and tools used for measuring mental health, and population groups of focus.

EVIDENCE SYNTHESIS

Overall, 2,952 studies were identified across the electronic databases. Of these, 1,804 unique studies underwent title and abstract screening. Thirty-eight relevant articles remained after the title and abstract screening, and 11 studies were selected for data extraction in the review.[46–56] One additional relevant study was not identified in the search but obtained through expert contact.[57] The flowchart for the process of study selection as per PRISMA guidelines is presented in Figure 1.

Summary Characteristics of Selected Studies

Summary characteristics of the included studies are presented in Table 1. With the exception of two studies,[53,56]

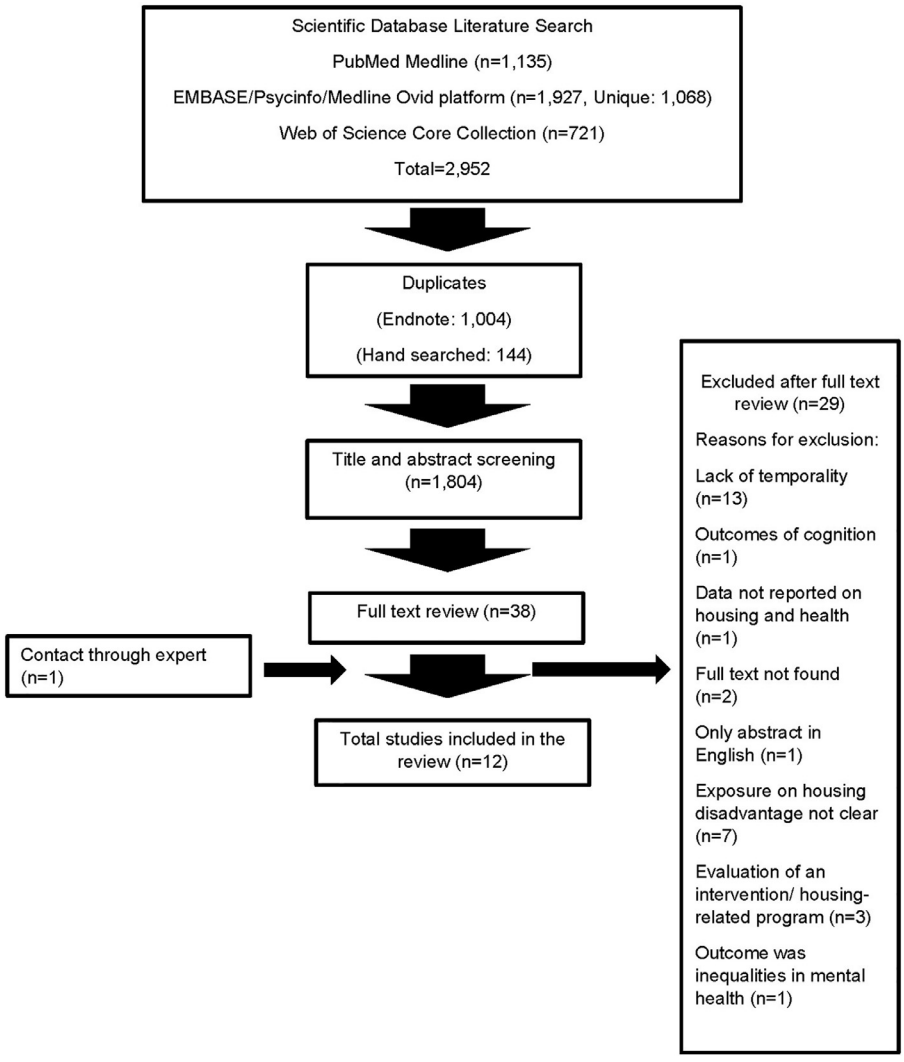

Figure 1. PRISMA flowchart.

all studies were published in 2011 or afterwards. All studies were from high-income countries. Six of the selected studies were from the U.S.,[46,47,51,54,55,57] two each from the United Kingdom/England[50,53] and Australia,[49,52] and one each from South Korea[48] and Finland.[56] Studies were conducted across all age groups: four conducted only among children,[47,51,52,57] two only among older adults,[46,48] and two specifically studied pregnant women.[49,54] Three of the included studies were retrospective cohort studies,[46,47,54] whereas the remaining were prospective cohort studies. Two of the selected studies were conducted among birth cohorts[52,53] (Table 1).

Three studies measured housing disadvantage through housing instability and number of residential moves.[47,52,54] Physical conditions of housing and overcrowding were also considered in four studies.[50,51,57] Two measured housing disadvantage by housing tenure and ownership.[48,52] One study measured financial characteristics of housing mortgage delinquency,[46] one studied eviction as exposure,[55] one studied subjective perceptions of accommodation problems,[49] and the final study assessed moving to a smaller apartment.[56] Multiple forms of housing disadvantage—where there were two or more housing-related exposure variables—were examined in three studies.[50–52] For outcomes, three studies measured both depression and anxiety,[49,51,54] five studies measured only depression,[46,47,52,53,55] one measured only anxiety,[48] two measured mental stress,[56,57] and one measured overall mental health.[50] Large variations were observed in the tools used to measure mental health status. Follow-up periods among selected studies between measurement of housing disadvantage and mental health outcomes ranged from proximity in time (when studies measured exposure to

Table 1. Summary Characteristics of the Included Studies (Ordered Temporally According to Publication Year)

Author, publication year	Country	Age group	Type of cohort study	Specific population subgroup	Exposure of housing disadvantage	Measurement of exposure	Outcome of mental health	Measurement tool for mental health	Time lag
Aro (1984)[56]	Finland	≤48 years	Prospective	Metal industry employees	Moving to smaller apartment	Comparing size of apartment at two study time points	Mental strain	Cornell Medical Index (disturbed affects) and psychosomatic symptoms	5 years
Sadowski (1999)[53]	England	Birth until 32/34 years	Prospective (birth cohort study)	Not applicable	Overcrowding	Not reported	Depression	Depression Index and Depressive Symptom Score	32–34 years
Alley (2011)[46]	U.S.	≥50 years	Retrospective	Not applicable	Mortgage delinquency	Participants were asked, *Have you fallen more than 2 months behind on mortgage payments in the past 2 years?*	Depression	Center for Epidemiological Studies Depression Scale	Undefined (during the last 2 years before outcome measurement)
Blair (2011)[57]	U.S.	7–48 months	Prospective	Children	Substandard housing quality	The cleanliness of the home, the number of rooms in the home, the safety of the building's interior, and safety of the area outside the building on a 0–4 Likert-type scale	Stress	Salivary cortisol levels	Up to 42 months (3.5 years)
Suglia (2011)[54]	U.S.	Mean 24.8 years (SD=5.9)	Retrospective	Mothers recruited from 20 large cities in the U.S.	Housing instability	Mothers were asked whether they had moved two or more times in the past 2 years	Depression and anxiety	Composite International diagnostic interview-short form (CIDI-SF)	Undefined (during the last 2 years before outcome measurement)
Rumbold (2012)[52]	Australia	Birth until 9 years	Prospective (birth cohort study)	Children	Housing tenure and residential mobility (trajectories of housing disadvantaged modeled as exposure)	Change in housing tenure between the ages of 2, 3.5, and 9 years Number of house moves in the periods birth to <2, 2 to <5 and 5 to 9 years	Depression: internalizing behavior problems (withdrawn/ depression)	Achenbach's CBCL	9 years
Fowler (2015)[47]	U.S.	Grade 7 to 12 in baseline and aged 18–26 years at follow-up	Retrospective	Children	Household instability	Housing instability was indicated by a count of the number of residential addresses youth reported since the beginning of the study	Depression	Modified version of Center for Epidemiologic Studies Depression Scale	Undefined
Desmond (2015)[55]	U.S.	Low income urban mothers and their children	Prospective	Mothers	Eviction	Mothers were asked *in the past 12 months, were you evicted from your home or apartment for not paying the rent or mortgage?*	Depression	CIDI-SF MD score	Two different time lags: early eviction (child 0–1/2–3 years) and recent eviction (child 4–5 years)
Kang (2016)[48]	South Korea	≥65 years	Prospective	Older adults	Housing tenure	Housing status (owned or rented)	Anxiety	AGECAT	2 years
Pevalin (2017)[50]	United Kingdom	≥19 years	Prospective	Not applicable	Housing condition: density of housing problems	A measured of cumulative housing problems derived through estimating density of housing problems as the proportion of years over the last 4 years that people have been living with housing problems	Mental health	Overall score of 0–36 on General Health Questionnaire with a higher score indicating poorer mental health	Undefined (4 years changes in housing problems and 4 years changes in mental health), time modeled as a covariate

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housing disadvantage before outcome measurement but did not define the period) up to 34 years. Only one study examined two different time lags between exposure to housing disadvantage and mental health (Table 1). The temporal ordering of housing disadvantage (exposure) and mental health outcomes in the included studies is also presented graphically in Appendix Figure 1 (available online).

Quality Assessment Summary

Of the 12 studies, five studies were found to be of good quality and scored highly across all assessment domains. Six studies scored fair, and only one study[53] scored poorly in overall risk of bias assessment. Generally, the studies scored well against the criteria of selection of nonexposed cohort, ascertainment of exposure, demonstration that outcomes of interest were not present at start of study, and comparability of cohorts. By contrast, most studies scored relatively poorly against cohort representativeness, assessment of outcome, and adequacy of follow-up of cohorts criteria (Table 2).

Impact of Housing Disadvantage on Anxiety

Of the 12 selected studies, only two studies[48,54] examined longitudinal associations between housing disadvantage and anxiety in a collective sample of 3,103 individuals. Both studies had a maximum follow-up period of 2 years. One of them[54] was a retrospective cohort study, and the other a prospective cohort study.[48] Suglia et al.[54] was found to be of fair methodologic quality, whereas the study of Kang and colleagues[48] was found to be of good methodologic quality. The reported effect estimates confirmed the relationship between housing disadvantage and incident cases of anxiety in one study,[54] whereas the other[48] found this association to be nonsignificant. Longitudinal associations between housing disadvantage and prevalence of anxiety were confirmed in both studies (ORs ranging from 1.9 [95% CI=1.2, 3.0] to 2.2 [95% CI=1.1, 4.7]). In addition, Kang et al.[48] confirmed an association between housing disadvantage and persistent anxiety (Appendix Table 2, available online). No substantial variations as a result of study quality or by follow-up period were identified.

Impact of Housing Disadvantage on Depression

Most selected studies examined the longitudinal relationship between housing disadvantage and depression. The collective sample analyzed for this relationship was 15,047, with follow-up periods ranging from proximity in time to 32 years. Most studies were found to be of fair methodologic quality. Positive associations between housing disadvantage and depression were confirmed in seven of the eight studies. Studies that confirmed

Table 1. Summary Characteristics of the Included Studies (Ordered Temporally According to Publication Year) (*continued*)

Author, publication year	Country	Age group	Type of cohort study	Specific population subgroup	Exposure of housing disadvantage	Measurement of exposure	Outcome of mental health	Measurement tool for mental health	Time lag
Rollings (2017)[51]	U.S.	Mean age of 9.5 years at baseline	Prospective	Children	Housing condition	Measures of structural quality, clutter and cleanliness, hazards, indoor climate, and privacy/crowding	Depression and anxiety	Internalizing (depression and anxiety) and externalizing (aggression) symptoms	4 years
Kingsbury(2018)[49]	Australia	≥20 years	Prospective	Pregnant women	Accommodation problems	Mothers were asked: *have you had serious housing or accommodation problems*	Depression and anxiety (trajectory of outcomes modeled over 27 years)	Delusions-Symptoms-States-Inventory: state of anxiety and depression	27 years

AGECAT, Automated Geriatric Examination for Computer-Assisted Taxonomy; CBCL, child behaviour checklist.

Table 2. Quality Assessment of the Included Studies

	Selection					Outcome			
Study	**Representativeness of the exposed cohort**	**Selection of the nonexposed cohort**	**Ascertainment of exposure**	**Demonstration that outcome of interest was not present at start of study**	**Comparability of cohorts on the basis of the design or analysis**	**Assessment of outcome[a]**	**Adequacy of follow-up of cohorts**	**Overall**	
Aro (1984)[56]		•	•	•			•	4/8	Fair
Sadowski (1999)[53]				•	•	•		3/8	Poor
Alley (2011)[46]	•	•	•	•	••			6/8	Fair
Blair (2011)[57]	•	•	•	•	••	•	•	8/8	Good
Suglia (2011)[54]		•	•	•	••			5/8	Fair
Rumbold (2012)[52]		•		•	••	•		5/8	Fair
Fowler (2015)[47]	•	•	•		••	•		6/8	Good
Desmond (2015)[55]		•	•	•	••		•	6/8	Good
Kang (2016)[48]	•	•	•	•	•		•	6/8	Good
Pevalin (2017)[50]	•	•	•	•	••	•		7/8	Good
Rollings (2017)[51,b]		•	•		•	•		4/8	Fair
Kingsbury (2018)[49]		•	•		•			3/8	Fair

[a]Diagnostic tools with reference and validation. Outcome criteria: Was follow-up long enough for outcomes to occur = an objective of the study so not assessed; Good quality: three or four dots in selection domain AND one or two dots in comparability domain AND one dot in outcome/exposure domain.
[b]Ascertainment of exposure was good however not according to NOS.
NOS, Newcastle-Ottawa Scale.

associations, and reported ORs as effect estimates, found odds of depression ranging from 1.10 (95% CI=1.04, 1.16) to 7.86 (95% CI=3.13, 19.77). Studies that examined mean differences in mental health scores also found housing disadvantage to be associated with worse depression scores (Appendix Table 2, available online). No substantial variations as a result of study quality or by follow-up period were identified.

Housing Disadvantage and Mental Health Score

Only one study[50] examined the association between the density of housing problems and mental health scores. The study was of good methodologic quality and found a positive association between housing disadvantage and poor mental health (Appendix Table 2, available online).

Housing Disadvantage and Stress

Two studies examined the association between housing disadvantage (moving to a smaller apartment and substandard housing conditions) and measures of stress.[56,57] Both confirmed an association between high housing disadvantage and high levels of stress. One study was of good methodologic quality, whereas the other was found to be of poor methodologic quality (Table 2). Blair and colleagues[57] examined associations between substandard housing condition and allostatic load (measured through salivary cortisol) among children. The study was of high methodologic quality and found cumulative scores of substandard housing over 42 months to be associated with higher levels of salivary cortisol. The study by Aro and Hannien[56] examined the association between moving to a smaller apartment and stress in a Finnish population and found a decline in the mean scores of psychosomatic symptoms and disturbed affects. The study was of fair methodologic quality. The collective sample size analyzed between the two studies was 1,883.

Life-Course Theories

Of the two birth cohort studies,[52,53] Rumbold et al.[52] examined variation in the association between residential mobility and depression scores among 9-year-old children by multiple periods (birth until 2 years, 2–5 years, and 5–9 years) (Appendix Figure 1, available online). The study found a longitudinal association between residential mobility during birth until 2 years and depression. Similarly, Sadowski and colleagues[53] found an association between overcrowding during birth and depression in those aged 32–34 years, but this was observed only among male participants (Appendix Table 2, available online).

DISCUSSION

This review uses a temporal ordering restriction, one of nine long-standing and undisputed key criteria for establishing causal relationships.[1,35–37] Therefore, this review focuses on longitudinal studies where exposure to housing disadvantage preceded a mental health outcome. Increasingly, longitudinal data from observational studies are being leveraged to examine causal relationships under strict assumptions[34,58–61] when RCTs are not feasible—a particular problem in housing and other social determinants research.

In a time of increasing focus on the quality of research evidence, this systematic review provides relevant insights. A relatively small number of existing studies were identified, and from these, a consistent, robust, and temporally ordered association between prior housing disadvantage and mental health was established. It is important to note that from the 1,669 studies selected in the initial search, the studies found to have met the causal criteria and also have methods judged to be "good" are all mainly recent (2017, 2016, 2015, and 2011).[47,48,50,55,57] This is perhaps not surprising, reflecting new methodologic developments and improved access to quality longitudinal data, but promisingly, it perhaps also reflects a general turn within the field toward seeking out causally focused evidence.

Limitations

This systematic review has several strengths and some weaknesses. This is the first systematic review on housing disadvantage and mental health that uniquely investigates evidence from longitudinal studies; however, some weaknesses must be considered. Although this systematic review aimed to examine a specific research question, multiplicity and heterogeneity of exposure and outcome definitions, and specific subpopulation groups, prevent the authors from summarizing the relationship between housing disadvantage and mental health quantitatively using meta-analysis. In addition, despite the criterion of the exposure preceding the outcome, three included studies examined housing disadvantage retrospectively,[46,47,54] assuming that the effect of housing disadvantage was relatively instantaneous. It must be acknowledged that the evidence yielded from this systematic review assessed different forms of housing disadvantage and different measures and definitions for mental health and often studied only specific subpopulations. The highest-quality evidence arising from the review was on the relationship between housing disadvantage and anxiety, demonstrating a clear negative effect. Studies included within the review were found to be of fair to good methodologic quality, with varying follow-up periods. However, it must be noted that

these characteristics did not appear to induce substantive variations in the findings. One of the most important findings from the review is that evidence from the birth cohort studies strongly suggests that housing disadvantage in early life is related to worse mental health outcomes during the life course. The implication of this finding is the potential for this to be a focus of further work. Finally, homelessness was excluded from this systematic review to maintain a clearly defined exposure measure. It is widely acknowledged that homelessness is more than a simple lack of shelter.[62–65] Homelessness is a complex social issue and presents as an extreme manifestation of poverty, of which the lack of adequate and affordable housing is one of many contributors. Homeless populations exhibit high levels of personal disability (including alcohol and substance misuse), social estrangement, and deep poverty, distinguishing their shelter problems from those in the housing market.[62,65] Therefore, interventions for improving mental health are likely to be different. The existing systematic reviews on homelessness and mental health support this distinction.[31,32] Nonetheless, future systematic reviews concerned with the causal relationship between homelessness and mental health, and the role of time, would be of great research interest.

Overall, the findings from this review substantiate the conclusions from existing systematic reviews that report associations between housing disadvantage and poor mental health, even adjusting for potential confounding factors.[26,28,29] Findings from this systematic review are not comparable with prior systematic reviews limited to intervention studies.[8,9,25,27,30] Evidence from this systematic review satisfies one cardinal criterion of causality between housing disadvantage and mental health, though the modest number of studies included within the final review was prohibitive to fully investigating critical assumptions relevant to causality, including positivity, consistency, and exchangeability.[34,58–61]

The review highlights the diversity in mechanisms through which multiple housing disadvantage exposures relate to multiple mental health outcomes at the different stages of life course and demonstrates that it deserves due attention. For instance, pathways through which housing-related physical inadequacies such as damp or cold impact mental health are not likely to be the same as those through which housing-related financial insecurities might impact mental health.[66] Furthermore, financial circumstances and poor physical characteristics of housing are interlinked and represent different forms of housing disadvantage[6] and can interact together to amplify negative consequences on mental health. In addition, because of the differences in the etiologies of various mental health conditions, pathways through which housing disadvantage leads to anxiety and depression can be overlapping but different.[2,67] Finally, contemporary housing disadvantage can act as a mediator in the relationship between prior housing disadvantage and current mental health. An in-depth understanding of these intervening mechanisms is paramount for improving the current understanding of the causal effects of housing disadvantage on mental health, as well as supporting evidence on the development of interventions to break the causal chain.[66] Some support from the included birth cohort studies for life-course impact of housing disadvantage on worse mental health was found. Future longitudinal studies with robust methodology can be employed further to shed light on the role of housing disadvantage during the life course and its effects on mental health.

CONCLUSIONS

Evidence from longitudinal studies indicates that prior exposure to housing disadvantage is consistently associated with worse mental health. Findings reinforce housing as a key social determinant of mental health, and policy interventions directed at reducing housing disadvantage may achieve substantial mental health benefit at the population level.[2–4,6,43] The lack of studies from low- and middle-income countries suggests a need for initiating studies directed toward these nations, expanding the evidence base to account for very different housing, economic, and political conditions.[68] Finally, more clarity on causal mechanisms through which different dimensions of housing disadvantage lead to poor mental health is necessary.

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SUPPLEMENTAL MATERIAL

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