UCSF
UC San Francisco Previously Published Works

Title

Neighborhoods matter. A systematic review of neighborhood characteristics and adolescent reproductive health outcomes

Permalink

https://escholarship.org/uc/item/2v79z0v4

Authors

Decker, Martha J
Isquick, Sarah
Tilley, Lana
et al.

Publication Date

2018-11-01

DOI

10.1016/j.healthplace.2018.09.001

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

Health and Place 54 (2018) 178–190

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Review Essay

Neighborhoods matter. A systematic review of neighborhood characteristics and adolescent reproductive health outcomes

Martha J. Decker*, Sarah Isquick, Lana Tilley, Qi Zhi, Anya Gutman, William Luong, Claire D. Brindis

Philip R. Lee Institute for Health Policy Studies University of California, San Francisco 3333 California Street, Suite 265, San Francisco, CA 94118, USA

ABSTRACT

This systematic review examines the relationship between neighborhood characteristics and adolescent pregnancy, contraceptive use, sexual initiation, and birthrate. Several studies found a significant association between higher poverty and increased adolescent birthrate, pregnancy, and earlier age at sexual initiation. Unsafe neighborhoods were associated with earlier sexual initiation and increased adolescent pregnancy. Mixed results were found for neighborhood racial or ethnic composition. Lower collective efficacy and social support were associated with increased rates of adolescent pregnancy and earlier age at sexual initiation. Improved definitions of neighborhoods, as well as research on interactions between structural factors and social processes during adolescence is needed.

1. Introduction

Social determinants of health, including the role that place-based context can play, is increasingly recognized in research into human behavior and health outcomes. In particular, neighborhoods have been studied for their contextual influences on the development of children and adolescents. Despite this growing recognition, most adolescent health interventions and research are still focused on individual-level behavior and do little to acknowledge or address the role communities play in shaping adolescent development and health outcomes (Salazar et al., 2010). This paper provides a systematic review of studies assessing the relationship between neighborhood-level characteristics and adolescent sexual and reproductive health outcomes to provide a clearer understanding of these complex and dynamic interactions and identify the most relevant factors to help guide programming and policy decisions.

The theory of social ecology posits that individuals' development is shaped by the multiple nested environmental systems in which they live and with which they interact (Bronfenbrenner, 1979). In the 1990s and 2000s, neighborhood-level research became a focus for understanding the relationship between social and structural processes and young people's development. Previous studies have examined the relationship between neighborhood-level factors and substance abuse, violence, adolescent physical activity, and mental health, among others (Hannon et al., 2012; Karriker-Jaffe et al., 2011; Mennis and Mason, 2011; Rios et al., 2012). Mayer and Jencks (1989) conducted an early review of the limited literature studying the effects of neighborhoods on adolescent sexual behavior and concluded that adolescents' sexual behavior was sensitive to their neighbors' socioeconomic status and race. They noted that dynamic social processes, though less frequently studied by social scientists, likely contributed in varying degrees to the influence of "neighborhood effects" on a given outcome.

In a later review of neighborhood effects literature from the mid-1990s to 2001, Sampson et al. (2002) found little consistency in the way in which neighborhood social and institutional processes were defined or operationalized. Other key findings included evidence that collective efficacy was important for child well-being and safety, and that neighborhood poverty, disorder, and low social cohesion were associated with risk-taking high-risk sex among adolescents. The authors also distinguished between measurements of structural conditions and social processes that can act as risk or protective factors for individuals' behaviors.

The purpose of this paper is to synthesize and provide an update of the literature that examines the relationship between neighborhood effects and adolescent sexual and reproductive health outcomes.

2. Methods

To identify relevant research related to neighborhood characteristics and adolescent sexual and reproductive health, we conducted a search of peer-reviewed literature focusing on three individual outcome variables: sexual initiation, contraceptive use, and adolescent pregnancy or birth and one neighborhood-level variable, adolescent birthrate. To capture the variety of neighborhood and outcome variables used, we included the search terms detailed in Table 1.

We searched for articles published between 2000 and 2017 using

* Corresponding author.
E-mail address: mara.decker@ucsf.edu (M.J. Decker).

https://doi.org/10.1016/j.healthplace.2018.09.001
Received 13 February 2018; Received in revised form 28 August 2018; Accepted 4 September 2018
1353-8292/ © 2018 Elsevier Ltd. All rights reserved.

Table 1
Search terms used.

Study variables	Search terms used
Neighborhood-level	neighborhood, community, social ecology, environment
Sexual Initiation	first sex, ever had sex, age at first sex, sexual onset, sexual debut
Contraceptive Use	condom use, contraceptive use, contraceptive use at first sex, contraceptive use at last sex, family planning, birth control, reproductive health
Pregnancy	birth, birth rate, pregnancy rate, pregnancy
Adolescent	Youth, young, teen, teenager

the databases PsychINFO, JSTOR, PubMed, Web of Science, and ProQuest. These databases were selected to encompass behavioral, health, medical, and social science research. We also reviewed reference lists for other relevant titles. Both qualitative and quantitative studies conducted in the United States were eligible for inclusion. Studies needed to have a sub-county geographic unit of analysis, such as zip codes or census tracts, or to have participant self-defined neighborhoods, such as when study participants described their own neighborhood boundaries. All studies using data at the county or state level were excluded to ensure community-level context. In addition, studies needed to compare more than one community to decrease risk of bias; therefore, most qualitative studies were excluded as they were generally conducted in only one location.

Our initial search generated 13,671 articles. After removing duplicate articles and those that did not meet the criteria based on a review of titles and abstracts, we conducted a full review of 142 articles. Of these, 39 articles met the inclusion criteria, representing 37 studies (Fig. 1).

At least two researchers conducted the full text review and determined if each article should be included. If there was disagreement, the researchers discussed the study and came to consensus about its possible inclusion. Data from all included studies were then extracted including sample, data source, methodology and analysis, neighborhood unit of analysis, neighborhood variables, and relevant outcome (see Table 2).

All included articles were reviewed for quality according to the strength of the evidence and potential bias. A rating of risk for bias was determined by assessing the presence or absence of several characteristics known to protect a study from the confounding influence of bias. The GRADE criteria and process developed for Cochrane reviews was used for quantitative studies (Ryan and Hill, 2016) and qualitative studies were assessed using criteria based on recommendations by Mays and Pope (2000). All studies were ranked as high, medium, low, or very low quality.

3. Results

This section presents the findings of each study by adolescent sexual and reproductive health outcome and relevant neighborhood category, all of which have been divided into two domains: 1) structural factors and conditions of the neighborhood or 2) social processes and mechanisms within the neighborhood (Sampson et al., 2002). Table 2 describes the characteristics of the included studies, including methodology, geographic unit of analysis, and neighborhood variables measured.

Of the 37 studies included, two were qualitative, one was mixed methods, and 34 were quantitative. Fifteen studies were cross-sectional and 22 were longitudinal. The majority conducted secondary data analyses of existing data. The quality of the studies varied, with most quantitative cross-sectional studies rated of low quality for potential bias and most longitudinal studies ranked as moderate or high quality.

3.1. Neighborhood variables

We identified 12 neighborhood categories: economic status,

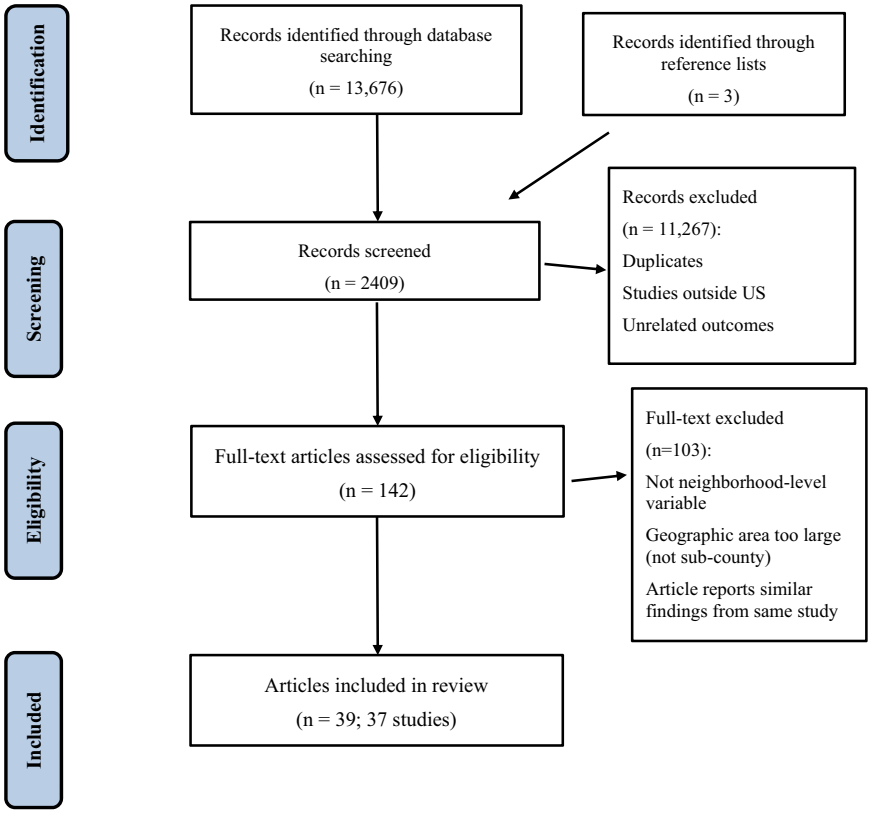

Fig. 1. PRISMA flowchart for article review process.

Table 2
Description of included articles.

Author	Year	Sample	Primary data sources	Study type and analysis	Quality of study	Neighborhood unit of measurement	Neighborhood variables included	Relevant outcome	Domain of neighborhood variables
Averett, S.L., Rees, D.I., et al.	2002	N = 1280 unmarried females ages 15–19	• National Survey of Family Growth (NSFG), Cycle V, 1995	Cross-sectional; Bivariate probit model	Low	Census tracts	• Racial or ethnic composition • Economic status	• Contraceptive use	Structural
Bauermeister, J.A., Zimmerman, M.A., et al.	2010	N = 681 African American youth in grades 9–12	• Flint Adolescent Study, 1994–2004 • Census data, 1990	Longitudinal; Hierarchical linear model	Very low	Census block groups	• Neighborhood disadvantage	• Contraceptive use	Structural
Baumer, E.P. and South, S.J.	2001	N = 1111 youth ages 7–22	• National Survey of Children (NSC)-III, 1976–1987 • Census data, 1980	Longitudinal; Proportional hazard regression and logistic regression model	High	Zip codes	• Neighborhood disadvantage	• Sexual initiation • Contraceptive use	Structural
Biello, K.B., Ickovics, J.	2013	N = 4311 youth ages 12–20	• National Longitudinal Study of Youth (NLYS), 1997–2005 • Census data, 2000	Longitudinal; Multiple hierarchical discrete time-to-event model	Moderate	Census tracts	• Racial or ethnic composition	• Sexual initiation	Structural
Blake, B.J., Bentov, L.	2001	N = 8858 births to unmarried females ages 12–19	• Birth certificate data, Texas Department of Health, 1995–1996 • Census data, 1990	Cross-sectional; Spatial analysis and Spearman Rho correlation	Low	Zip codes	• Economic status • Household composition	• Adolescent birthrates	Structural
Brahmbhatt, H., Kagesten, A.	2014	N = 456 youth ages 15–19 (Baltimore sub-sample)	• Well Being of Adolescents in Vulnerable Environments Study, 2013	Cross-sectional; Multivariate logistic regression model	Low	Participant defined neighborhoods	• Safety	• Adolescent pregnancy	Structural and social
Browning, C. R. Leventhal, T., et al.[a]	2004	N = 915 youth ages 11–16	• Project in Human Development in Chicago Neighborhoods Community Survey (PHDCN), Wave I, 1994–1997 • Census data, 1990	Longitudinal; Multilevel discrete-time logit model	Moderate	Census tracts (combined into neighborhood clusters)	• Economic status • Residential stability • Racial or ethnic composition • Collective efficacy and social support	• Sexual initiation	Structural and Social
Browning, C. R., Leventhal, T., et al.[a]	2005	N = 907 youth ages 11–16	• PHDCN, Wave I, 1994 − 1997 • Census data, 1990	Longitudinal; Multilevel discrete-time logit model	Moderate	Census tracts (combined into neighborhood clusters)	• Economic status • Residential stability • Racial or ethnic composition • Collective efficacy and social support	• Sexual initiation	Structural and Social
Carlson, D.L., McNulty, J.L.	2015	N = 6985 unmarried youth ages 12–16	• NLYS, 1997–2002 • Census data, 2000	Longitudinal; Hierarchical level model	High	Census block groups	• Neighborhood disadvantage	• Sexual initiation	Structural
Choby, A.A, Dolcini, M.M., et al.	2012	N = 39 females ages 15–17	• Interviews with adolescent females	Cross-sectional; Qualitative analysis	Moderate	Participant-defined neighborhoods	• Safety • Norms and peer influences	• Sexual initiation	Social
Crowder, K., J., Teachman, J.	2004	N = 1361 females ages 13–19	• Panel Study of Income Dynamics (PSID), 1981–1993 • Census data, 1970, 1980, 1990	Longitudinal; Discrete-time event history model	Moderate	Census tracts	• Neighborhood disadvantage	• Adolescent pregnancy	Structural

(*continued on next page*)

Table 2 (*continued*)

Author	Year	Sample	Primary data sources	Study type and analysis	Quality of study	Neighborhood unit of measurement	Neighborhood variables included	Relevant outcome	Domain of neighborhood variables
Cubbin, C., Brindis, C.D., et al.	2010	N = 5838 non sexually active youth ages 11–17	• National Longitudinal Study of Adolescent Health (Add Health), Waves I-II, 1994–1996	Longitudinal; Logistic regression model	Moderate	Census tracts	• Economic status	• Sexual initiation	Structural
Cubbin, C., Santellim J., et al.	2005	N = 14,151 youth in grades 7–12	• Add Health, Wave I, 1994–1995	Cross-sectional; Multilevel, gender-specific logistic regression analyses	Low	Census tracts	• Economic status • Racial or ethnic composition • Norms and peer influences • Household composition • Residential stability	• Sexual initiation • Contraceptive use	Structural and social
Decker et al.	2016	N = 186 youth (in 22 focus groups), 94 adults	• Interviews with adults • Focus groups with youth	Cross-sectional; Qualitative analysis	High	Medical Service Study Areas	• Economic status • Safety • Collective efficacy and social support	• Adolescent birthrates	Structural and social
Denner, J., Kirby, D., et al.	2001	N = 167 youth and youth-serving key informants (in California zip codes with ≥ 1000 Latina residents ages 15–17)	• Interviews with youth and adults • California Education Data Partnership profiles of CA public schools • CACI Marketing Systems data • Census data, 1990	Cross-sectional; Qualitative analysis	Moderate	Zip codes	• Economic status • Physical environment • Collective efficacy and social support	• Adolescent birthrates	Structural and social
Driscoll, A. K., Sugland, B. W., et al.	2005	N = 5650 non pregnant or parenting females in grade 8 to age 20	• -National Education Longitudinal Study, 1988–1994 • Census data, 1990	Longitudinal; Race-specific multivariate regression models	Moderate	Zip codes	• Neighborhood disadvantage	• Adolescent birth	Structural
Gunaratne, S., Masinter, L., et al.	2015	N = 77 Chicago community areas	• Annual teen birthrates 1999–2009 (Illinois Dpt Health) • Census data, 2000 • ACS, 2005–2009	Cross-sectional; Stepwise multiple linear regression model	Moderate	Community areas (neighborhood-like districts)	• Economic status • Education status • Racial or ethnic composition	• Adolescent birthrates	Structural
Harding, D.J.	2009	N = 13,975 in grade 7 to age 25	• Add Health, Waves I, II, III • Census data, 1990	Longitudinal; Multi-level logit model	High	Census tracts	• Neighborhood disadvantage • Safety	• Adolescent pregnancy	Structural and social
Harding, D.J.	2003	N = 1104 matched cases of people born between 1958 and 1977	• PSID, 1968–1997 • Census data, 1970–1990	Longitudinal; Counterfactual model with propensity score matching and sensitivity analysis	High	Census tracts	• Economic status	• Adolescent pregnancy	Structural
Kerrigan, D., Witt, S., et al.	2006	N = 343 sexually active youth ages 14–19	• Perceived Risk of Sexually Transmitted Diseases study, 2000–2002	Cross-sectional; Multivariate logistic regression model	Low	Participant-defined neighborhoods	• Collective efficacy and social support • Norms and peer influences	• Contraceptive use	Social

(*continued on next page*)

Table 2 (*continued*)

Author	Year	Sample	Primary data sources	Study type and analysis	Quality of study	Neighborhood unit of measurement	Neighborhood variables included	Relevant outcome	Domain of neighborhood variables
Kim, J.	2010	N = 859 youth ages 12–17	• Los Angeles Family and Neighborhood Survey • (LAFANS), Wave I, 2000–2001 • -Census data, 2000	Cross-sectional; two-level hierarchical logistic regression model	Low	Census tracts	• Collective efficacy and social support • Economic status • Residential stability	• Sexual initiation	Social
Kirby, D., Coyle, K., et al.	2001	N = 1192 California zip codes with ≥ 200 females ages 15–17	• Birth certificate data, California, 1991–1996 • Census data, 1990	Cross-sectional; Stepwise regression model	Low	Zip codes	• Neighborhood disadvantage • Household composition • Racial or ethnic composition	• Adolescent birthrates	Structural
Lanctot, N., Smith, C.A.	2001	N = 196 African American females with mean ages 14–17.3	• Rochester Youth Development Study, 1998 • Census data, 1980 • Police data, 1988	Longitudinal; Multivariate logistic regression model	Moderate	Census tracts	• Household composition • Safety	• Sexual initiation • Adolescent pregnancy	Structural and social
Lindberg, L. D., Orr, M.	2011	N = 1092 unmarried males ages 15–19	• NSFG, Cycle VI, 2000–2002 • Census data, 2000	Cross-sectional; multivariate logistic regression model	Moderate	Census tracts	• Neighborhood disadvantage	• Sexual initiation • Contraceptive use • Adolescent pregnancy	Structural
Moore, M. R., Chase-Lansdale, P.L.	2001	N = 289 African American females ages 15–18 and their primary caregiver	• Families in Communities Study, 1996 • Census data, 1990	Cross-sectional; Multivariate logistic regression model	Low	Census block groups	• Collective efficacy and social support • Employment status	• Sexual initiation • Adolescent pregnancy	Structural and social
Oman, R.F., Vesely, S.K., et al.	2013	N = 1089 youth ages 12–17 and a household caregiver	• Youth Asset Study, annual 2003/04–2007/08 • Census data, 2000	Longitudinal; Cox proportional hazard and marginal logistic regression model	Moderate	Census tracts	• Physical environment	• Sexual initiation • Contraceptive use • Adolescent pregnancy	Structural
Ramirez-Valles, J., Zimmerman, M.A., et al.	2002	N = 558 African American youth ages 14–16 with an 8th grade GPA ≤ 3.0	• Michigan high school dropout study, 1994–1996	Longitudinal; Gender-specific semiparametric proportional hazards model	Moderate	Census tracts	• Racial or ethnic composition • Household composition • Education status • Economic status	• Sexual initiation	Structural
Roche, K.M., Leventhal, T.	2009	N = 846 youth of color ages 10–14 and a female caregiver	• Welfare, Children and Families: A Three City Study, Waves I-II, 1999–2000	Longitudinal; Two-level Bernoulli or logistic regression modeling	Moderate	Census tracts	• Economic status • Safety	• Sexual initiation	Structural and socail
Roche, K.M., Mekos, D., et al.	2005	N = 2559 non sexually active youth ages 12–16	• Add Health, Waves I-II, 1995 • Census data, 1990	Longitudinal; Multivariate weighted logistic regression model	High	Census block groups	• Economic status	• Sexual initiation	Structural

(*continued on next page*)

Table 2 (*continued*)

Author	Year	Sample	Primary data sources	Study type and analysis	Quality of study	Neighborhood unit of measurement	Neighborhood variables included	Relevant outcome	Domain of neighborhood variables
South, S.J., Baumer, E.P.[a]	2000	N = 562 females ages 18–22	• NSC-III, 1976, 1981, 1987 • Census data,1980	Longitudinal; Proportional hazards regression model	High	Zip codes	• Neighborhood disadvantage	• Adolescent birth	Structural
South, S.J., Baumer, E. P.[a]	2001	N = 535 females ages 18–22	• NSC-III, 1976, 1981, 1987 • Census data, 1980	Longitudinal; Two-stage nested logistic regression model	Moderate	Zip codes	• Neighborhood disadvantage	• Adolescent pregnancy	Structural
South, S.J., Crowder, K.	2010	N = 4855 youth ages 14–20	• -PSID, 1968–1985 • Census data, 1970, 1980, 1990	Longitudinal; series of discrete-time event-history regression models	High	Census tracts	• Economic status	• Adolescent birth	Structural
Upchurch, D. M., Mason, W.M., et al.	2004	N = 15,633 youth in grades 7–12	• -Add Health, Waves I-II, 1995–1996 • Census data, 1990	Longitudinal; Piecewise exponential hazard regression model	Moderate	Census tracts	• Residential stability • Employment status	• Sexual initiation	Structural
Warner, T.D.	2017	N = 12,421 adolescents	• Add Health, Waves II, III, (1995, 1996, 2001)	Longitudinal; Two-level hierarchical linear and hierarchical generalized linear model	Moderate	Census tracts	• Neighborhood type • Normative climate	• Sexual initiation	Structural
Warner, T. D., Giordano, P.C., et al.	2011	N = 1321 youth ages 12–19 and a parent	• -Toledo Adolescent Relationships Study, Waves I-II, 2001–2002 • Census data, 2000	Longitudinal; Hierarchical generalized linear model)	Moderate	Census tracts	• Norms and peer influences • Neighborhood disadvantage • Racial or ethnic composition	• Sexual initiation	Structural and Social
Way, S., Finch, B.K., et al.	2006	N = 2565 adults and birthrates for females ages 10–19	• LAFANS, 2001 • Census data, 2000 • L.A. county birth records, 2000–2001	Cross-sectional; Ordinary least-squared regression model	Moderate	Census tracts	• Racial or ethnic composition • Neighborhood disadvantage • Collective efficacy and social support	• Adolescent birthrates	Structural and Social
Wei, E., Hipwell, A., et al.	2005	N = 82 Pittsburgh neighborhoods	• Physical observations of neighborhood blocks • Census data, 2000	Cross-sectional; Hierarchical linear regression model	Low	Census tracts	• Physical environment	• Adolescent birthrates	Structural
Wickrama, T., Merten, M.J., et al.	2012	N = 14,058 youth ages 12–19	• Add Health, Waves I, II, III, (1995, 1996, 2001) • Census data, 1990	Longitudinal; Multilevel structural equation models (SEM)	Moderate	Census tracts	• Neighborhood disadvantage	• Sexual initiation • Contraceptive use	Structural
Wodtke, G.T.	2013	N = 6242 youth ages 4–19	• PSID, 1968–1989 • Census data, 1970–2000	Longitudinal; Inverse probability of treatment (IPT)-weighted model	High	Census tracts	• Economic status	• Adolescent birth	Structural

[a] 39 articles were included in this review, representing 37 studies.

neighborhood disadvantage, employment status, education status, racial or ethnic composition, household composition, residential stability, physical environment, neighborhood type, collective efficacy and social support, safety, and norms and peer influence. Many studies measured similar neighborhood categories using different variables or indicators. For summary purposes, we used one term for variables that were similar or named differently by researchers. This adjustment can be seen in our consistent use of the terms Hispanic/Latino, Black, and White, when the source articles may have used other race/ethnicity terminology. Table 3 summarizes the results by outcome.

Structural factors and conditions were primarily defined using data gathered at the census or zip code level. Some studies used a Neighborhood Disadvantage Index, or a similar index, to combine variables. Social processes and mechanisms at the neighborhood level were primarily gathered through interviews and surveys of residents about their perceptions. Collective efficacy, social cohesion, and social support were all measured through surveys of community members about their neighborhood interactions and relationships. Only Denner et al. (2001) included a count of locally run agencies in their measure of social capital.

3.2. Definitions of neighborhoods

Twenty-five studies used census tracts or census block groups to delineate neighborhoods or neighborhood clusters, of which two also incorporated boundaries such as railroad tracks and freeways. Six studies used zip codes. Three studies used neighborhood geographic boundaries defined by community members, referenced in Table 2 as "participant defined neighborhoods". Two studies used governmental definitions specific to the location, "community areas" in Chicago and "Medical Service Study Areas" in California (Gunaratne et al., 2015; Decker, 2016). Some researchers parceled neighborhood clusters to achieve relative population homogeneity in racial/ethnic, socioeconomic, and housing structure characteristics.

3.3. Structural factors and conditions of the neighborhood

3.3.1. Neighborhood disadvantage

Fifteen studies used a multi-faceted neighborhood disadvantage scale or index, combining more than one indicator. All scales included at least one measure of income, most commonly the poverty rate, the percentage of families using public assistance, or the percentage of families without or with high incomes (usually defined as more than $50,000). Each scale also included a variety of additional indicators, such as employment, education, household composition, perceived opportunity, and residential stability. Most studies found that increased neighborhood disadvantage was associated with an earlier sexual onset and increased likelihood of adolescent pregnancy or birth. Results for contraceptive use and birthrates were mixed.

3.3.1.1. Sexual initiation. Four studies found an association between increased neighborhood disadvantage and increased likelihood of earlier sexual onset. This pattern emerged in studies using national surveillance data (Lindberg and Orr, 2011; Wickrama et al., 2012) as well as in smaller samples (Browning et al., 2004, 2005). Browning's 2004 study found that the association between higher neighborhood disadvantages explained the racial difference in sexual initiation between Black and White adolescents. In his 2005 study, the effect of neighborhood disadvantage on age of sexual onset was stronger for males than for females. Four studies reported no significant association between neighborhood disadvantage and sexual initiation (Roche et al., 2005; Baumer and South, 2001; Carlson et al., 2014; Warner et al., 2011). Roche et al. (2005) found that increased parental involvement was associated with decreased likelihood of sexual initiation only in neighborhoods with higher levels of advantages. Carlson et al. (2014) found that differences in the odds of sexual debut between Blacks and Whites, as well as between Hispanics/Latinos and Whites, were minimized when they controlled for neighborhood disadvantage in their analyses.

3.3.1.2. Contraceptive use. The relationship between neighborhood disadvantage and unprotected sex had varied results in four studies. Results from one study showed that adolescents living in neighborhoods with greater economic disadvantage were less likely to report infrequent condom use (Wickrama et al., 2012). In contrast, two studies found that neighborhood disadvantage was associated with inconsistent condom use or increased unprotected sex (Bauermeister and Caldwell, 2010; Baumer and South, 2001). A national sample of male adolescents showed mixed results, with higher levels of neighborhood disadvantage significantly associated with lower condom use but not with condom use at first or last intercourse (Lindberg and Orr, 2011).

3.3.1.3. Adolescent pregnancy or birth. Five studies using different neighborhood disadvantage scales found a positive association between neighborhood disadvantage and increased adolescent pregnancy or births (South and Baumer, 2000; Crowder and Teachman, 2004; Harding, 2009; Lindberg and Orr, 2011; Driscoll et al., 2005) while an additional study found a positive, but not significant association (South and Baumer, 2001). Five of the six studies measured adolescent pregnancy or births among females, while Lindberg and Orr (2011) measured whether males reported ever getting a partner pregnant.

3.3.1.4. Adolescent birthrate. One study (Way, 2006) found a strong association between neighborhood disadvantage and increased birthrates among married adolescents; but not unmarried adolescents.

3.3.2. Neighborhood economic status

Twelve studies examined the association between neighborhood economic status on adolescent sexual and reproductive health outcomes, usually measured by neighborhood poverty. One of these studies also compared the effect of relative affluence in surrounding neighborhoods (South and Crowder, 2010). Several high quality studies found significant associations between higher poverty and increased adolescent pregnancy and birthrates.

3.3.2.1. Sexual initiation. In four studies, higher neighborhood poverty generally was associated with an increased likelihood of a younger age at first sexual experience (Ramirez-Valles et al., 2002; Cubbin et al., 2005, 2010; Averett et al., 2002). In two of those studies, the association was significant only for males (Ramirez-Valles et al., 2002; Cubbin et al., 2005). Another study by Cubbin et al. (2010) reported a significant association only in older adolescents (15–17 years old).

3.3.2.2. Contraceptive use. One study found that increased median family income at the neighborhood level was associated with increased contraceptive use (Averett et al., 2002).

3.3.2.3. Adolescent pregnancy or birth. Three studies found that as the proportion of families living in poverty grew, the likelihood of adolescent pregnancy or birth for females increased (Harding, 2003; South and Crowder, 2010; Wodtke, 2013). Two of these studies also assessed exposure to, and duration of, neighborhood poverty with both finding a stronger association with cumulative exposure to local poverty and pregnancy or parenthood (South and Crowder, 2010; Wodtke, 2013).

3.3.2.4. Adolescent birthrate. Four studies found that as the proportion of families living in poverty grew was associated with increased adolescent birthrates (Kirby et al., 2001; Blake and Bentov, 2001;

Table 3
Neighborhood variables by sexual health outcome, of quantitative studies reviewed[a].

Neighborhood Variables	Studies included	Earlier age at sexual initiation				Decreased contraceptive use				Increased adolescent pregnancy or birth				Increased adolescent birthrate			
		+	–	Mixed results	Not signif.	+	–	Mixed results	Not signif.	+	–	Mixed results	Not signif.	+	–	Mixed results	Not signif.
STRUCTRUAL CONDITIONS																	
Neighborhood disadvantage																	
Greater neighborhood disadvantage	15	4			4	2	1		1	5			1			1	
Neighborhood economic status																	
Poorer neighborhood economic status	11	3		1	2	1		1		3				3			
Neighborhood employment status																	
Higher proportion adult unemployment	3	1			1					1						1	
Higher proportion male unemployment	1															1	
Higher proportion female unemployment	1			1												1	
Neighborhood education status																	
Lower proportion with higher education	4				1									3			
Neighborhood racial or ethnic composition																	
Higher proportion Black	6		1	1	1				2					2		1	
Higher proportion Hispanic	8			2	2				2					3		1	
Increased racial segregation	1	1															
Neighborhood household composition																	
Decreased percentage of married households	1			1													
Increased percentage female-headed households	4	1			2									1			
Neighborhood residential stability																	
Lower residential stability	6				4					2							
Neighborhood physical environment																	
Negative physical conditions	3				1		1					1	1	1			
Neighborhood type																	
Rural (working class, poor)	1	1															
SOCIAL PROCESSES AND MECHANISMS																	
Neighborhood collective efficacy and social support																	
Decreased collective efficacy	4	2		1										1			
Decreased perceived social support	1				1								1				
Decreased neighborhood cohesion	1					1											
Neighborhood safety																	
Higher community arrest rate	1									1							
Increased neighborhood violence	3			1						2							
Higher neighborhood disorder	2	1			1												
Neighborhood norms and peer influences																	
Increased percentage of youth idle	1	1				1											
Lower collective monitoring of youth	1								1								
Lower number positive peer influences	1				1								1				
Normative climate more favoring toward sexual activity	3	1			1					1							

[a] Only quantitative and mixed-methods studies included, qualitative studies are described in the narrative.

Decker et al., 2016; Gunaratne et al., 2015).

3.3.3. Neighborhood employment status

Five studies analyzing the relationship between neighborhood employment levels and adolescent sexual and reproductive health outcomes had mixed results.

3.3.3.1. Sexual initiation. Three studies examined the association between neighborhood employment status and likelihood of a younger age of sexual onset. A higher percentages of the adult population who were unemployed (Upchurch et al., 2004) was associated with a lower age at sexual onset. However, no significant effect was found between a higher percentage of adults in an adolescent's social network who use welfare benefits (a proxy measurement of adult joblessness) and earlier sexual debut for females (Moore and Chase-Lansdale, 2001). One study found that a higher percentage (> 35%) of females working full time in a neighborhood was associated with a lower likelihood of having sexual experience among male adolescents, with no effect found for females (Cubbin et al., 2005).

3.3.3.2. Adolescent pregnancy or birth. One study found that an increased percentage of adults in an adolescent's social network who used welfare benefits (a proxy measurement of adult joblessness) was associated with higher likelihood of ever being pregnant (Moore and Chase-Lansdale, 2001).

3.3.3.3. Adolescent birthrate. Increased employment among male and female adults was associated with decreased birthrates (Kirby et al., 2001). However, the results varied for different racial/ethnic groups with an increased adolescent birthrate associated with male unemployment among Whites and female unemployment among Black and Hispanic adolescents (Kirby et al., 2001). A qualitative study by Decker et al. (2016) found that adult unemployment was more pronounced in communities with higher adolescent birthrates.

3.3.4. Neighborhood education status

Five studies assessed levels of education in neighborhoods with adolescent sexual health outcomes.

3.3.4.1. Sexual initiation. One study had no significant results between level of education (less than high school) and time of sexual initiation for male or female adolescents (Ramirez-Valles et al., 2002).

3.3.4.2. Adolescent birthrate. Four studies focused on birthrates and educational levels. One found that an increased proportion of adults 25 or older with a college education within a zip code was associated with a decreased adolescent birthrate among all racial groups (Kirby et al., 2001). Two other studies (Blake and Bentov, 2001; Gunaratne et al., 2015) found that an increased proportion of adults 25 or older with lower education levels was positively correlated with higher birthrates. Qualitative results from Decker et al. (2016) revealed that communities with higher adolescent birthrates were more likely to perceive fewer available educational opportunities.

3.3.5. Neighborhood racial or ethnic composition

Nine studies assessed the racial or ethnic composition of neighborhoods. All race and ethnicity categories were defined by researchers' review of census data or through respondent information in survey data. Results were mixed, depending on the racial or ethnic group being analyzed and the composition of the surrounding population. In some cases, increased concentrations of one's own racial or ethnic group served as a protective factor, while in other cases, increased concentrations of a historically marginalized group correlated with poorer adolescent sexual health outcomes. Qualitative studies provided additional perspectives on neighborhood racial or ethnic characteristics.

3.3.5.1. Sexual initiation. The relationship between neighborhood racial or ethnic composition and sexual initiation had varied results in six studies. One found mixed results between immigrant concentration (a combined percentage of percentage Hispanic/Latino and percentage foreign born) and age of sexual initiation (Browning et al., 2004). Another study found higher odds of sexual initiation among youth living in poor Black urban and rural neighborhoods, but mixed or insignificant results for other races/ethnicities living in different geographic settings (Warner, 2017).

A study using national surveillance data found that living in a neighborhood greater than 15% Hispanic/Latino was associated with decreased likelihood of sexual initiation, but only for girls (Cubbin et al., 2005). The same study found that living in a neighborhood greater than 33% Black was associated with increased likelihood of sexual initiation, but, similarly, only for girls. Another study found that the higher proportion of a census tract that was Black was associated with decreased risk of being sexually active (Averett, 2002).

One study found that a type of racial segregation called centralization (the concentration of an ethnic group near the urban center of a city) was associated with a younger age of sexual initiation for the ethnic group that is centralized (Biello et al., 2013). Two studies had mixed or non-significant results when analyzing neighborhood ethnicity (Browning et al., 2005; Ramirez-Valles et al., 2002).

3.3.5.2. Contraceptive use. Two studies found no significant association between neighborhood racial or ethnic composition and contraceptive use (Averett et al., 2002; Cubbin et al., 2005).

3.3.5.3. Adolescent birthrate. The relationship between neighborhood racial and ethnic composition and adolescent birthrates was analyzed in five studies. One found that having greater than 50% Hispanic/Latino composition in a census tract was associated with an increased birthrate among adolescents of all races and ethnicities (Way et al., 2006). Similarly, Gunaratne et al. (2015) found that an increase in the proportion of Hispanic residents was associated with an increase in the adolescent birthrate. Blake and Bentov (2001) found that a higher proportion of Black or Hispanic in a population was correlated with increased adolescent birthrates. Alternatively, in race-specified models, Kirby et al. (2001) found a significant association between the higher the percentage of a given racial or ethnic group in a zip code and a lower birthrate for adolescents of that racial or ethnic group. Qualitative interviews with residents in Hispanic/Latino neighborhoods with low adolescent birth rates revealed sentiments that a culturally homogenous environment acted as a protective factor for youth, while communities with high adolescent birthrates expressed negative perceptions toward increased cultural diversity (Denner et al., 2001).

3.3.6. Neighborhood household composition

Four studies assessed neighborhood household composition, including single-headed or female-headed households.

3.3.6.1. Sexual initiation. Of the three studies analyzing sexual initiation, one found a significant association between living in a neighborhood with greater than 33% married households and a decreased risk of sexual initiation only for girls (Cubbin et al., 2005). Another found an increased proportion of female-headed households was significantly associated with a reduction in racial differences in sexual debut among Black and White participants and Hispanic and White participants (Carlson et al., 2014). One study found no significant results for household composition (Ramirez-Valles et al., 2002).

3.3.6.2. Adolescent birthrate. One study found a positive correlation between increased single-headed households and unmarried adolescent birthrates (Blake and Bentov, 2001).

3.3.7. Neighborhood residential stability

Six studies examined residential stability at the neighborhood level.

3.3.7.1. Age at sexual initiation. Four studies that analyzed neighborhood residential stability found no significant association with age of sexual onset across virtually all models (Browning et al., 2004, 2005; Cubbin et al., 2005; Upchurch et al., 2004).

3.3.7.2. Adolescent pregnancy or birth. Two studies found that residential mobility or instability (number of moves between neighborhood) was significantly associated with premarital adolescent pregnancy and timing of first premarital birth (Crowder and Teachman, 2004; South and Baumer, 2000).

3.3.8. Neighborhood physical environment

Three studies examined how the physical environment in a neighborhood, which includes elements such as graffiti, litter, and land use, may influence adolescent sexual outcomes. The authors found positive associations for contraceptive use and adolescent birthrates.

3.3.8.1. Age at sexual initiation. One study found that neighborhood physical conditions, which was measured utilizing a Broken Windows/neighborhood conditions survey that evaluated the condition of the homes and amount of trash, graffiti, and abandoned cars in a neighborhood, had no significant association with adolescent sexual initiation (Oman et al., 2013).

3.3.8.2. Contraceptive use. The same study found that positive neighborhood physical conditions were significantly associated with increased use of birth control among youth (Oman et al., 2013).

3.3.8.3. Adolescent pregnancy or birth. The two studies that analyzed relationships between neighborhood physical environments and adolescent pregnancy found mixed or non-significant results (Brahmbhatt et al., 2014; Oman et al., 2013).

3.3.8.4. Adolescent birthrate. One study using an observational physical disorder index found an association between increased neighborhood physical disorder and adolescent birthrates (Wei et al., 2005).

3.3.9. Neighborhood type

One study created ten different "types" of communities by combining rural, urban, and suburban location with economic and other variables. It found that the odds of sexual debut was highest among youth from rural (poor Black and working class White) neighborhoods. It found no significant difference for other neighborhood types compared to upper middleclass White suburban neighborhoods (Warner, 2017).

3.4. Social processes and mechanisms

3.4.1. Neighborhood collective efficacy and social support

Protective social processes were assessed in varying ways in six studies. Browning et al., (2004, 2005) measured participants' perceptions of their neighborhood using a scale consisting of multiple statements about community trust, values, willingness to help each other, and to get along. Other researchers measured collective efficacy by surveying adults about social cohesion and informal social control and then averaging the scores across neighborhoods (Kim, 2010; Way et al., 2006). Denner et al. (2001) measured social capital using factors such as shared adult monitoring, information channels, locally run agencies, strong social networks, and whether youth know and look out for each other. Moore and Chase-Landsdale (2001) defined social support using a scale that compiled community members' perceptions of the quality of their neighbors, youth's number of positive peer influences, and the economic stability of adults in adolescent's social circles. Kerrigan (2006) defined neighborhood cohesion by asking participants if people in their neighborhood could be trusted, care a lot about each other, and were willing to help each other. Decker (2016) defined community cohesion as recognizing and helping each other. Overall, these protective social processes were associated with decreased sexual risk behaviors, with some points of variation.

3.4.1.1. Sexual initiation. Four studies analyzed the relationship between neighborhood collective efficacy and sexual initiation. A longitudinal study found that neighborhood collective efficacy was associated with decreased risk of sexual initiation among male and female adolescents (Browning et al., 2004), particularly when parental monitoring was low (Browning et al., 2005). Similarly, Kim et al. (2010) found neighborhood collective efficacy was associated with decreased odds of sexual initiation, but the finding was only significant among adolescent males who were not involved in out-of-school recreational activities. Among female adolescents, no significant association was found between neighborhood social support and sexual initiation (Moore and Chase-Lansdale, 2001).

3.4.1.2. Contraceptive use. One study found that increased levels of neighborhood cohesion were associated with increased odds of condom use at last intercourse (Kerrigan et al., 2006).

3.4.1.3. Adolescent pregnancy or birth. One study found no significant relationship between neighborhood social support scores and risk of adolescent pregnancy (Moore and Chase-Lansdale, 2001).

3.4.1.4. Adolescent birthrate. Three studies found that great neighborhood social support or community cohesion was associated with decreased birthrates (Way et al., 2006; Decker et al., 2016; Denner et al., 2001). One of these studies, however, found that in neighborhoods with less than 50% Hispanic/Latino population, increased collective efficacy was associated with a decreasing unmarried adolescent birth rate, while in neighborhoods with greater than a 50% Hispanic/Latino population, collective efficacy was associated with an increased married adolescent birthrate (Way et al., 2006). Denner et al. (2001) found through interviews in communities that levels of informal social capital were higher in communities with low adolescent birthrates than in comparable communities with high birthrates.

3.4.2. Neighborhood safety

Five studies measured neighborhood safety variables by examining the community arrest rate, levels of resident-observed neighborhood violence, or by interviewing adolescents about their perceived neighborhood safety. Two employed a neighborhood disorder scale with scores derived from survey data that included measures such as the commonality of vandalism, drugs and drug dealing, gangs, violent crimes, and abandoned property (Lanctot and Smith, 2001; Roche and Leventhal, 2009). Decreased neighborhood safety was associated with earlier sexual initiation and with increased odds of adolescent pregnancy.

3.4.2.1. Sexual initiation. Neighborhood safety and sexual initiation was analyzed in three studies. In a study of Black female adolescents, higher levels of neighborhood disorganization was associated with increased odds of sexual initiation (Lanctot and Smith, 2001). Surveying low-income families, Roche and Leventhal (2009) did not find a significant main effect of neighborhood disorder on risk of sexual onset; however, an association with sexual onset was found after assessing the interaction of family-level factors along with neighborhood disorder. In a mixed methods study analyzing qualitative interviews, along with a survey rating their neighborhoods as positive, negative or mixed, about 20% of young women interviewed linked violence with sexual activity choices, specifically in initiating sex

at a younger age (Choby et al., 2012).

3.4.2.2. Adolescent pregnancy or birth. Three studies found that lower neighborhood safety was associated with increased rates of adolescent pregnancy. Higher levels of neighborhood violence (Harding, 2009) or an increased community arrest rate (Lanctot and Smith, 2001) were associated with an increase in the odds of adolescent pregnancy. Harding (2009) also found that neighborhood violence served as a mediator to neighborhood disadvantage in adolescent pregnancy. Brahmbhatt et al. (2014) found that adolescent males had increased odds of impregnating a partner if they reported living in a neighborhood where they observed violence in the past year, but no significance was found for females.

3.4.3. Neighborhood norms and peer influence

Although peer influence is often measured at the individual level, six studies examined peer or community norms at the neighborhood level.

3.4.3.1. Sexual initiation. Neighborhood norms and sexual initiation was analyzed in five studies. One found an association between neighborhood normative climates that are more accepting of sexual activity and earlier sexual initiation among youth (Warner et al., 2011). A national study found that increased youth idleness (the proportion of the population who are high school dropouts and not in the civilian labor force or Armed Service) was associated with increased risk of sexual initiation (Cubbin et al., 2005). Another study by Warner and Settersten (2017) found no significant effect of permissive sexual climate on adolescent sexual debut after adjusting for individual risk factors.

3.4.3.2. Contraceptive use. Two studies analyzed the relationship between neighborhood norms and contraceptive use. In one, higher concentrations of idle youth were associated with lowered likelihood of contraceptive use only among female adolescents (Cubbin et al., 2005). However, Kerrigan (2006) found no significant relationship between lower neighborhood collective monitoring of youth and condom use.

3.4.3.3. Adolescent pregnancy or birth. One study found no significant relationship between negative peer influences and premarital birth (South, 2000).

3.4.3.4. Adolescent birthrate. One qualitative study found that residents in Hispanic/Latino communities with lower than average adolescent birthrates described strong traditional values about commitment to family and community, collective monitoring, and strong ties to Latino culture in the neighborhood. These same factors were not identified in neighborhoods with higher rates (Denner et al., 2001).

4. Discussion

Overall, the included studies of specific neighborhood characteristics measured structural characteristics (poverty, education, employment) that may be associated with reproductive health outcomes, but fewer studies assessed the social processes (such as collective efficacy and norms) within a neighborhood. In the last decade, progress has been made in determining which structural factors matter to health, and how to define these measures, with the majority of studies emphasizing “disadvantages” in neighborhoods over more “positive” neighborhood-level factors. With 22 studies analyzing structural conditions, three studies analyzing social processes and mechanisms and 11 studies analyzing both, these patterns echo Sampson's (2002) findings. However, the differences are not as great as Sampson found, indicating increased attention to the complexities of neighborhood characteristics.

Most neighborhood-level variables were socioeconomic measurements that align with previous measurements used in neighborhood research generally. Mirroring other findings (Penman-Aguilar et al., 2013), this review found fairly consistent associations regarding structural characteristics of neighborhood poverty, education, and employment with adolescent reproductive health outcomes. Increased neighborhood poverty was regularly associated with increased risk of adolescent pregnancy and higher birthrates, decreased likelihood of contraceptive use, and increased likelihood of sexual initiation, while higher levels of neighborhood education and adult employment had the opposite results.

Studies examining neighborhood racial and ethnic composition found mixed results. It remains unclear how or if the racial or ethnic concentrations within a community influence the risk of an adolescent birth, contraceptive use, or sexual initiation. Indicators for racial and ethnic group concentration in a neighborhood were less uniform, with group concentration defined as anywhere between greater than 15% of a population, to greater than 50% of a population. Differences in defining groups by race/ethnicity, by immigrant status, or a combination of both also make comparison between studies more challenging. Other researchers added layers of complexity by analyzing racial segregation and cultural heterogeneity (Denner et al., 2001; Harding, 2007; Biello et al., 2013).

The results reported in this review most strongly support the field's current understanding that economic and institutional resource scarcity within certain neighborhoods are significantly associated with increased risky sexual and reproductive health behaviors and outcomes among adolescents. Three additional structural neighborhood categories – household composition, residential stability, and neighborhood physical environment – had insufficient evidence to determine their potential role in adolescent reproductive health outcomes.

Studies of social processes and mechanisms found that factors such as increased social support, cohesion, and collective efficacy, generally decreased the risk of sexual initiation, increased contraceptive use, and decreased adolescent birthrates, with some mediating factors of race/ethnicity and marital status. Increased neighborhood violence, community disorder, or arrest rates were associated with earlier sexual initiation and higher adolescent pregnancy. Qualitative interviews with young women echoed the perception that neighborhood violence is linked with sexual risk behaviors (Choby et al., 2012). Three additional social processes – youth norms, youth idleness, and collective monitoring of youth – had insufficient evidence to determine their potential role in adolescent reproductive health.

There is less robust data exploring the social processes leading to risky behaviors or acting as protective factors, as well as how interactions with various community institutions could influence adolescent sexual health. Efforts to explore the interactions of social processes with structural conditions at the neighborhood level can be found in Harding's (2007) analysis of how cultural heterogeneity affect pregnancy views and ultimately, sexual initiation. Roche and Leventhal (2009) also considered the interactions of neighborhood disorder, family routines, and sexual initiation. Studies that were not included in this review, because they didn’t compare results between neighborhoods, further analyzed other social processes including recreational options (Akers et al., 2011), messages and norms around sexual conduct (Catania and Dolcini, 2012), gender norms (Hanson et al., 2014), and social capital (Cene et al., 2011). Similar studies that compare multiple neighborhoods would help to advance the field of neighborhood effects.

Jencks and Mayer (1990) proposed four social process pathways linking individual behavior with neighborhood effects: collective socialization, availability of institutional resources, the influence of problematic norms, and models of competition for scarce resources. This can form a theoretical foundation for the development of more consistent and nuanced measurement of social processes and advance an understanding of their importance.

We did not identify any studies that mapped resources at the neighborhood level. The availability and position of local institutions and resources, as well as collective efficacy, are impacted by policy

decisions, migration, employment opportunities, and community safety. This also points to the need for further analysis of the policy and infrastructure on adolescent sexual health and behaviors. For example, are school-based health centers in the area and do they provide contraception?

Adolescents navigate multiple physical and social spaces in their daily lives, yet most studies of neighborhood-level factors measure neighborhoods using census tracts, census block groups, or zip codes. These geographic delineations may create artificial neighborhood boundaries and likely do not represent the full array or self-perceived boundaries of what constitutes neighborhood contexts and the social interactions that occur in such settings. To capture the multiple environments adolescents navigate and the social processes at work in these environments, it is crucial that researchers understand how adolescents and their families define and delineate the boundaries of their "neighborhoods." Additionally, few studies measure the length of time an adolescent has been exposed to a neighborhood environment. In this review, only Wodtke (2013) and South and Crowder (2010) included neighborhood exposure as a variable. Finally, understanding the role of online and social media spaces is increasingly a factor in understanding adolescent community perceptions and experiences. Additional research on the interplay between the physical environment, social networks, and health behaviors is needed.

A greater use of qualitative methods, including ethnographic studies at the neighborhood and community level, in conjunction with quantitative data, can better assess social mechanisms of neighborhood effects and the perceptions of young residents who are impacted through those interactions. While some qualitative research provides insight into these topics, many are limited to one community rather than cross-community comparisons (Akers et al., 2011; Hanson et al., 2014; Mmari et al., 2014). Geographic information systems and spatial analysis tools also have potential to measure neighborhood factors in increasingly meaningful ways (Koblin et al., 2013).

Better understanding how structural conditions and social processes interact can help link neighborhood effects and psycho-social developmental research. Researchers have suggested that a culmination of risk factors in a young person's life can increase the likelihood of sexual risk behaviors (Small and Luster, 1994; Lohman and Billings, 2008), with a particular focus on familial events during early childhood (Hillis et al., 2004; Anda et al., 2002). Similarly, further research of social processes and mechanisms should assess how and when in the life course neighborhood characteristics may have the greatest influence on adolescent health. In addition, research to understand the protective community factors shaping adolescent sexual and reproductive health can help improve sexual behavior interventions (Kogan et al., 2013).

The neighborhood effects field faces the added challenge of isolating the effect of individual socioeconomic and demographic characteristics known to predict health outcomes from those same characteristics that influence the sorting of people into neighborhoods (Diez Roux, 2001; Diez Roux and Mair, 2010). For example, poor families tend to live in impoverished neighborhoods while wealthy families tend to live in wealthier neighborhoods with better schools. A number of studies reviewed analyzed the interaction between individual and family-level variables along with neighborhood-level variables. Although multivariate analyses can account for the correlation between individual-level variables and poverty, race, and other measures of neighborhood disadvantage, research is still limited on the underlying structures and systems that reinforce this stratification. As Warner (2017) states, "scant attention has been paid to how neighborhoods are a product of social stratification forces that operate simultaneously to affect human development" by differentially distributing resources and risks.

5. Limitations

This review has several limitations based on the studies available and the data reported. Some neighborhood characteristics, particularly household composition and residential stability, had too few studies to fully examine their potential role on adolescent reproductive health. With the exception of a few studies (Browning et al., 2004, 2005; Lanctot and Smith, 2001; Moore and Chase-Lansdale, 2001), most data were not collected specifically to examine the association between neighborhood effects and reproductive health outcomes. Because the majority of these studies were observational, causal inferences cannot be drawn from the findings. In addition, many of the studies were cross-sectional, further limiting the strength of the association.

Although we included both measures of adolescent pregnancy and births, we were not able to explore the role of access to abortion, which may impact birth rates and/or result in under-reporting of pregnancy. In most studies, adolescents' sexual behavior was both self-reported and reported retrospectively, allowing for a possible recall and positive response bias on the part of study participants, particularly for more sensitive items. Furthermore, most sexual activity reported was vaginal sex, with no studies identified that focused on young men who have sex with men.

6. Conclusion

As the field of neighborhood research advances, we encourage researchers to continue refining definitions of neighborhoods, incorporate smaller geographic units of analysis, and include both structural and social measurements. Researchers should consider longitudinal studies that assess neighborhood social norms and processes in adolescence to better understand possible critical points in adolescent development, and how processes within and between neighborhoods can act as protective or risk factors to adolescent sexual and reproductive health. These more nuanced profiles of neighborhoods can help to tailor policies and programming to better respond to the specific needs and contexts of different communities.

Funding

This work was supported in part by a grant from the Doris Duke Charitable Foundation to fund a Clinical Research Fellow.

References

Akers, A.Y., Muhammad, M.R., Corbie-Smith, G., 2011. "When you got nothing to do, you do somebody": a community's perceptions of neighborhood effects on adolescent sexual behaviors. Social. Sci. Med. 72, 91–99.
Anda, R.F., Chapman, D.P., Felitti, V.J., Edwards, V., Williamson, D.F., Croft, J.B., Giles, W.H., 2002. Adverse childhood experiences and risk of paternity in teen pregnancy 1, 2. Obstet. Gynecol. 100, 37–45.
Averett, S.L., Rees, D.I., Argys, L.M., 2002. The impact of government policies and neighborhood characteristics on teenage sexual activity and contraceptive use. Am. J. Public Health 92, 1773–1778.
Bauermeister, J.A., Z, M.A., Caldwell, C.H., 2010. Neighborhood disadvantage and changes in condom use among African American adolescents. J. Urban Health-Bull. N.Y. Acad. Med. 88, 66–83.
Baumer, E.P., South, S.J., 2001. Community effects on youth sexual activity. J. Marriage Fam. 63, 540–554.
Biello, K.B., Ickovics, J., Niccolai, L., Lin, H., Kershaw, T., 2013. Racial differences in age at first sexual intercourse: residential racial segregation and the black-white disparity among U.S. adolescents. Public Health Rep. 128 (Suppl 1), 23–32.
Blake, B.J., Bentov, L., 2001. Geographical mapping of unmarried teen births and selected sociodemographic variables. Public Health Nurs. 18, 33–39.
Brahmbhatt, H., Kagesten, A., Emerson, M., Decker, M.R., Olumide, A.O., Ojengbede, O., Lou, C., Sonenstein, F.L., Blum, R.W., Delany-Moretlwe, S., 2014. Prevalence and determinants of adolescent pregnancy in urban disadvantaged settings across five cities. J. Adolesc. Health 55, S48–S57.
Bronfenbrenner, U., 1979. The Ecology of Human Development: Experiments by Nature and Design. Harvard University Press, Cambridge, MA.
Browning, C.R., Leventhal, T., Brooks-Gunn, J., 2004. Neighborhood context and racial differences in early adolescent sexual activity. Demography 41, 697–720.
Browning, C.R., Leventhal, T., Brooks-Gunn, J., 2005. Sexual initiation in early adolescence: the nexus of parental and community control. Am. Sociol. Rev. 70, 758–778.
Carlson, D.L., McNulty, T.L., Bellair, P.E., Watts, S., 2014. Neighborhoods and racial/ethnic disparities in adolescent sexual risk behavior. J. Youth Adolesc. 43, 1536–1549.
Catania, J.A., Dolcini, M.M., 2012. A social-ecological perspective on vulnerable youth:

toward an understanding of sexual development among urban African American adolescents. Res. Human. Dev. 9, 1–8.
Cene, C.W., Akers, A.Y., Lloyd, S.W., Albritton, T., Hammond, W.P., Corbie-Smith, G., 2011. Understanding social capital and HIV risk in rural African American communities. J. General. Intern. Med. 26, 737–744.
Choby, A.A., Dolcini, M.M., Catania, J.A., Boyer, C.B., Harper, G.W., 2012. African American adolescent females' perceptions of neighborhood safety, familial strategies, and sexual debut. Res. Human. Dev. 9, 9–28.
Crowder, K., Teachman, J., 2004. Do residential conditions explain the relationship between living arrangements and adolescent behavior? J. Marriage Fam. 66, 721–738.
Cubbin, C., Brindis, C.D., Jain, S., Santelli, J., Braveman, P., 2010. Neighborhood poverty, aspirations and expectations, and initiation of sex. J. Adolesc. Health 47, 399–406.
Cubbin, C., Santelli, J., Brindis, C.D., Braveman, P., 2005. Neighborhood context and sexual behaviors among adolescents: findings from the National Longitudinal Study of Adolescent Health. Perspect. Sex. Reprod. Health 37, 125–134.
Decker, M., Gutmann-Gonzalez, A., Lara, D., Brindis, C.D., 2016. Exploring neighborhood-level factors influencing adolescent birth rates in California. Youth Soc. 1–28.
Denner, J., Kirby, D., Coyle, K., Brindis, C., 2001. The protective role of social capital and cultural norms in Latino communities: a study of adolescent births. Hisp. J. Behav. Sci. 23, 3–21.
Diez Roux, A.V., 2001. Investigating neighborhood and area effects on health. Am. J. Public Health 91, 1783–1789.
Diez Roux, A.V., Mair, C., 2010. Neighborhoods and health. Ann. N.Y. Acad. Sci. 1186, 125–145.
Driscoll, A.K., Sugland, B.W., Manlove, J., Papillo, A.R., 2005. Community opportunity, perceptions of opportunity, and the odds of an adolescent birth. Youth Soc. 37, 33–61.
Gunaratne, S., Masinter, L., Kolak, M., Feinglass, J., 2015. Change in Population Characteristics and Teen Birth Rates in 77 Community Areas: Chicago, Illinois, 1999-2009. Public Health Reports 130 (4), 372–379. https://doi.org/10.1177/003335491513000416.
Hannon, L., Sawyer, P., Allman, R.M., 2012. The influence of community and the built environment on physical activity. J. Aging Health 24, 384–406.
Hanson, J.D., McMahon, T.R., Griese, E.R., Kenyon, D.B., 2014. Understanding gender roles in teen pregnancy prevention among American Indian youth. Am. J. Health Behav. 38, 807–815.
Harding, D.J., 2003. Counterfactual models of neighborhood effects: the effect of neighborhood poverty on dropping out and teenage pregnancy. Am. J. Sociol. 109, 676–719.
Harding, D.J., 2007. Cultural context, sexual behavior, and romantic relationships in disadvantaged neighborhoods. Am. Sociol. Rev. 72, 341–364.
Harding, D.J., 2009. Collateral consequences of violence in disadvantaged neighborhoods. Social. Forces 88, 757–784.
Hillis, S.D., Anda, R.F., Dube, S.R., Felitti, V.J., Marchbanks, P.A., Marks, J.S., 2004. The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. Pediatrics 113, 320–327.
Jencks, C., Mayer, S.E., 1990. The social consequences of growing up in a poor neighborhood. In: Laurence, E., Lynn, J., Michael, G.H., Mcgeary (Eds.), Inner-City Poverty in the United States. National Academy of Sciences, Washington, D.C..
Karriker-Jaffe, K.J., Foshee, V.A., Ennett, S.T., 2011. Examining How Neighborhood Disadvantage Influences Trajectories of Adolescent Violence: a Look at Social Bonding and Psychological Distress. J. Sch. Health 81, 764–773.
Kerrigan, D., Witt, S., Glass, B., Chung, S.E., Ellen, J., 2006. Perceived neighborhood social cohesion and condom use among adolescents vulnerable to HIV/STI. Aids Behav. 10, 723–729.
Kim, J., 2010. Influence of neighbourhood collective efficacy on adolescent sexual behaviour: variation by gender and activity participation. Child Care Health Dev. 36, 646–654.
Kirby, D., Coyle, K., Gould, J.B., 2001. Manifestations of poverty and birthrates among young teenagers in California zip code areas. Fam. Plan. Perspect. 33, 63–69.
Koblin, B.A., Egan, J.E., Rundle, A., Quinn, J., Tieu, H.-V., Cerdá, M., Ompad, D.C., Greene, E., Hoover, D.R., Frye, V., 2013. Methods to measure the impact of home, social, and sexual neighborhoods of urban gay, bisexual, and other men who have sex with men. PLoS One 8, e75878.
Kogan, S.M., Cho, J., Allen, K., Lei, M.-K., Beach, S.R., Gibbons, F.X., Simons, L.G., Simons, R.L., Brody, G.H., 2013. Avoiding adolescent pregnancy: a longitudinal analysis of African-American youth. J. Adolesc. Health 53, 14–20.
Lanctot, N., Smith, C.A., 2001. Sexual activity, pregnancy, and deviance in a representative urban sample of African American girls. J. Youth Adolesc. 30, 349–372.
Lindberg, L.D., Orr, M., 2011. Neighborhood-level influences on young men's sexual and reproductive health behaviors. Am. J. Public Health 101, 271–274.
Lohman, B., Billings, A., 2008. Protective and risk factors associated with adolescent Boys' early sexual debut and risky sexual behaviors. J. Youth Adolesc. 37, 723–735.
Mayer, S.E., Jencks, C., 1989. Growing up in poor neighborhoods - how much does it matter. Science 243, 1441–1445.
Mays, N., Pope, C., 2000. Assessing quality in qualitative research. BMJ 320 (7226), 50–52.
Mennis, J., Mason, M.J., 2011. People, places, and adolescent substance use: integrating Activity space and social network data for analyzing health behavior. Ann. Assoc. Am. Geogr. 101, 272–291.
Mmari, K., Lantos, H., Brahmbhatt, H., Delany-Moretlwe, S., Lou, C., Acharya, R., Sangowawa, A., 2014. How adolescents perceive their communities: a qualitative study that explores the relationship between health and the physical environment. BMC Public Health 14, 1.
Moore, M.R., Chase-Lansdale, P.L., 2001. Sexual intercourse and pregnancy among African American girls in high-poverty neighborhoods: the role of family and perceived community environment. J. Marriage Fam. 63, 1146–1157.
Oman, R.F., Vesely, S.K., Aspy, C.B., Tolma, E.L., Gavin, L., Bensyl, D.M., Mueller, T., Fluhr, J.D., 2013. A longitudinal study of youth assets, neighborhood conditions, and youth sexual behaviors. J. Adolesc. Health 52, 779–785.
Penman-Aguilar, A., Carter, M., Snead, M.C., Kourtis, A.P., 2013. Socioeconomic disadvantage as a social determinant of teen childbearing in the U.S. Public Health Rep. 128, 5–22.
Ramirez-Valles, J., Zimmerman, M.A., Juarez, L., 2002. Gender differences of neighborhood and social control processes - A study of the timing of first intercourse among low-achieving, urban, African American youth. Youth Soc. 33, 418–441.
Rios, R., Aiken, L.S., Zautra, A.J., 2012. Neighborhood contexts and the mediating role of neighborhood social cohesion on health and psychological distress among hispanic and non-hispanic residents. Ann. Behav. Med. 43, 50–61.
Roche, K.M., Leventhal, T., 2009. Beyond neighborhood poverty: family management, neighborhood disorder, and adolescents' early sexual onset. J. Fam. Psychol. 23, 819–827.
Roche, K.M., Mekos, D., Alexander, C.S., Astone, N.M., Bandeen-Roche, K., Ensminger, M.E., 2005. Parenting influences on early sex initiation among adolescents: how neighborhood matters. J. Fam. Issues 26, 32–54.
Ryan R., Hill S., 2016. How to GRADE the quality of the evidence. Cochrane Consumers and Communication Group, Version 3.0 December 2016. Available at ⟨http://cccrg.cochrane.org/author-resources⟩.
Salazar, L.F., Bradley, E.L.P., Younge, S.N., Daluga, N.A., Crosby, R.A., Lang, D.L., DiClemente, R.J., 2010. Applying ecological perspectives to adolescent sexual health in the United States: rhetoric or reality? Health Educ. Res. 25, 552–562.
Sampson, R.J., Morenoff, J.D., Gannon-Rowley, T., 2002. Assessing "neighborhood effects": social processes and new directions in research. Annu. Rev. Sociol. 28, 443–478.
Small, S.A., Luster, T., 1994. Adolescent sexual-activity: an ecological risk-factor approach. J. Marriage Fam. 56, 181–192.
South, S.J., Baumer, E.P., 2000. Deciphering community and race effects on adolescent premarital childbearing. Social. Forces 78, 1379–1407.
South, S.J., Baumer, E.P., 2001. Community effects on the resolution of adolescent premarital pregnancy. J. Fam. Issues 22, 1025–1043.
South, S.J., Crowder, K., 2010. Neighborhood poverty and nonmarital fertility: spatial and temporal dimensions. J. Marriage Fam. 72, 89–104.
Upchurch, D.M., Mason, W.M., Kusunoki, Y., Johnson, M., Kriechbaum, J., 2004. Social and behavioral determinants of self-reported STD among adolescents. Perspect. Sex. Reprod. Health 36, 276–287.
Warner, T.D., 2017. Adolescent sexual risk taking: the distribution of youth behaviors and perceived peer attitudes across neighborhood contexts. J. Adolesc. Health.
Warner, T.D., Giordano, P.C., Manning, W.D., Longmore, M.A., 2011. Everybody's doin' it (right?): neighborhood norms and sexual activity in adolescence. Social. Sci. Res. 40, 1676–1690.
Warner, T.D., Settersten JR., R.A., 2017. Why neighborhoods (and how we study them) matter for adolescent development. Adv. Child Dev. Behav. 52, 105–152.
Way, S., Finch, B.K., Cohen, D., 2006. Hispanic concentration and the conditional influence of collective efficacy on adolescent childbearing. Arch. Pediatr. Adolesc. Med. 160, 925–930.
Wei, E., Hipwell, A., Pardini, D., Beyers, J.M., Loeber, R., 2005. Block observations of neighbourhood physical disorder are associated with neighbourhood crime, firearm injuries and deaths, and teen births. J. Epidemiol. Community Health 59, 904–908.
Wickrama, T., Merten, M.J., Wickrama, K.A.S., 2012. Early socioeconomic disadvantage and young adult sexual Health. Am. J. Health Behav. 36, 834–848.
Wodtke, G.T., 2013. Duration and timing of exposure to neighborhood poverty and the risk of adolescent parenthood. Demography 50, 1765–1788.