

Rapid Review: Housing interventions for adults experiencing homelessness and their effects on substance use and criminal activity

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Executive Summary

Background

Description of the Problem

Hamilton's major public transit system, the Hamilton Street Railway (HSR), has recently received complaints regarding drug behaviour on their property, namely bus terminals and public bathrooms. Residents and users of the system have stated that they feel unsafe and worried about drug use occurring in public. Upon investigation of this matter, the literature revealed that the rate of substance-related disorders is higher in populations experiencing homelessness, as compared to the general population (Public Health Ontario, 2019). In fact, 40% of homeless individuals in Ontario report having used drugs recently (within the last 30 days; Grinman, 2010). Furthermore, Hamilton has a higher than provincial average rate of overdose related deaths due to harmful substances (Hamilton Drug Strategy, 2019). When considering the literature in conjunction with the problem posed by the HSR, the review authors determined that it is prudent to target populations experiencing homelessness. As populations experiencing homelessness have no secure location to use drugs, it is probable that targeting persons experiencing homelessness and their general substance use may directly address the problems posed in both the literature and by the HSR. Programs which provide housing for persons experiencing homelessness have been implemented across North America to provide upstream harm reduction (Watson, 2017). One example of this approach is the "Housing First" model which prioritizes providing immediate stable housing to people experiencing homelessness, over the more traditional approach of requiring treatment or program attendance before housing provision is considered (Goering, et al., 2014). The use of this intervention points to a potential solution to the problem at hand. Public disturbance and discarded supplies are directly related to the problem posed by the HSR, therefore are outcomes of interest in this review. Previous research has demonstrated an association between homelessness and public drug use, as well as an association between public drug use and criminal activity and was therefore also considered in choosing outcomes of interest (Sutter, Curtis, & Frost, 2019). As such, this review aims to explore the effectiveness of housing provision programs on substance use, criminal activity, public disturbance, and discarded supplies among populations experiencing homelessness.

Explanation of Who the Review is For

The problem at hand was proposed to the rapid review team by manager Ali Sabourin at the Customer Experience & Innovation Department of the City of Hamilton, HSR. This department has been grappling with the urban drug problem, and its effects on user experience of the HSR, as well as its effects on population health within the city. As mentioned above, public drug use is the key concern. The City of Hamilton and the HSR serve the entirety of the Hamilton population with a vast network of public transportation vessels and facilities. Hamilton is a large, high income city, and as such the review team ensured targeting of urban communities in high-income countries in the rapid review.

Research Question

This rapid review aims to answer the following question: How do housing interventions, including but not limited to Housing First, affect drug use, substance-related public disturbance, discarded supplies, and criminal activity in adults (aged 18-65) experiencing homelessness in urban communities in high-income countries?

Key Points

- Our synthesis of available evidence, including previously completed systematic reviews, indicates no single clear effect of housing interventions for individuals experiencing homelessness on substance use or criminal activity. The highest quality evidence that was appraised shows that there are mixed results between no observed effect of housing on substance use and criminal activity, and improvement on these outcomes.
- Though the research indicates mixed effects on outcomes, there does not appear to be any detrimental effect of housing interventions compared to treatment as usual for individuals experiencing homelessness. In other words, we cannot definitively conclude that housing interventions are “better” than treatment as usual. Further to this point, please refer to limitations regarding ethical concerns of comparison groups, under “Overview of Evidence and Knowledge Gaps”.
- There is emerging evidence showing the effectiveness of abstinence-contingent housing over non-abstinence contingent housing on substance use. However, we cannot conclude that abstinence-contingent housing is more effective in reducing substance use than non-abstinence contingent housing, because a low number of studies look at this specific comparison, and in studies that compare the two, effectiveness of abstinence-contingent housing depends on how long follow-up is conducted for.
- Much fewer studies reported on criminal activity than substance use, and no studies reported on public disturbance or discarded supplies.

Overview of Evidence and Knowledge Gaps

- Majority of syntheses and single studies look at housing interventions, such as Housing First, that are not abstinence-contingent. Furthermore, the majority of housing interventions were evaluated in conjunction with community supports such as intensive case management, assertive community treatment, and/or other programs and services. As such, very few studies look at housing as an intervention on its own.
- This review considered substance use and criminal activity as outcomes of interest. Other outcomes important to the health of populations experiencing homelessness (such as mental health outcomes, physical health outcomes, number of days housed, etc.) also need to be considered when making decisions about providing an intervention like Housing First.
- Research with this vulnerable population includes ethical concerns, which prevent researchers from having a control group with treatment as usual that varies widely from the intervention. For example, many treatment as usual groups also had access to case management or community services, which could provide access to housing and have a confounding effect. This similarity in intervention and control may influence whether researchers are able to observe significant differences between the groups.
- The nature of the intervention prevents participants, and often researchers or evaluators, from being blind to their treatment.

- Many outcome measures in this review, especially substance use, are self-reported. While some are not, having many studies which rely on self-reported results can bias our conclusions, importantly if participants are under-reporting their substance use.
- While one randomized controlled trial (RCT) followed participants for 6 years, very few studies followed participants for longer than 12-24 months. Longer follow-up periods are recommended for future research to examine sustained change in adults experiencing homelessness.

Methods

Research Question

How do housing interventions, including but not limited to Housing First, affect drug use, substance-related public disturbance, discarded supplies, and criminal activity in adults (aged 18-65) experiencing homelessness in urban communities in high-income countries?

Search

The electronic search for research evidence regarding the question was conducted in the following databases on November 4th and 13th, 2020:

- Public Health +
- Health Evidence
- TRIP
- Embase
- Medline
- CINAHL

The electronic search strategy was developed in Medline, then translated to the other databases. The Medline search strategy can be found in Appendix A. All search results were uploaded to the online systematic review management software “Covidence” for screening.

Selection Criteria

To be considered eligible for inclusion in this rapid review, all pieces of evidence retrieved through the above search strategy were screened using “Covidence”. Two review authors, using the criteria listed in the table below, screened titles and abstracts independently for inclusion/exclusion. Any discrepancies between review authors were resolved through discussion or by a third reviewer. Then, the full texts of the included studies from the previous step were screened using “Covidence”, and additional exclusions were made based on the criteria from the same table. Any discrepancies between review authors were again resolved through discussion or by a third reviewer.

	Inclusion Criteria	Exclusion Criteria
Population	Adults aged 18 or older *Studies with youth and adults acceptable, if adult data can be extracted separately Homeless, vulnerably housed, or precariously housed individuals	Children/youth under the age of 18
Setting	Urban High-income countries	Rural Low- and middle-income countries
Intervention	Provision of permanent/semi-permanent housing directly or through vouchers	Provision of respite care, short-term housing, halfway housing, transitional housing, residential treatment, rehabilitation, hospice care
Comparison	Not required	Not required
Outcomes	One or more of the following are reported on: Any general drug use outcome Drug-related public disturbance Discarded supplies Any criminal-related activity	Not reporting on an outcome of interest
Study Design	Randomized controlled trials (RCTs), pre-post studies, cohort studies, case-control studies, cross-sectional studies, systematic reviews, rapid reviews, mixed-methods studies, qualitative studies *Update: November 24, 2020 Systematic reviews & RCTs included only (see "Departures from Initial Protocol")	Commentary, descriptive studies, editorials, conference abstracts, literature reviews, scoping reviews, case series, case reports

Data Extraction

Relevant information from each piece of evidence was extracted by one review author, and then reviewed for accuracy by a second review author. Any discrepancies were resolved through discussion. A Google Sheets template was used to extract the following information from each included piece of evidence:

- Author and publishing date
- Study design
- Setting
- Description of population/sample
- Description of intervention
- Description of control or comparison (if applicable)
- Description of outcome(s)
- Study results/summary of findings

The completed extraction template can be found at this link: [Data Extraction](#)

Quality Appraisal

The quality of each piece of included evidence was appraised using the Joanna Briggs Institute Critical Appraisal Tools (Joanna Briggs Institute, n.d.). The “Checklist for Randomized Controlled Trials” or “Checklist for Systematic Reviews” was used depending on study design (Joanna Briggs Institute, n.d.). Quality appraisals were completed by two review authors, independently, and any discrepancies were resolved through discussion. An overall rating of Low, Moderate, or High was decided for each included RCT or systematic review based on their percentage score on their respective checklist:

Low: 0-40% of appraisal checklist answers are “Yes”
Moderate: 41-70% of appraisal checklist answers are “Yes”
High: 71-100% of appraisal checklist answers are “Yes”

Data Synthesis

The findings from and quality appraisal of all included pieces of evidence were assessed by all review authors. Tables 1 and 2 in “Findings” summarize these assessments. The review authors then met and synthesized the identified evidence into key points, an overview of evidence, and knowledge gaps. These results are presented in the “Executive Summary” above. It should be noted that higher quality evidence was taken into higher consideration than lower quality evidence in synthesis.

Departures from Initial Protocol

The review team initially endeavored to include a range of study designs in this rapid review as outlined in the inclusion criteria. Following full text screening, a total of 78 articles were included using these criteria. Due to feasibility and time constraints, the decision was made to restrict study design inclusion to systematic reviews and randomized controlled trials only. This prioritized designs of higher methodological quality and allowed completion of the review in the required timeline.

In addition, the search strategy listed was updated on November 13th, 2020 after title and abstract screening, to ensure a more comprehensive search on the criminal activity outcome. Prior to the update, only drug-related criminal activity was included in the search, but any criminal activity was part of inclusion criteria during screening. The reason for this change in inclusion criteria was that review authors noted specific details regarding criminal activity were not always available to researchers (for example, reason for arrest being drug-related). The search was expanded to include public disturbance, arrests, offenses, charges, crime, and criminality. Additional articles retrieved at this stage went through the same screening process, before being included in the review.

Findings

Summary of Quality of Findings

A total of 3634 results were retrieved from our search. After removing duplicates and screening for eligibility, 32 pieces of evidence were included in this review (please refer to Appendix B for a full PRISMA diagram). An overview of the results and corresponding quality of evidence is included here:

Evidence Type	Number Included	Quality of Evidence
Systematic Reviews	7	5 High 2 Moderate
RCTs	25	9 High 16 Moderate

It should be noted here that no results were found regarding the public disturbance and discarded supplies outcomes of interest. The results regarding other outcomes of interest are summarized in this review and in Table 1 and 2 below.

Table 1: Summary of Systematic Review (SR) Evidence

Reference	Date Published	Study Design	Sample	Setting	Summary of Findings	Quality Rating
Aubry, T., Bloch, G., Brcic, V., Saad, A., Magwood, O., Abdalla, T., Alkhateeb, Q., Xie, E., Mathew, C., Hannigan, T., Costello, C., Thavorn, K., Stergiopoulos, V., Tugwell, P., & Pottie, K. (2020). Effectiveness of permanent supportive housing and income assistance interventions for homeless individuals in high-income countries: A systematic review. <i>The Lancet Public Health</i> , 5(6), e342–e360.	2020	Systematic Review	Number of included studies: 72	All High-Income Countries Included in Search	<p>This review explored the effectiveness and cost-effectiveness of permanent supportive housing and income interventions on the health and social wellbeing of individuals who are homeless in high-income countries. The authors included randomized controlled trials, quasi-experimental studies, and cost-effectiveness studies, which reported on our outcome of interest of substance abuse.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • The effect of permanent supportive housing on substance use was assessed in 9 studies. • One study found no significant differences in substance-use related problems in permanent supportive housing participants compared with usual services over 6 years. • One study found that the proportion of permanent supportive housing participants who reported severe drug-use problems was significantly higher than those receiving usual services, but no significant differences in severe alcohol-use problems were identified between the groups. • Permanent supportive housing was not found to have any additional benefits on substance-use outcomes in four other studies. 	High
Peng, Y., Hahn, R. A., Finnie, R. K. C., Cobb, J., Williams, S. P., Fielding, J. E., Johnson, R. L., Montgomery, A. E., Schwartz, A. F., Muntaner, C., Garrison, V. H., Jean-Francois, B., Truman, B. I., &	2020	Systematic Review	<p>Number of included studies: 26</p> <p>Total number of participants: 17182</p> <p>Eligibility criteria beyond homelessness</p>	Canada and the United States	<p>This review explored the effectiveness of Housing First versus Treatment First approaches on housing stability, health outcomes and health care utilization. This review addressed our outcome of interest, substance use.</p> <p>Overall, there were mixed results for substance use. Specific findings include:</p> <ul style="list-style-type: none"> • A study observing the U.S. Department of Housing and Urban Development-VA Supportive Housing (HUD-VASH) Program found a 51% reduction in 	High

<p>Fullilove, M. T. (2020). Permanent Supportive Housing with Housing First to Reduce Homelessness and Promote Health Among Homeless Populations With Disability: A Community Guide Systematic Review. <i>Journal of Public Health Management and Practice</i>, 26(5), 404–411.</p>			<p>included: most studies recruited participants with a mental health disorder, substance use disorder, or a dual diagnosis</p>		<p>alcohol use compared to the treatment as usual group.</p> <ul style="list-style-type: none"> 6 studies comparing Housing First to treatment as usual reported mixed results on participants' alcohol and illegal substance use. 	
<p>Baxter, A. J., Tweed, E. J., Katikireddi, S. V., & Thomson, H. (2019). Effects of Housing First approaches on health and well-being of adults who are homeless or at risk of homelessness: systematic review and meta-analysis of randomized controlled trials. <i>Journal of Epidemiology and Community Health</i>, 73(5), 379-387.</p>	<p>2019</p>	<p>SR</p>	<p>Number of included studies: 7 Total number of participants: 3410</p>	<p>Canada and the United States</p>	<p>This study explored the evidence from randomized controlled trials in North America for the effects of Housing First (with or without ICM/ACT) on health and well-being in the population of interest. They reported on our outcome of interest of substance abuse.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> Two studies reported on substance abuse. Data from one study were reported as showing no significant differences in either alcohol or drug use at 24 months between intervention and control groups. In the other study, across 48 months, a greater reduction of heavy alcohol use in intervention groups compared with control was reported (no clear difference in drug use). The second study used data from the At Home/Chez Soi RCT, and with pooled analysis across age groups, showed a very small overall difference in self-reported problematic substance use, favouring the intervention group. 	<p>High</p>
<p>Leclair, M. C., Deveaux, F., Roy,</p>	<p>2019</p>	<p>Systematic Review</p>	<p>Five included studies</p>	<p>Canada, the</p>	<p>This review assessed the impact of Housing First on criminal justice involvement outcomes in homeless</p>	<p>High</p>

<p>L., Goulet, M.-H., Latimer, E. A., & Crocker, A. G. (2019). The Impact of Housing First on Criminal Justice Outcomes among Homeless People with Mental Illness: A Systematic Review. <i>Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie</i>, 64(8), 525–530.</p>			<p>N = 7128</p> <p>Eligible studies included homeless or precariously housed participants, of whom $\geq 50\%$ have a serious mental disorder diagnosis.</p>	<p>United States, & Australia</p>	<p>people with mental illness. This addresses one of our outcomes of interest: criminal activity.</p> <p>This review concludes that Housing First interventions have little impact on criminal justice involvement outcomes in homeless adults with mental illness.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • Two studies with low risk of bias found no significant differences between Housing First and Treatment as Usual groups on the outcome of participant arrests. Both groups showed similar decreases in arrests from baseline to two year follow up. • One study with moderate risk of bias assessed differences between Forensic and Non-Forensic Housing First groups and found the Non-Forensic group had significantly fewer days spent in the justice system at one year follow up (12 fewer days versus 2 fewer days in Forensic). • One study with serious risk of bias assessed differences between Housing First and Treatment First interventions and found the Housing First group had significantly fewer days incarcerated at two year follow up (3.5 fewer days versus 1.5 greater days in Treatment First). • One study with serious risk of bias assessed the differences between scattered and congregate Housing First sites and found the scattered-site group had significantly lower engagement with the justice system scores (-0.5 versus +0.4 in congregate-sites). 	
<p>Fitzpatrick-Lewis, D., Ganann, R., Krishnaratne, S., Ciliska, D., Kouyoumdjian, F., & Hwang, S. W. (2011). Effectiveness of</p>	<p>2011</p>	<p>Rapid Systematic Review</p>	<p>84 included studies:</p> <ul style="list-style-type: none"> • 10 moderate quality studies narratively synthesized in detail 	<p>Canada</p>	<p>This rapid review assessed the effectiveness of any interventions aimed at improving the health or healthcare utilization of homeless people on several health and housing outcomes, one being substance use which is our outcome of interest.</p> <p>This review concludes that abstinence-contingent housing compared to no housing is associated with</p>	<p>High</p>

<p>interventions to improve the health and housing status of homeless people: A rapid systematic review. <i>BMC Public Health</i>, 11(1), 1–14.</p>			<ul style="list-style-type: none"> 74 weak quality studies discussed in minimal detail <p>Eligible studies included participants who were homeless, marginally housed, or at risk of homelessness.</p>		<p>some benefits including reduced substance use. Non-abstinence-contingent housing is found to be most effective for long term abstinence from substance use.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> Three of 10 moderate quality studies address the effect of housing interventions on substance use outcomes. The integration of additional supportive services in housing provision such as case management, work-therapy, or post-detoxification stabilization, are suggested to be beneficial for health and substance use outcomes. General findings from weak quality studies suggest provision of housing and other supportive service may be beneficial for homeless people with substance use disorders. 	
<p>Benston, E. A. (2015). Housing programs for homeless individuals with mental illness: effects on housing and mental health outcomes. <i>Psychiatric Services</i>, 66(8), 806-816.</p>	<p>2015</p>	<p>SR</p>	<p>Number of included studies: 14</p> <p>Homeless adults with mental illness</p>	<p>United States</p>	<p>This study analyzed the best available research in the United States on permanent supportive housing programs for homeless individuals with mental illness and the effect of these programs on housing status and mental health. The review included randomized controlled trials, quasi-experimental, and interventional studies which provided permanent supportive housing (with or without ICM, ACT, and housing vouchers). They reported on our outcome of interest of substance abuse.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> Seven studies reported on mixed clinical and substance use outcomes. One study reported that the experimental housing condition was associated with a reduction in substance use. Another study found no difference in substance use between persons in experimental and control conditions because substance use declined in both conditions. 	<p>Moderate</p>

<p>Leff, H. S., Chow, C. M., Pepin, R., Conley, J., Allen, I. E., & Seaman, C. A. (2009). Does One Size Fit All? What We Can and Can't Learn from a Meta-analysis of Housing Models for Persons with Mental Illness. <i>Psychiatric Services, 60</i>(4), 473–482.</p>	<p>2009</p>	<p>Systematic Review</p>	<p>Number of included studies: 30</p> <p>Total number of participants: 13436</p> <p>Eligible studies included participants who were both homeless and living with mental illness</p>	<p>The United States</p>	<p>This systematic review and meta-analysis assessed the effect of different housing models on multiple outcomes, including substance use and criminal activity.</p> <p>This review does not provide conclusive findings for the effect of housing on the outcomes of substance use or criminal activity.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • No statistically significant differences in alcohol or substance use outcomes were found between permanent supportive housing compared to residential treatment or transitional housing interventions. • No significant difference is found between permanent supported housing and no housing. • Residential treatment and transitional housing interventions are suggested to provide some benefit for reducing alcohol use, but analysis did not show a statistically significant effect. • Data on incarceration was reported to be insufficient to synthesize and effects on this outcome are not reported. • This review restricted inclusion to USA based studies only and did not appraise quality for every included study. Authors indicate meta-analysis findings are to be interpreted with caution. 	<p>Moderate</p>
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Table 2: Summary of Randomized Controlled Trial (RCT) Evidence

Reference	Date Published	Study Design	Sample	Setting	Summary of Findings	Quality Rating
Raven, M. C., Niedzwiecki, M. J., & Kushel, M. (2020). A randomized trial of permanent supportive housing for chronically homeless persons with high use of publicly funded services. <i>Health Services Research, 55</i> (S2), 797–806.	2020	RCT	n = 423 Mean Ages = 51.8 years (Intervention) 51.2 years (Control)	The United States	<p>This study compared permanent supportive housing as part of “Project Welcome Home,” which used a Housing First model, intensive case management, and integrated community-based services, to “usual care,” which includes referrals to shelters or other permanent supportive housing that is NOT associated with Project Welcome Home, and other community services for individuals experiencing homelessness. The study examined the effect of this permanent supportive housing intervention on our outcome of interest: criminal activity. Participants were followed for a total of almost 3 years (1070 days).</p> <p>Overall, there was no observed effect of permanent supportive housing through Project Welcome Home on time spent in jail.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • Not all participants were followed for the full 3 years. 	High
Aubry, T., Bourque, J., Goering, P., Crouse, S., Veldhuizen, S., LeBlanc, S., Cherner, R., Bourque, P., Pakzad, S., & Bradshaw, C. (2019). A randomized controlled trial of the effectiveness of Housing First in a small Canadian city. <i>BMC Public Health, 19</i> (1154).	2019	RCT	n = 201 Age Range = 18+ Canadian homeless adults with a current mental disorder	Canada	<p>This study compared members of the sample receiving Housing First with Assertive Community Treatment (ACT) with members receiving treatment as usual. The outcome of interest was the intervention’s effect on substance abuse. Participants were followed for a total of 2 years.</p> <p>At the conclusion of the study period both the intervention and control groups showed significant improvements in mean substance abuse symptoms, with no significant difference identified between the two.</p>	High
Stergiopoulos, V., Mejia-Lancheros, C., Nisenbaum, R.,	2019	RCT	n = 575 Mean Age = 40.2	Canada	<p>This study compared Housing First to treatment as usual and the effect on our outcome of interest, substance use. Participants for followed for 6 years.</p>	High

<p>Wang, R., Lachaud, J., O'Campo, P., & Hwang, S. W. (2019). Long-term effects of rent supplements and mental health support services on housing and health outcomes of homeless adults with mental illness: Extension study of the At Home/Chez Soi randomised controlled trial. <i>The Lancet Psychiatry</i>, 6(11), 915–925.</p>					<p>There were no statistically significant differences in substance use severity between participants in the Housing First and treatment as usual groups during the 6-year follow-up period.</p> <p>This study is a part of the Canadian At Home/Chez Soi trial.</p>	
<p>Stergiopoulos, V., Gozdzik, A., Misir, V., Skosireva, A., Sarang, A., Connelly, J., Whisler, A., & McKenzie, K. (2016). The effectiveness of a Housing First adaptation for ethnic minority groups: Findings of a pragmatic randomized controlled trial. <i>BMC Public Health</i>, 16(1), 1110.</p>	<p>2016</p>	<p>RCT</p>	<p>n = 237 Mean Age = reported in groups. Largest age group was <30 years old in treatment group, 40-49 years old in the control group at least one mental illness</p>	<p>Canada</p>	<p>This study compared Housing First to treatment as usual and the effect on our outcome of interest, substance use. Participants were followed for 24 months. There was a statistically significant reduction in severity of substance use and number of days experiencing problems due to alcohol in the Housing First group compared to the treatment as usual group at 12 months, but no difference at 24 months.</p> <p>This study is a part of the Canadian At Home/Chez Soi trial.</p>	<p>High</p>
<p>Somers, J. M., Moniruzzaman, A., & Palepu, A. (2015). Changes in daily substance use among people experiencing homelessness and mental illness: 24-</p>	<p>2015</p>	<p>RCT</p>	<p>n = 497 Mean Age = 41 At least one mental illness stratified into high needs and moderate needs</p>	<p>Canada</p>	<p>This study compared Housing First to treatment as usual and the effect on our outcome of interest, substance use. Participants were followed for 24 months.</p> <p>There was no difference between Housing First and treatment as usual on substance use.</p>	<p>High</p>

<p>month outcomes following randomization to Housing First or usual care: Substance use and Housing First: results of a randomized trial. <i>Addiction</i>, 110(10), 1605–1614.</p>						
<p>Stergiopoulos, V., Gozdzik, A., O’Campo, P., Holtby, A. R., Jeyaratnam, J., & Tsemberis, S. (2014). Housing First: Exploring participants’ early support needs. <i>BMC Health Services Research</i>, 14(1), 167.</p>	<p>2014</p>	<p>RCT</p>	<p>n = 301 Mean Age = Not reported. Estimated to be early forties per final At Home/Chez Soi report</p>	<p>Canada</p>	<p>This study compared two Housing First treatments arms and the effects of housing on our outcome of interest, substance use, pre and post treatment. Participants were followed for 6 months.</p> <p>There was an increase in substance use at 6 months.</p> <ul style="list-style-type: none"> At 6 months, 28% of the participants experienced increased problems due to substance use compared to baseline. This study is a part of the Canadian At Home/Chez Soi trial. 	<p>High</p>
<p>Slesnick, N., & Erdem, G. (2013). Efficacy of Ecologically-Based Treatment with Substance-Abusing Homeless Mothers: Substance Use and Housing Outcomes. <i>Journal of Substance Abuse Treatment</i>, 45(5), 416–425.</p>	<p>2013</p>	<p>RCT</p>	<p>n = 60 Mean Age = 26.3</p> <p>The study population was specifically mothers (of biological children aged 2-6) who use substances</p>	<p>The United States</p>	<p>This study compared permanent housing that followed a Housing First model, including rental assistance, case management, and substance abuse treatment, to “treatment as usual,” which included housing and services received through a family shelter and community housing programs. The study examined the effect of permanent housing on our outcome of interest: substance use. Participants were followed for a total of 9 months.</p> <p>Overall, there was no difference in alcohol and drug use between the group that received permanent housing and the group that received treatment as usual.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> There was an observed difference in alcohol use at 3 months and 6 months of follow-up, but not 9 months. There was a quicker decline in alcohol use for mothers receiving permanent housing than in mothers receiving treatment as usual. 	<p>High</p>

Somers, J. M., Rezansoff, S. N., Moniruzzaman, A., Palepu, A., & Patterson, M. (2013). Housing First Reduces Re-offending among Formerly Homeless Adults with Mental Disorders: Results of a Randomized Controlled Trial. <i>PLOS ONE</i> , 8(9), e72946.	2013	RCT	n = 198 Mean Age = 39.2 Admitted to hospital for psychiatric reasons and justice system involvement in the last two years	Canada	This study compared Housing First (HF) to treatment as usual and the effect on our outcome of interest, criminal activity. Participants were followed for 24 months. There was a statistically significant reduction of offenses in the Housing First group compared to the treatment as usual group at 24 months. Specific findings include: <ul style="list-style-type: none"> Scattered site HF group had a larger reduction in offenses compared to congregate HF group; but both showed a reduction. 	High
Tsemberis, S., Gulcur, L., & Nakae, M. (2004). Housing First, Consumer Choice, and Harm Reduction for Homeless Individuals With a Dual Diagnosis. <i>American Journal of Public Health</i> , 94(4), 651–656.	2004	RCT	n = 225 Mean Age = 41.3	The United States	This study compared Housing First to treatment as usual and the effect on our outcome of interest, drug and alcohol use. The participants were followed for 24 months. There were no statistically significant differences between the Housing First and treatment as usual groups for drug and alcohol use at 24 months.	High
Edalati, H., Nicholls, T. L., Schutz, C. G., Somers, J. M., Distasio, J., Aubry, T., & Crocker, A. G. (2020). Examining the relationships between cumulative childhood adversity and the risk of criminal justice involvement and victimization among	2020	RCT	n = 1888 Mean Age = 41 Homeless adults with a diagnosis of mental illness at the time of enrolment	Canada	This study compared members of the sample receiving Housing First (with ICM for moderate needs participants and ACT for high needs participants) with members receiving treatment as usual. The outcome of interest was the intervention's effect on criminal justice involvement (any involvement in the past 6 months, as determined by the presence/absence of detention by police without being held in a cell, held in a police cell for 24 h or less, arrest, and/or court appearance). Participants were followed for a total of 2 years.	Moderate

homeless adults with mental illnesses after receiving Housing First intervention. <i>The Canadian Journal of Psychiatry</i> , 65(5), 409-417.					At the end of the two-year study period, the odds of experiencing criminal justice involvement were similarly reduced in both intervention and control groups, with no significant treatment effect found for the intervention group.	
Kerman, N., Aubry, T., Adair, C. E., Distasio, J., Latimer, E., Somers, J., & Stergiopoulos, V. (2020). Effectiveness of Housing First for Homeless Adults with Mental Illness Who Frequently Use Emergency Departments in a Multisite Randomized Controlled Trial. <i>Administration and Policy in Mental Health and Mental Health Services Research</i> , 47(4), 515–525.	2020	RCT	n = 2111 Mean Age Frequent ED users = 39.15 Mean Age Non-Frequent ED users = 41.17 Eligibility beyond homelessness included meeting diagnostic criteria for a mental disorder.	Canada	This study compared the effects of Housing First versus Treatment as Usual, on the outcome of substance use. Sub-groups were analyzed based on frequent or non-frequent Emergency Department (ED) use. Substance use was measured using the Global Appraisal of Individual Needs–Substance Problem Scale (GAINS). Participants were followed for a total of 24 months. This study concluded that the Housing First group overall significantly improved GAINS scores (i.e. fewer substance use problems) from baseline to follow up. The frequent-ED users of the Housing First group improved significantly less than the non-frequent ED users. There was no significant improvement in GAINS scores in the Treatment as Usual group overall, or for either subgroup. Specific findings include: <ul style="list-style-type: none"> • This study uses data from all five cities included in the Canadian At Home/Chez Soi project: Moncton, Montreal, Toronto, Vancouver, and Winnipeg. • Key limitations include loss to follow up, and baseline difference between the ED use subgroups. 	Moderate
Tinland, A., Loubière, S., Boucekine, M., Boyer, L., Fond, G., Girard, V., & Auquier, P. (2020). Effectiveness of a housing support team intervention with a recovery-oriented approach on hospital and emergency	2020	RCT	n = 701 Mean Age: Intervention = 38.1 Control = 39.4 With schizophrenia or bipolar disorder	France	This study compared Housing First to treatment as usual and the effect on our outcome of interest, substance and alcohol dependence. The participants were followed for 24 months. There were no statistically significant differences between the Housing First and treatment as usual groups for substance and alcohol dependence at 24 months.	Moderate

department use by homeless people with severe mental illness: A randomised controlled trial. <i>Epidemiology and Psychiatric Sciences</i> , 11.						
Chung, T. E., Gozdzik, A., Palma Lazgare, L. I., To, M. J., Aubry, T., Frankish, J., Hwang, S. W., & Stergiopoulos, V. (2018). Housing First for older homeless adults with mental illness: a subgroup analysis of the At Home/Chez Soi randomized controlled trial. <i>International Journal of Geriatric Psychiatry</i> , 33, 85-95.	2018	RCT	n = 2148 Mean Age = 36.8 for participants in the younger cohort and 55.8 for participants in the older cohort Homeless adults with a mental illness, and with or without a concurrent substance use disorder	Canada	This study compared members of the sample receiving Housing First with ICM or ACT (including housing vouchers for payments beyond 30% of their annual income) with members receiving treatment as usual. The outcome of interest was the intervention's effect on substance abuse. Participants were followed for a total of 2 years. Specific findings include: <ul style="list-style-type: none"> The analysis was stratified into a "younger" and "older" group, and there was no significant difference in the intervention's effect on substance abuse symptoms between younger and older homeless adults at the end of the study period. This study was a re-analysis of the At Home/Chez Soi RCT with age stratification. 	Moderate
Mennemeyer, S. T., Schumacher, J. E., Milby, J. B., & Wallace, D. (2017). Costs and Effectiveness of Treating Homeless Persons with Cocaine Addiction with Alternative Contingency Management Strategies. <i>The Journal of Mental Health Policy and</i>	2017	RCT	n = 647 Mean Age = 38.3 Beyond homelessness, no specific inclusion criteria, but notable is the exclusion of persons with a psychotic disorder, such as schizophrenia	The United States	This paper reports on a group of four linked RCTs comparing the effects of interventions for homeless people that provide housing (n=6) versus interventions that do not provide housing (n=3), on the outcome of substance abuse. Housing intervention arms differed slightly by whether substance abstinence was required, and what additional services were provided. Substance use was measured through urine samples. Participants were followed for a total of 26 weeks. This study concluded that abstinence-contingent housing resulted in reduced substance use compared to non-abstinence-contingent housing. Additional services with more intensive counselling were associated with reduced substance use.	Moderate

<p><i>Economics</i>, 20(1), 21–36.</p>					<p>Specific findings include:</p> <ul style="list-style-type: none"> • Housing interventions overall consistently resulted in less substance use than non-housing interventions, though statistical significance was not established. • This study uses data from all nine arms of the Homeless RCTs conducted in Birmingham, Alabama between 1990 and 2006. • Exclusion of participants with psychotic disorders may limit generalizability to certain contexts. 	
<p>Aubry, T. A., Goering, P., Veldhuizen, S., Adair, C. E., Bourque, J., Distasio, J., Latimer, E., Stergiopoulos, V., Somers, J. Streiner, D. L., & Tsemberis, S. (2016). A multiple-city RCT of Housing First with assertive community treatment for homeless Canadians with serious mental illness. <i>Psychiatric Services</i>, 67(3), 275-281.</p>	<p>2016</p>	<p>RCT</p>	<p>n = 950 Mean Age = 39.4 Canadian homeless adults with a current mental disorder</p>	<p>Canada</p>	<p>This study compared members of the sample receiving Housing First with Assertive Community Treatment (ACT) with members receiving treatment as usual. The outcome of interest was the intervention’s effect on substance abuse. Participants were followed for a total of 2 years.</p> <p>A 30% decrease in mean substance abuse symptoms was observed in the intervention group as compared to the control group.</p>	<p>Moderate</p>
<p>Kozloff, N., Adair, C. E., Lazgare, L. I. P., Poremski, D., Cheung, A. H., Sandu, R., & Stergiopoulos, V. (2016). “Housing First” for Homeless Youth with Mental Illness. <i>Pediatrics</i>, 138(4).</p>	<p>2016</p>	<p>RCT</p>	<p>n = 156 Mean Age Intervention = 21.5 Mean Age Control = 21.6 Eligibility beyond homelessness included: age 18-24, and diagnosis of a mental disorder.</p>	<p>Canada</p>	<p>This study compared the effects of Housing First versus Treatment as Usual, on the outcomes of substance use and number of arrests. Substance use was measured using the Global Assessment of Individual Needs Short Screener—Substance Problem Scale (GAIN-SPS). Participants were followed for a total of 24 months.</p> <p>This study concluded that there were no significant differences in GAIN-SPS scores or number of arrests, between the Housing First and Treatment as Usual groups at 24 months follow up.</p> <p>Specific findings include:</p>	<p>Moderate</p>

					<ul style="list-style-type: none"> • This study uses youth (ages 18-24) data from all five cities included in the Canadian At Home/Chez Soi project: Moncton, Montreal, Toronto, Vancouver, and Winnipeg. • Non-statistically significant small overall reductions in GAIN-SPS and number of arrests were observed in the Housing First group compared to Treatment as Usual. • A key limitation to this study is small sample size, and limited age range of participants may not be generalizable to certain contexts. 	
O'Campo, P., Stergiopoulos, V., Nir, P., Levy, M., Misir, V., Chum, A., Arbach, B., Nisenbaum, R., To, M. J., & Hwang, S. W. (2016). How did a Housing First intervention improve health and social outcomes among homeless adults with mental illness in Toronto? Two-year outcomes from a randomised trial. <i>BMJ Open</i> , 6(9), e010581.	2016	RCT	n = 197 Mean Age = 40.07 years	Canada	<p>This study compared Housing First (not contingent on abstinence from substances) with Assertive Community Treatment for high-needs participants to “treatment as usual” (access to existing housing and community support services). The study examined the effect on our outcomes of interest: substance use and criminal activity. Participants were followed for a total of 2 years.</p> <p>Overall, Housing First had no observed effect on substance use, but Housing First with Assertive Community Treatment decreased in number of arrests significantly more than those receiving treatment as usual.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • These findings were from Toronto, as part of the At Home/Chez Soi randomized trial of Housing First. • Arrests decreased in both groups, but significantly more in the Housing First with Assertive Community Treatment group. 	Moderate
Kirst, M., Zenger, S., Misir, V., Hwang, S., & Stergiopoulos, V. (2015). The impact of a Housing First randomized controlled trial on substance use problems among homeless individuals with mental illness. <i>Drug and Alcohol</i>	2015	RCT	n = 575 Mean age = 39.8 Eligibility beyond homelessness included diagnosis of a mental disorder	Canada	<p>This study compared the effects of Housing First versus Treatment as Usual, on the outcome of substance use. Substance use was measured using the Global Appraisal of Individual Needs– Short Screener (GAIN-SS). Participants were followed for a total of 24 months.</p> <p>This study concluded with mixed results for substance and alcohol use outcomes, with general trends of improvement in Housing First compared to Treatment as Usual, but not all improvements found to be statistically significant.</p>	Moderate

<p><i>Dependence</i>, 146, 24–29.</p>					<p>Specific findings include:</p> <ul style="list-style-type: none"> • At 12 months follow up, the Housing First group showed significant reductions in both substance and alcohol use problems compared to Treatment as Usual. • At 24 months follow up, substance use problems were not significantly different between Housing First and Treatment as Usual groups, and alcohol problems were significantly less in the Housing First group compared to Treatment as Usual. • At 24 months follow up, spending on substances and alcohol were less in the Housing First group compared to Treatment as Usual, this difference was statistically significant for alcohol but not for substances. • This study uses Toronto data from the Canadian At Home/Chez Soi project. 	
<p>Nelson, G., Patterson, M., Kirst, M., Macnaughton, E., Isaak, C. A., Nolin, D., McAll, C., Stergiopoulos, V., Townley, G., MacLeod, T., Piat, M., & Goering, P. N. (2015). Life Changes Among Homeless Persons With Mental Illness: A Longitudinal Study of Housing First and Usual Treatment. <i>Psychiatric Services</i>, 66(6), 592–597.</p>	<p>2015</p>	<p>RCT</p>	<p>n = 219 Mean Age = 41.3</p>	<p>Canada</p>	<p>This study compared Housing First (not contingent on abstinence) with Assertive Community Treatment for high needs participants and Intensive Case Management for moderate needs participants to “treatment as usual,” (access to existing housing and community support services. The study examined the effect of Housing First with ACT and ICM on our outcome of interest: substance use. Participants were followed for a total of 18 months.</p> <p>Overall, Housing First participants reported positive changes associated with their new stable housing and support services, including a “fresh start” and reduced substance use.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • These findings use data from the At Home/Chez Soi pilot project. • Participants assigned to treatment as usual typically continued to struggle with numerous challenges related to housing, health, substance use, and community functioning. 	<p>Moderate</p>
<p>Milby, J. B., Schumacher, J. E., Wallace, D., Vuchinich, R.,</p>	<p>2010</p>	<p>RCT</p>	<p>n = 206 Mean Age = 39.5 (Treatment group)</p>	<p>The United States</p>	<p>This study compared Enhanced Treatment (cognitive behavioural day treatment, abstinence-contingent housing, vocational training, and work therapy) to Treatment (only abstinence-contingent housing, vocational training, and</p>	<p>Moderate</p>

<p>Mennemeyer, S. T., & Kertesz, S. G. (2010). Effects of Sustained Abstinence Among Treated Substance-Abusing Homeless Persons on Housing and Employment. <i>American Journal of Public Health, 100</i>(5), 913–918.</p>			<p>and 40.6 years (Enhanced Treatment group)</p>		<p>work therapy). The study examined the effect of Enhanced Treatment on our outcome of interest: substance use. Participants were followed for a total of up to 18 months.</p> <p>Overall, those in the Enhanced Treatment group achieved significantly more consecutive weeks of abstinence than the Treatment group, from 6-12 months of treatment.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> This RCT applied Treatment to two different groups; however, one was Enhanced (extra) treatment and the other was treatment without cognitive behavioural day treatment. 	
<p>O’Connell, M. J., Kaspro, W., & Rosenheck, R. A. (2008). Rates and Risk Factors for Homelessness After Successful Housing in a Sample of Formerly Homeless Veterans. <i>Psychiatric Services, 59</i>(3), 268–275.</p>	<p>2008</p>	<p>RCT</p>	<p>n = 392 Mean Age = 42.0</p> <p>In order to be eligible for the study, participants needed to be veterans eligible for Veterans Affairs services</p>	<p>USA</p>	<p>This study compared Housing and Urban Development – Veterans Affairs Supported Housing (HUD-VASH), including a voucher for housing and intensive case management, to intensive case management and standard care (a short-term broker case management). The study examined the effect on our outcomes of interest: substance use and criminal activity. Participants were followed for a total of 5 years.</p> <p>Overall, the groups receiving HUD-VASH treatment had significantly lower scores on alcohol and drug use, and lower expenditures on substances during the interview before the final point of follow-up. No differences in criminal activity (arrests for major and minor crimes in the past 30 days) were observed.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> This study used data from the HUD-VASH housing project. 	<p>Moderate</p>
<p>Cheng, A., Lin, H., Kaspro, W., & Rosenheck, R. A. (2007). Impact of supported housing on clinical outcomes analysis of a randomized trial using</p>	<p>2007</p>	<p>RCT</p>	<p>n = 460</p> <p>Homeless veterans with a diagnosis of a major psychiatric disorder and/or an</p>	<p>The United States</p>	<p>This study compared members of the sample receiving housing vouchers (for payments beyond 30% of their annual income – deemed the HUD-VASH intervention) and integrated case management (ICM) with members receiving either integrated case management only or treatment as usual. The outcome of interest was the intervention’s effect on substance abuse. Participants were followed for a total of 3 years.</p>	<p>Moderate</p>

<p>multiple imputation technique. <i>The Journal of Nervous and Mental Disease</i>, 195(1), 83-88.</p>			<p>alcohol or drug abuse disorder</p>		<p>Specific findings include:</p> <ul style="list-style-type: none"> • The HUD-VASH (intervention) group used alcohol on fewer days than the control groups. With multiple imputation analysis they had significantly fewer days of alcohol use, fewer days on which they drank to intoxication, and fewer days of drug use than the control groups. • The HUD-VASH (intervention) group also had significantly lower expenditures on alcohol and drugs than the control groups. • This study was a re-analysis of the HUD-VASH RCT with multiple imputation analysis to account for loss to follow-up. 	
<p>Padgett, D., Gulcur, L., & Tsemberis, S. (2006). Housing First Services for People Who Are Homeless With Co-Occurring Serious Mental Illness and Substance Abuse. <i>Research on Social Work Practice</i>, 16(1), 74–83.</p>	<p>2006</p>	<p>RCT</p>	<p>n = 225 Mean Age = 41.5</p>	<p>The United States</p>	<p>This study compared “Pathways to Housing,” a consumer-driven approach which gives participants immediate access to housing (not abstinence-contingent, independent scatter-site apartments), and Assertive Community Treatment, to “Treatment First,” which included referrals to abstinence-contingent housing and services. The study examined the effect of Pathways to Housing on our outcome of interest: substance use. Participants were followed for a total of 4 years.</p> <p>Overall, the Pathways to Housing group showed a trend of using less alcohol than the Treatment First group, but this difference was not significant (that is, there is no real difference observed between groups).</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • The Assertive Community Treatment model was modified in three ways: a nurse practitioner was employed to address health problems, a housing specialist was employed to coordinate housing needs, and Pathways to Housing tenants who abuse drugs or alcohol were counselled by clinical services staff based on readiness for change. Pathways to Housing also offers harm reduction support groups at various branch offices (not abstinence-contingent). 	<p>Moderate</p>

					<ul style="list-style-type: none"> • Consumer-driven programs for housing first and harm reduction are not linked to increased substance use, despite absence of restrictions on substance use. • There is consistent (and probably underreported) use of illicit substances by individuals enrolled in Treatment First programs, despite abstinence requirements. 	
<p>Milby, J. B., Schumacher, J. E., Wallace, D., Freedman, M. J., & Vuchinich, R. E. (2005). To House or Not to House: The Effects of Providing Housing to Homeless Substance Abusers in Treatment. <i>American Journal of Public Health, 95</i>(7), 1259–1265.</p>	2005	RCT	<p>n = 196 Mean Age Intervention (ACH) = 38.4 Mean Age Intervention (NACH) = 40.9 Mean Age Control (NH) = 38.2</p> <p>Beyond homelessness, no specific inclusion criteria, but notable is the exclusion of persons with a psychotic disorder, such as schizophrenia</p>	The United States	<p>This study compared the effect of abstinence-contingent housing (ACH) and non-abstinence contingent housing (NACH) to no housing (NH) on the outcome of substance use. Substance use was measured through urine samples. Participants were followed for a total of 24 weeks.</p> <p>This study concluded that both housing interventions, ACH and NACH resulted in significantly reduced substance use compared to NH. Between the two housing interventions, substance use was reduced in the ACH group more than the NACH group, though this difference was not statistically significant.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • Sub-group analysis based on low and high attendance of treatment found similar results at follow up, both housing interventions, ACH and NACH, significantly reduced substance use compared to NH, but there was no significant difference between the two housing groups. • This RCT is one of the four Homeless RCTs conducted in Birmingham, Alabama as discussed in summary of Mennemeyer et al. above. • A key limitation is small sample size. 	Moderate
<p>Rosenheck, R., Kasprow, W., Frisman, L., & Liu-Mares, W. (2003). Cost-effectiveness of Supported Housing for Homeless Persons With Mental Illness. <i>Archives of General</i></p>	2003	RCT	<p>n = 460 Mean Age = 43</p> <p>The population studied was veterans with diagnoses of psychiatric and/or substance abuse disorders</p>	The United States	<p>This study compared supportive housing and case management through the Housing and Urban Development – Veterans Affairs Supported Housing (HUD-VASH) program, to two comparison groups: case management only, and standard care (short-term broker case management). The study examined the effect of supportive housing and case management on our outcomes of interest: substance use, and criminal activity. Participants were followed for a total of 3 years.</p>	Moderate

<p><i>Psychiatry</i>, 60(9), 940.</p>					<p>Overall, there was no observed difference in alcohol and drug use between HUD-VASH participants and the two comparison groups. Additionally, there was no difference in arrests for major or minor crimes between the two groups either.</p> <p>Specific findings include:</p> <ul style="list-style-type: none"> • These findings were reported as part of the HUD-VASH housing project. 	
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Appendix A: Medline Search Strategy

1. Homeless Persons/
2. homeless*.mp.
3. no fixed address.mp.
4. untabl* hous*.mp.
5. residential instability*.mp.
6. vulnerable hous*.mp.
7. precarious* hous*.mp.
8. Housing/
9. housing first.mp.
10. (hous* adj2 support*).mp.
11. (homeless* adj2 intervention*).mp.
12. (hous* adj2 intervention*).mp.
13. income intervention*.mp.
14. basic income.mp.
15. financial intervention*.mp.
16. financial support*.mp.
17. Substance-Related Disorders/
18. ("substance abuse" or "substance use").mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
19. ("drug use" or "drug abuse").mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
20. addiction.mp.
21. intoxicat*.mp.
22. (opioid* or opiate*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
23. Drug Overdose/
24. overdose*.mp.
25. Mortality/
26. (mortality or death* or fatalit*).mp.

27. ("drug behaviour" or "drug behavior").mp.
28. Substance Abuse, Intravenous/
29. (inject* adj2 drug*).mp.
30. (discard* adj2 needle*).mp.
31. (discard* adj2 syringe*).mp.
32. Intervention*.mp.
33. 1 or 2 or 3 or 4 or 5 or 6 or 7
34. 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31
35. 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
36. public disturb*.mp.
37. arrest*.mp.
38. offense*.mp.
39. charge*.mp.
40. crime.mp.
41. criminal.mp.
42. crimes.mp.
43. 34 or 36 or 37 or 38 or 39 or 40 or 41 or 42
44. 33 and 35 and 4

Appendix B: PRISMA Diagram

