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## Social Determinants of Mental Health: Where We Are and Where We Need to Go

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### Abstract

**Purpose of Review:** The present review synthesizes recent literature on social determinants and mental health outcomes and provides recommendations for how to advance the field. We summarize current studies related to changes in the conceptualization of social determinants; how social determinants impact mental health; what we have learned from social determinant interventions; and new methods to collect, use and analyze social determinant data.

**Recent findings:** Recent research has increasingly focused on interactions between multiple social determinants, interventions to address upstream causes of mental health challenges, and use of simulation models to represent complex systems. However, methodological challenges and inconsistent findings prevent a definitive understanding of which social determinants should be addressed to improve mental health, and within what populations these interventions may be most effective.

**Summary:** Recent advances in strategies to collect, evaluate, and analyze social determinants suggest the potential to better appraise their impact and to implement relevant interventions.

### Keywords

social determinants; mental health; vulnerable populations; interventions; public health

### Introduction

Social determinants frameworks focus on understanding how the circumstances in which people live and work shape their health outcomes [1]. These circumstances (i.e., social determinants) are believed to drive many deep-rooted world health inequalities, such as lower life expectancy, higher rates of child mortality, and greater burden of disease among disadvantaged populations [1]. Social determinants frameworks build upon the concept of the “social gradient”—that individuals with lower social status have greater health risks and lower life expectancy than those with higher status, and that the impact of social position can

accumulate over time [2]. Observed differences in social determinants are thought to develop from unequal distribution of resources [3]; thus, they can be reduced through targeted social and economic policies and programs.

Considering mental health, the social gradient impacts both risk of disorder and access to services, and consequently improved outcomes. In a seminal review of social determinants, Allen and colleagues [4] applied a multilevel framework that includes: a life-course approach covering prenatal periods through old age; community-level contexts including environment and health care systems; and country-level contexts including political and economic factors, cultural norms, and specific policies. Overall, they found that poor and disadvantaged populations are most affected by mental disorders, and that cumulative stress and physical health serve as mechanisms through which the impacts of social determinants multiply across the lifespan [4]. Other research describes how cumulative advantages and disadvantages impact health across multiple generations [5].

As social determinants frameworks have evolved, a distinction between “upstream” versus “downstream” determinants has emerged. Braveman and colleagues [5] emphasize that upstream social determinants (e.g., economic opportunities) act as “fundamental causes” and typically impact health *through* downstream social determinants (e.g., living conditions). They also broaden the concept of social determinants to include “any nonmedical factors influencing health” (p. 383), thereby including fixed individual characteristics such as gender and race/ethnicity and more malleable factors like educational attainment, occupational status, and social support [5]. This work also highlights the impact of racism and of pervasive, daily stress [5]. Fisher and Baum [6] similarly characterize the impact of chronic stress on mental health outcomes through biological pathways. They propose mechanisms by which low socioeconomic status impacts mental health for those at the lower end of the social gradient, including stress from navigating everyday circumstances, anxiety about insecure and unpredictable living conditions, and perceived lack of control.

## Social Determinants and Mental Health Outcomes: Recent Findings

In the past three years, greater evidence has accumulated to support ways in which social determinants impact mental health outcomes within specific populations. Unemployment, precarious employment, and employment conditions continue to be routinely linked to increased psychological distress [7, 8], even in countries with universal healthcare [9, 10], where employer-provided health insurance is less essential to accessing services. Among migrant workers in Singapore, hostile interactions with employers (i.e., injury disputes, threats of deportation) were linked to increased rates of serious mental illness [11]. Similarly, nursing assistants were more likely to endorse depressive disorders if they worked with for-profit employers and experienced managerial domination and emotional strain while at work [12]. Employment status can also serve as an important moderator of other social determinants. For example, it has been suggested that unemployment has a greater impact on men’s mental health than women’s [13]. Further, occupational social class (i.e., manual or non-manual labor) was identified as the most influential factor in the relationship between nativity status and mental health among women working in Spain [14].

Swedish studies have observed that poor mental health was prevalent among individuals with lower incomes [15] and considerable financial strain [9, 16]. Similar findings have been observed in Korea, Europe, and North America [7, 8, 10], particularly among populations with other disadvantages. Katz-Wise and colleagues [17] observed that lower income was linked to self-harm, suicide attempts, and depression among transgender adults in the United States. Similarly, lower income was associated with symptoms of depression and anxiety among pregnant women [18]—however, this relationship was partially mediated by material hardship (e.g., insufficient food, transportation, or housing). Longitudinal studies have suggested that persistent exposure to poor quality housing conditions (e.g., inadequate heating, overcrowding) can have negative effects on psychological health for youth and adults [19, 20]. Food insecurity and poor diet quality have also been linked to poorer mental health in the United States and Canada [21–23].

Discrimination, whether related to race/ethnicity, immigrant status, sexual orientation, and/or occupational status, has repeatedly been associated with negative mental health outcomes in the United States and Canada [24–28]. Additionally, reported discrimination experiences were linked to increased depressive symptoms among African asylum-seekers in Hong Kong [29] and worse mental wellbeing among Iraqis living in Sweden [16]. Perceived discrimination has also been shown to have a cumulative effect on psychological distress over time in the United Kingdom, particularly for Pakistani individuals [30]. Khan and colleagues [31] argue that multifactorial discrimination (i.e., based on multiple minority identities) can be described as a “fundamental cause” of depression and a predictor of anxiety.

Familial relationships—both positive and negative—can also strongly impact mental health. Living with family, satisfaction with family relationships, and family connectedness have all been associated with fewer depressive symptoms [7, 29]. Parenting styles can affect mental health, as “reduced involvement” fathering (compared to “authoritative” fathering) was linked to more internalizing and externalizing symptoms among Mexican youth in the United States [32]. Similarly, a history of abuse and neglect from a family member has been associated with symptoms of PTSD, anxiety, and aggression [33, 34]. Social support, community belonging, and trust in others have been significantly associated with mental health outcomes [9, 35, 7, 10], and perceived emotional support and family/friend network size were identified as protective factors against common mental health disorders, personality dysfunction, and psychotic experiences [36]. Social support and participation may be particularly important for populations such as migrants, refugees, and transgender individuals [28, 16, 37].

Contemporary analysis into social determinants has often focused on community characteristics, such as urbanicity or neighborhood safety. Residents of rural areas demonstrate higher disorder prevalence than urban residents [38], and population density appears to influence depressive symptoms among gay and bisexual men [39]. Neighborhood safety—measured by personal perception and experience—has emerged as an important predictor of mental health outcomes [40, 41]. Among urban residents in China, satisfaction with living environment and neighborhood safety were linked to lower levels of depression [42] and neighborhood planning conflicts with local government were linked to higher levels

[43]. In contrast, a U.S. longitudinal study failed to observe a significant relationship between neighborhood quality (e.g., proximity to nature/amenities) and youth mental health when controlling for other relevant variables [20]. Direct and indirect experiences of community violence in adolescence have been significantly associated with elevated depressive, anxiety, and PTSD symptoms [40, 41]. Additionally, U.S. residents living in areas with high prison admission rates may be at increased risk for major depressive or generalized anxiety disorder [44]. Bor and colleagues [45] examined a unique community-level predictor—police killings of unarmed Black Americans at the state level. In that study, Black respondents living in a state with at least one such killing in the previous three months reported an increased number of days in which their mental health was “not good” [45]. Similarly, a study of the 2014 unrest that developed in Ferguson, Missouri after the death of Michael Brown found that proximity to associated violence was linked to negative mental health outcomes [46].

In addition to examining dynamic social determinants associated with mental health, recent research has further supported the significance of several fixed characteristics, including race/ethnicity, nationality, gender, and sexual orientation. Some studies have addressed the known link between racial/ethnic minority status and certain mental health symptoms [40, 30], whereas others have examined how race/ethnicity might interact with different variables to impact mental health. For example, among LGBT adults in the United States, racial/ethnic minorities frequently reported poorer mental health than White respondents [31]. Among New York City residents most affected by Hurricane Sandy, Black race and Latinx ethnicity predicted higher post-traumatic stress [47]. However, Chang and colleagues [48] found that the direction and magnitude of the relationship between race and psychological wellbeing depended largely on whether other social and health variables were included in the analysis, suggesting that race/ethnicity may play more of an indirect role in influencing mental health.

Globally, nationality and migration status have demonstrated significant negative impacts on mental health [15]. A recent Canadian examination has provided further evidence that, although migrants on average demonstrate *better* mental health than native populations shortly after their arrival, this effect typically disappears over time [10]. In the United States, Latinx parents reporting adverse immigration-related impacts since January 2017 were more likely to report high psychological distress than those without immigration concerns [49]. Women also consistently report poorer mental wellbeing than men [15, 50, 7, 51, 10]. However, they may be *less* likely to meet diagnostic criteria for neurodevelopmental and disruptive and impulse control disorders [13]. Additionally, factors related to gender identity (e.g., transgender identity, visual gender nonconformity) and sexual orientation continue to be linked to behavioral health outcomes, including self-harm, suicide attempts, depression, and other serious mental illness [17]. It is important to note, however, that mental health differences based on such fixed characteristics (e.g., race/ethnicity, gender) likely reflect experiences of oppression or discrimination rather than inherent vulnerability to illness.

## **Mental health’s reciprocal impact on social determinants**

Although less frequently discussed than the converse pathway, mental illness can also impact social determinants, including homelessness, school dropout, marital instability, and

economic insecurity [52–54]. A two-way relationship exists between mental health disorders and social determinants, as poor mental health can aggravate personal choices and affect living conditions that limit opportunities [55]. Using a life-course approach, the World Health Organization [55] has described how mental health symptoms in each stage of life can negatively impact socioeconomic status and other social determinants in a cumulative and dynamic manner. Young adulthood is a crucial period where multiple social determinants can intersect and contribute to behavioral health disorder onset. At this life stage, mental health symptoms can adversely influence how individuals navigate societal norms and structures, affecting educational performance, employment capacity, and/or justice involvement [56, 57, 58]. These risk factors can then impede future earnings, create barriers to socioeconomic improvement, and increase mental health disorder risk. Further, young adults often lack access or long-term connection to behavioral health services, facilitating social inequities [59].

### **Interventions to address the social determinant and mental health cycle**

Given considerable evidence of the links between social determinants and mental health outcomes, multilevel interventions aimed at eliminating systemic social inequalities—such as access to educational and employment opportunities, healthy food, secure housing, and safe neighborhoods—are crucial [55]. A framework designed by Bell, Donkin, and Marmot [60] incorporates the individual, family, systems (e.g., health, education), societal (e.g., social norms), and macro (e.g., political, economic) levels. Table 1 briefly summarizes several recent studies of interventions targeting social determinants of mental health at various levels; these studies are also described and contextualized below.

Interventions aimed at improving household and working life for individuals with mental illness have demonstrated success in increasing housing stability, community functioning, perceived wellbeing and quality of life, and increased self-esteem [61]. A recent meta-analysis of interventions targeting employment showed that Individual Placement and Support (IPS) programs have effectively improved employment rates, as well as individual functioning and wellbeing [62]. However, limited funding impedes IPS program implementation [63]. Housing First programs have been linked to improved housing outcomes, lower rates of inpatient hospitalization, and more stable use of health services for individuals experiencing homelessness and mental health challenges; however, these programs did not significantly reduce clinical symptoms [61, 64]. Studies investigating the effects of addressing mental health needs *before* offering housing have not shown promising outcomes [61].

Social policies targeting housing stability have also been credited with decreasing food insecurity rates in Canada [65]. Food insecurity has been linked with poor mental health outcomes [21–23]; however, benefits of national programs like the Supplemental Nutrition Assistance Program may be moderated by individual perceptions of government assistance [66]. Other poverty reduction programs, such as the Earned Income Tax Credit, suggest that such national efforts can decrease depressive symptoms and improve self-esteem among beneficiaries [67].

Community-based interventions that build neighborhood trust and safety, mitigate violence and crime, or improve neighborhood deprivation can also lessen mental health inequalities [68, 69]. Regional and national programs focused on urban planning (e.g., improving access to green spaces) have been linked to reduced depression symptoms [70] and improved mental wellbeing [71, 72]. These results may reflect improvements in stress reduction, increased physical activity, and/or more social connectedness [73]. Interventions designed to improve social connectedness and inclusion have also demonstrated positive responses [74]. For youth in particular, programs that encourage engagement through social media and social marketing, schools, primary care, and parental relationships have been linked to improvement of several behavioral health outcomes [75]. Communities That Care, a community building/mobilization strategy aimed at reducing youth substance use, violence, and other problem behaviors community-wide, utilizes stakeholder coalitions to increase adoption of evidence-based prevention practices [76]. This strategy has shown positive results—not only in reducing drug use initiation and delinquency rates, but also in reducing overall projected justice- and health-related costs [76].

Emerging literature illustrates the positive impact of investing in and integrating social services with mental health care. The use of community health workers (CHWs) for patient outreach, navigation, and care management activities has been credited with improving patient engagement and treatment utilization in low-resource settings [77]; CHWs have also successfully implemented interventions targeting social determinants among individuals with mental health conditions [78]. Social prescribing or “community/social referral” strategies, where socioeconomically disadvantaged patients are linked to appropriate social and cultural activities through primary care providers, has demonstrated mixed results regarding mental health benefits [79, 80]. However, a recent systematic review revealed that many social prescribing studies were considerably small in scale and utilized poor quality study designs [79]. Finally, universal primary health care access is presented as a method for reducing mental health inequalities, given better emotional wellbeing demonstrated in individuals from nations with universal health care [81, 82].

## Advancing methodological techniques for social determinant research

Social determinants interact at different levels within complex systems, creating direct and indirect impacts on mental health—often with time delays [69]. To estimate these non-linear, dynamic, and time-varying relationships, researchers have utilized analytical strategies beyond generalized linear models. Simulation models, for example, offer a simplified representation of complex systems [83] and can be a useful tool for understanding system dynamics related to social determinants.

State-transition and network models are used to simulate disease progression among populations; they are particularly useful when clinical event timing (i.e., incidence, relapse) is important [84]. For example, Scata and colleagues [85] modeled the spread of suicidal ideation as a social contagion phenomenon among individuals with psychological distress using a state-transition model. Their results suggested that increasing awareness of suicidal behavior risks through prevention programs and social campaigns may reduce suicidal ideation contagion. Heterogeneous social networks consisting of individuals with varying



degrees of susceptibility and awareness—possibly resulting from distinct socioeconomic backgrounds—might also increase network resilience against contagion [85].

Agent-based models (ABMs) simulate actions and interactions of multiple agents (i.e., patients, providers) and assess their combined effects on a system [86–88]. For example, Silverman [88] modeled a behavioral healthcare system using ABMs, where agents' circumstances (e.g., patient employment) and/or system structures (e.g., provider workflow) were modified to evaluate the impact on patient re-hospitalization and days of hospitalization. Compared with randomized control trials, ABMs can simulate outcomes of systems under different scenarios, and therefore be significantly more time and cost-efficient for testing intervention effectiveness and examining policy impact [84].

Although simulation techniques allow modifying social determinants for heterogeneous individuals within a system, researchers must take caution identifying “allowable” vs. “non-allowable” [89] differences in social determinants—especially when measuring mental health disparities. Certain “allowable,” or justifiable, social determinants of health (e.g., age, sex) should not be adjusted via simulation. “Non-allowable” determinants (e.g., employment, education) are not justified to contribute to health differences, and therefore, can be subject to simulation adjustment [89]. Alegría and colleagues [90] used reweighting and propensity score matching to adjust certain “non-allowable” social determinants. They found that increasing employment was strongly correlated with improvements in mental health outcomes, while increasing education or income produced weak correlations. These weight-based approaches can be readily integrated in existing survey designs, and thus are convenient tools for weighted survey analysis.

Recent social determinants research [91, 92] has also used descriptive (unsupervised) and predictive (supervised) machine learning algorithms to interpret existing patterns and behaviors and predict future events. Unsupervised learning methods allow systems to learn the structure of input data without explicitly provided outputs [93]; enabling identification of previously unknown data patterns. In two recent studies [94, 95], k-means clustering methods were used to identify distinct social determinant clusters from interview responses of LGBT adolescents. Poor mental health outcomes (i.e., anxiety, depression, suicidality, psychological distress) were more prevalent among youth with low or no family support. In contrast, supervised learning methods allow systems to learn a mapping function (i.e., classification or prediction models) when both input and output data are available [96]. Penalized regressions, random forest, and neural networks have been used to illustrate important social determinants of health, including income and social support [92]. Nonclinical data regarding individual- and community-level social determinants might help supervised learning models predict mental health outcomes and service need, but performance improvement findings have been mixed [97, 92]. In contrast to traditional models where outputs are affected by a linear combination of inputs, machine learning algorithms can account for more complex, dynamic relationships, and thus identify new social determinants [98].

## Collecting and using social determinant data

Proliferation of big data and wider use of electronic health records (EHR) have presented new options for using social determinants data. In 2014, the Institute of Medicine (IOM) presented standardized measures for EHR that collect information from 12 recommended domains [99, 100]. These measures have been adopted and expanded in various settings [101, 102], and are often used in conjunction with locally designed instruments [103]. In the era of value-based care, incorporating community-level social determinants into EHR is of great interest. Because geomarkers, such as public transportation availability or distance from care providers, can approximate risk of poor health outcomes [104], researchers have sought to develop effective geospatial techniques to link such information to EHR data. Developed by Bazemore and colleagues [105], a novel Application Programming Interface (API) can map community-level social determinants based on address and/or zip code using geospatial technology. Once obtained, geocoded community-level information can be readily added into EHR. Of note, quality of mapping can be affected by uncertainty in matching geocoded information to addresses for individual patients in EHR [106].

Despite ongoing efforts to include standardized social determinants data in EHR, socioeconomic information is still collected in an unstructured format (e.g., free-text clinical notes) [107]. Recently developed text-mining algorithms can identify social determinants information that may be hidden within EHR entries. A study searching for 22 terms related to social determinants (e.g., “homeless,” “shelter,”) within EHR correctly identified patients with increased psychosocial risk that might benefit from care coordination with a high degree of specificity [108]. However, when examining the effectiveness of similar techniques, Hollister and colleagues [109] found that algorithm sensitivity and specificity varied by semantic category and observed differences in text retrieval across racial/ethnic groups. Thus, existing algorithms may require modification for specific populations in different contexts to ensure validity.

Given identified links between social determinants and health care need, utilization, and spending, some states have sought to use social determinants (e.g., stability of housing, neighborhood stress) in their risk adjustment strategies for state Medicaid accountable care reimbursements [110–113]. These strategies allow states to capture risk beyond traditional diagnostic data and avoid financially penalizing providers who care for patients with greater social needs.

## Conclusions and recommendations

The movement to address social determinants of mental health can accelerate advances in the evaluation and dissemination of social interventions and increase social and institutional supports for disadvantaged patients. There are, however, some limitations from this work. Below, we raise several points for consideration regarding future research.

1. As research continues to illuminate the connections between social determinants and mental health outcomes, researchers should also focus on identifying any negative consequences of such work. For example, does knowledge about patients’ social determinants lead providers and insurers to assume less



responsibility for patient outcomes, stigmatize or disempower patients, or use such information against these patients? Caution should be taken to ensure that patients are supported, rather than harmed.

2. Many social determinant studies have used cross-sectional designs that fail to account for temporal trends and cumulative effects [114], and many have failed to include control groups or address selection bias. Future investigation could utilize pragmatic trials, cost-effectiveness analysis, and scientifically rigorous designs and analyses (e.g., longitudinal studies, stepped wedge cluster design) to permit causal attribution of intervention effects on mental health outcomes.
3. Lack of definitions and dosage information across intervention studies prevents aggregation of data to draw broader conclusions. Achieving a better definition of criteria and elements addressed in a specific social determinant intervention will allow researchers to better replicate, interpret and understand the mechanisms driving change in the mental health outcomes.
4. Scholars should seek to learn more about differential effects of social determinants on members of different populations (e.g., by age, gender, race/ethnicity, sexual orientation, illness profile, etc.). Perhaps there are time sensitive periods where specific social determinants—and, therefore, associated interventions—have a larger impact on mental health outcomes. Supported education might be beneficial for young adults experiencing mental illness, but benefits may weaken as individuals age. Efforts to develop a more comprehensive understanding of the optimal time and dosage of certain interventions could inform future policy and program planning.
5. Investigators should continue using simulation models to understand relationships between social determinants and mental health outcomes, and should merge varied sources of data to ensure all relevant factors are included. Trainings at NIH, SAMHSA, and the Center for Medicaid and Medicare could play a role in suggesting available data sources and providing methodological training. Additionally, investigators should consider utilizing social media data, which are inherently longitudinal and available in real-time, thereby facilitating surveillance and prediction of mental health risk [115, 116].
6. Although interventions tend to focus solely on one domain (e.g., employment, housing), future research should assess whether individuals with mental health conditions would be better served via interventions addressing multiple social determinants and supports [117], considering an individual's social position and living circumstances [118].
7. Evaluations of interventions targeting social determinants often utilize clinical outcomes (i.e., symptom improvement) to determine effectiveness [117]. However, other potential outcomes might be equally, if not more important to patients, providers, or other interested parties. Creating partnerships across patients, policymakers, and researchers can elicit multiple perspectives on what matters most.

8. Social determinants should be framed as the result of structural inequalities in our institutional systems rather than patient vulnerabilities [117]. A narrative supported by past research focused on individual-level explanations suggests that the responsibility to overcome barriers such as poverty lies with the person rather than with allocation of resources by governments and institutions. This shift in framing the problem is critical for changing societal attitudes towards funding social programs or interventions targeting populations that have been disadvantaged due to long-standing structural inequalities.
9. Dissemination efforts via policy briefs and patient blogs can clarify what research has found regarding social determinants and what information gaps remain. Providing evidence-based information to wider audiences can help decision-makers and patients prioritize and select which social determinants have substantial evidence for implementation given the mental health outcome they seek to tackle [119].
10. To maximize the potential of these recommendations, decision-makers must assign responsibility to specific leaders and institutions for identifying and addressing patient social determinants—especially those with strong links to mental health and wellbeing. The silo approach to governmental, social, and health system duties and responsibilities tends to muddle responsibility which can lead to inaction.

We end with optimism that the social determinant movement will allow us to decrease mental health disease burden, reduce adverse patient selection for insurers and finally recognize that healthcare systems must treat the whole person, not just the illness.

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Table 1.

## Selected interventions targeting social determinants of mental health

Intervention	Objective	Characteristics of the intervention	Participants	Outcome Variables	Main Results
Family, Household and Working Life Interventions					
Housing First [61]	Combine Housing First with assertive community treatment to assist people with serious mental illness to exit homelessness	Housing First= homeless assistance program, prioritizes providing permanent housing before getting a job or addressing mental health/ substance use symptoms	Randomized control trial with 50 homeless participants with serious mental illness	Housing stability Community functioning	Housing First participants spent more time in stable housing, entered housing more quickly, rated the quality of their housing more positively, reported higher quality of life
Housing First [64]	Compare mental health service use among individuals who received Housing First vs. standard care	See above	Multi-site randomized controlled trial with 2039 severely mental ill and homeless participants	Reported service use over 24 months	Housing first program decreased use of inpatient psychiatric hospitals and increased use of food banks
Housing Stability and Food Insecurity [65]	Identify trends in food insecurity by main source of income and housing tenure; determine the impact of one-time increase in social assistance on food insecurity	Social assistance in Canada= income supplements, healthcare costs and childcare expenses paid for, available for low-income individuals who meet eligibility requirements	Data from Canadian Community Health Survey, 2005 to 2012; Canadian population aged 12 and over	Household food insecurity over the prior 12 months	Overall and moderate food insecurity declined among households on social assistance, but severe food insecurity remained unchanged
SNAP Program for Food Insecurity [22]	Examine the associations between household food security and depression and whether these differed by SNAP participation	SNAP= Supplemental Nutrition Assistance Program, provides nutrition assistance to millions of low-income individuals and families and provides economic benefits to communities	3518 adults with household incomes 130% of the federal poverty level	Food insecurity was assessed with the US Household Food Security Survey Module; depression assessed with the 9-item Patient Health Questionnaire	The overall prevalence of depression was 9.3%, ranging from 6.7% among SNAP nonparticipants to 12.8% among SNAP participants; higher prevalence was observed with worsening food insecurity
SNAP Program for Food Insecurity [66]	Investigate the impact of change in SNAP participation status on maternal depression and on perception of government assistance	See above	Fragile Families and Child Wellbeing Study, N= 256 SNAP-eligible mothers who changed SNAP participation & depression status	Perceptions of government assistance defined as feelings of humiliation or loss of freedom and tested for interactions with SNAP participation	Those with positive perceptions of welfare had 0.27 times lower odds of depression when enrolled; for those with negative perceptions of welfare, SNAP enrollment was not associated with depression

Intervention	Objective	Characteristics of the intervention	Participants	Outcome Variables	Main Results
Community Level Programs					
Communities That Care [76]	Determine whether the Communities That Care (CTC) prevention system is a cost-beneficial intervention	Communities That Care= community mobilization strategy intended to produce community-wide reductions in youth substance use, delinquency, and violence	Longitudinal panel of 4,407 youth participating in a randomized controlled trial including 24 towns in 7 states	Alcohol and tobacco use, delinquency rates, long-term cost savings estimation	CTC produced \$4,477 in benefits per youth and cost \$556 per youth to implement CTC for 5 years—the net present benefit was \$3,920, the benefit-cost ratio was \$8.22 per dollar invested
Bridge to Better Health and Wellness [78]	Examine the feasibility, acceptability, and initial impact of the intervention (B2BHW)	B2BHW= a culturally-adapted health care manager intervention delivered by community health workers for Hispanics with serious mental illness	34 Hispanics with SMI and at risk for cardiovascular disease	Examine changes over 12-months on patient activation, self-efficacy, quality of care, receipt of preventive primary care services, and quality of life	Significant improvements were found for patient activation, self-efficacy, patients' ratings of quality of care, and receipt of preventive primary care
Policy Level Programs					
Urban Planning [70]	Explore the association between green space and depression in a deprived, multiethnic sample of pregnant women	Green spaces such as parks and gardens around homes, schools, and workplaces have mental and physical health benefits: provide a peaceful place to play, relax, study, or exercise, as well as a social gathering place	7547 women recruited to the 'Born in Bradford' cohort	Depressive symptoms; 2 green space measures—quintiles of greenness and access to major green spaces	Pregnant women in the greener quintiles were 18–23% less likely to report depressive symptoms than those in the least green quintile; significant for women who had lower education or were active
Urban Planning [71]	Examined the influence of parks on comprehensive measures of subjective wellbeing at the city level	See above	2014 data from 44 U.S. cities, from a variety of secondary data sources (e.g., Gallup, Trust for Public Land, U.S. Census Bureau).	Urban park quantity, quality and self-reported scores on the Gallup-Healthways Wellbeing Index (WBI).	Park quantity was among the strongest predictors of overall wellbeing; the strength of park quality and accessibility were positively associated with wellbeing
Universal Primary Health Care Access [81]	Analyze cross-national results of self-reported health and the prevalence of material hardship for adults, which can lead to poor mental health	U.S. has lack of accessible, comprehensive care for all people; material hardship= an inadequate consumption of goods or services minimally necessary for decent	Data from a 2016 telephone survey conducted in 11 countries for noninstitutionalized adults ages 18 and older	Existence of chronic conditions, coping ability, daily life functioning, financial hardship and emotional well-being	US adults who reported poor emotional wellbeing were most likely to experience material hardship; in all countries, shortfalls in patient engagement and chronic care management were reported

Intervention	Objective	Characteristics of the intervention	Participants	Outcome Variables	Main Results
Earned Income Tax Credit (EITC) [67]	Study the impact of the EITC on various measures of subjective well-being	EITC= Earned Income Tax Credit, a refundable tax credit for low- to moderate-income working individuals and couples; the benefit depends on a recipient's income and number of children	Use the National Survey of Families and Households, first wave N=13,007 adults, second wave N= 10,005 adults	Depression measured using the Center for Epidemiological Studies Depression scale, Evaluative well-being is measured using happiness and self-esteem questions	The EITC expansion generated well-being improvements; decreased depression, increased happiness and self-esteem for married women compared to unmarried women