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Adolescent food insecurity: A review of contextual and behavioral factors

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Abstract

Objective: The purpose of this review is to examine recent research on contextual and behavioral factors that will lead to better understanding of adolescent food insecurity and health outcomes.

Design: A literature search for peer-reviewed, English language, research articles published between 2009 and 2019, using CINAHL, Embase®, Pubmed, and the Cochrane Library.

Sample: The final sample represents thirty studies on food insecurity that have a study sample including adolescents and which employ a measure of food insecurity.

Results: Variables of interest and results on topics such as weight-related factors, maternal parenting and behaviors, mental health, and adolescent-level behavioral factors are summarized.

Conclusion: Food insecurity is associated with poor adolescent health and mental health. All adolescents should be screened for food insecurity, involving pediatric and mental health care settings. Future research on adolescent food insecurity should explore parent and parenting factors, household composition and family dynamics, psychological factors, health behaviors, and stress; peer influences might also be an important area of research with adolescents. While previous research has relied on parents' reports, adolescents'experiences are unique, and they are willing and reliable research participants; they should be included in future food insecurity research.

KEYWORDS
adolescent, food insecurity, household, maternal, mental health

1 | INTRODUCTION

Food insecurity is a household-level social and economic condition of limited or uncertain access to adequate food (United States Department of Agriculture Economic Research Service [USDA], 2018). In food insecure households with children, adults and children often rely on low-cost and unhealthy food or adjust their intake by reducing portions, skipping meals, or by going hungry. The USDA classifies households along a continuum of food security, from *high* or *marginal* to *low* or *very low* levels of food security and provides data on households with and without children, based on responses to a 10-18 item Food Security Supplement in the Current Population Survey (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2019). Households with *high* and *marginal* food security are

typically considered "food secure" and experience minimal worry about food or alterations to their diet due to limited resources. "Food insecure" (FI) households with *low* and *very low* food security have resource limitations leading to significant dietary changes that can include reduced intake and hunger. In 2018, in 2.7 million or 7.1% of all U.S. households with children, both adults and children were food insecure (Coleman-Jensen et al., 2019). Whereas almost 14% of all households with children are affected by food insecurity, about half the time only the adults are food insecure, often because parents protect children from the effects of FI (Coleman-Jensen et al., 2019). Evidence suggests that younger children are more often protected by adults from the effects of food insecurity than older children or adolescents (Coleman-Jensen, McFall, & Nord, 2013). Furthermore, an analysis of child-level food insecurity data from 2010-2011 showed that households with adolescents were twice as likely to report some level of food insecurity and three times as likely to report very low child food security as households with only younger children under 5 years of age (Coleman-Jensen et al., 2013). As of 2018 households with older children under age 18 years continued to have rates of very low food security that are slightly higher than households with only younger children (Coleman-Jensen et al., 2019). Compared to younger children and adults, adolescents are understudied in food security research despite their apparent vulnerability to food insecurity.

The findings from research on adolescent-specific health outcomes provide a strong rationale for further research on food insecurity among adolescents. Evidence shows that adolescents with food insecurity or in households with food insecurity have higher rates of overall poorer general health and asthma (Coleman-Jensen et al., 2013; Kirkpatrick, McIntyre, & Potestio, 2010), a lack of preventive health and dental care (Duke & Borowsky, 2018), hospitalization (Banach, 2016), untreated dental caries (Chi, Masterson, Carle, Mancl, & Coldwell, 2014), iron deficiency anemia (Eicher-Miller, Mason, Weaver, McCabe, & Boushey, 2009), depression and suicidal ideation (McIntyre, Williams, Lavorato, & Patten, 2013), mental disorders (Burke, Martini, Çayır, Hartline-Grafton, & Meade, 2016), dyslipidemia (Tester, Laraia, Leung, & Mietus-Snyder, 2016), and lower bone mass among early adolescent males (Eicher-Miller, Mason, Weaver, McCabe, & Boushey, 2011). Food security also affects glycemic control among adolescents and young adults with type 1 diabetes (Mendoza et al., 2018). Children and adolescents in food insecure households may be more likely to drop out of school and have poor academic performance, contributing to social disadvantage when they transition to adulthood (Narula, Simon, Scholes, & Zureick, 2013).

As a health determinant associated with economic, geographic, social and biological components, the effects of food insecurity on health are complicated and can be direct and indirect. Many studies on health outcomes do not discuss or delineate causal pathways (Gundersen & Ziliak, 2015). While altered nutrition may explain some health outcomes among adolescents, evidence suggests that pathways outside the availability of adequate food such as contextual and behavioral factors may be more potent and should be understood by involving adolescents in research (Fram, Frongillo, Draper, & Fishbein, 2013; Frongillo as cited in National Research Council & Institute of Medicine, 2013; Willis & Fitzpatrick, 2016). The purpose of this literature review is to explore recent research to identify contextual and behavioral factors associated with food insecurity among adolescents to understand the factors outside direct dietary influences that are relevant to adolescents' experiences and which might help explain negative health outcomes.

2 | MATERIALS AND METHODS

The integrative review strategy outlined by Whittemore and Knafl (2005) guided this review because it provides a systematic approach to assessing nonexperimental data and diverse perspectives on a given topic. This framework aligns with the purpose of this review which is to both assess evidence and consider methodological questions.

An initial search of CINAHL, Embase®, PubMed, and Cochrane Library using combinations of the terms "food insecurity," "food security," "household," "child," "health," and "adolescent" yielded a combined sample of 1,558 manuscript titles. The initial search was limited to works published between 2009 and February 2019 and studies with a focus on food insecurity in the United States. After eliminating duplicates and reviewing article titles, a total of 151 remaining articles were chosen for further review. Inclusion criteria included having a measure of food security and a sample of youth 12–17 years of age, or in middle or high school. Based on these criteria, the list was reduced further to 45 articles; these abstracts and manuscripts were closely reviewed. Studies were included if they were in peer-reviewed journals, written in English, and were not abstracts or research briefs. Studies on health outcomes were not included in the larger review. Certain topics were excluded such as studies of food environments, interventions, parenting/pregnancy, and scale/measurement development. Twenty-three articles were chosen for the literature review. Reference lists were handsearched which led to the addition of seven more articles and one major nonpeer-reviewed research report. Ultimately, a sample of 30 articles was included in this review. Abstracts and citations for each study were entered in MAXQDA Analytics Pro (version 2018.2), where they were annotated and coded to facilitate extraction of information.

3 | RESULTS

3.1 | Evidence on Contextual and Behavioral Factors

Tables 1 and 2 provide a summary of articles in this review of literature. The results show that a wide variety of approaches are used to measure food security, which poses a challenge when comparing results over multiple studies. Though cross-sectional studies cannot determine causality, they suggest potential linear relationships

TABLE 1 Cross-sectional research

Authors (Year)	Sample size/age, source study, (data years)	Food security[a] measure and source person	Key variables[b,c]	Key results, strengths/limitations
Baer and Scherer (2018)	N = 376 Ages 15–25 Boston, urban primary care clinic population (2008–2010)	Ten-item USDA FSSM (if parents, 18-item); under 18, self-report on 9-item child-level FS module (computer-assisted)	Food security: FS, marginal FS, LFS, VLFS Weight status, exercise/nutrition barriers	Weight, FS not associated. FI youth less satisfied and had more barriers to healthy foods and exercise; FI/FS showed no difference in frequency of exercise; lack of access, not knowledge, implicated. Large minority sample (55% Black)
Baer et al. (2015)	N = 400 Ages 15–25 Boston, urban primary care clinic population (2008–2010)	Ten-item USDA Household FSSM (if parents, 18-item); under 18, self-report on 9-item child-level FS survey (computer-assisted). (2 items extracted to test validity)	Food security: FS, LFS, VLFS Health-related social problems: substance use, health care access, education, housing and income security	Prevalence of LFS higher among 15–17 year olds; VLFS higher among 18–25 year olds. Overall, FI associated with more health-related social problems. Relatively low sensitivity of 2-item screener (88.5%) could be result of lack of awareness of HH resources among youth. Large minority sample
Bauer et al. (2015)	N = 2087 Ages 11–18 Mother/child dyad, Minn./ St. Paul, MN (EAT/Project F-EAT study). Mail/phone survey, multiple languages. (2009–2010)	Six-item USDA FSSM on household FS (parent report only)	Food security: FS, LFS, VLFS Parenting and feeding practices. Maternal and adolescent BMI. Gender	High rates of reported HFI (40% in the past year). In general, FI mothers more likely to exhibit behaviors associated with disordered eating and higher BMI in youth. Some FI mothers more likely to have concern about and comment on their sons' weight and use restrictive feeding with girls. FS status did not alter likelihood of mother encouraging healthful eating
Bruening et al. (2012)	N = 2095 Ages 11–18 Surveyed parents, Minn./ St. Paul, MN (Project F-EAT) Mail/phone survey, multiple languages. (2009–2010)	Six-item USDA self-administered FSSM on household FS (parent report only)	Food security: FS, FI, VLFS Parental weight HH food environment, eating patterns	FI associated with single mothers, minority status, excess weight, and low education in mother. HFI associated with more unhealthy parental eating behaviors such as no breakfast, binging, more sugary beverages and fast food, and fewer fruits/vegetables Does not connect parental to adolescent behaviors/outcomes
Bruening et al. (2017)	N = 55 Approximate ages 12–16 Parent/child dyads, Spanish and English speaking, Arizona public housing. (2014)	sIX-item USDA self-administered FSSM on household FS (parent and youth reports)	Food security: FS, FI, VLFS Eating behaviors: 1-week recall of intake and meal patterns, and binge eating Mindful Eating Questionnaire	Adolescents in HH with FI differed in eating practices: less likely to eat breakfast, more likely to eat fast food and not have family meals; youth in FI HH more likely to binge than their mothers. FI adolescent and mothers had some similar eating patterns, such as binging. FI may mediate relationship of maternal and adolescent eating patterns. Small sample
Burke et al. (2017)	N = 746 Families w/ children < 18 Up to 3 x Fed. Poverty level. Urban/nonurban S. Carolina (2012–2013)	18-item HFSSM (parent report only). Follow-up questions on child-level FS, depending on responses	Food security, dichotomous: FS, FI. Open-ended survey on household food management practices and behaviors	High minority, urban sample with high rate of VLFS among children (35%); 80% African-American. Frequent responses to HFI[d] included changes in food choices, shopping practices, and reducing meals/portions (mainly for adults). Creative practices by mothers (leftovers, freezing, stretching stews, casseroles, etc.). Dietary intake for children & adolescents modified (less meat, vegetables, and fruits; more grains/carbs, beans, hot dogs, etc.)

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TABLE 1 (Continued)

Authors (Year)	Sample size/age, source study, (data years)	Food security[a] measure and source person	Key variables[b,c]	Key results, strengths/limitations
Buscemi et al. (2011)	N = 63 Ages 2–17 Parent/Latino child dyads Immigrant/nonimmigrant children in low-income primary care setting. (Data years N/A)	15-item household Core Food Security Measure (CFSM) (parent report only) (English/Spanish)	Food security: FS, FI with and without hunger Child BMI calculated Immigrant group: Marin's Short Acculturation Scale for Hispanics	Lower mean BMI percentiles among FI youth. Positive relationship between FS and acculturation among immigrants. Acculturation may moderate relationship between FI and BMI; low acculturation in FI households contributed to lower BMI. Small sample of adolescents, missing data, and lack of socioeconomic variables
Chavez et al. (2017)	N = 70 Latino dyads Middle or high school students (Tulsa 100 Family Study)	18-item HFSSM, Spanish version for adults; if under 18, self-report on 9-item child-level FS survey (computer-assisted) (parent and youth reports)	Food security: high FS, marginal FS, low FS and VLFS Parent-adolescent conflict, openness, involvement	High levels of discordance between adolescent and parent FS reports. Cultural factors, such as *familismo* and *respeto*, and unequal food distribution may explain the differences
Chi et al., 2015	N = 212 Adult caregiver/parent with children < 18 in pediatric dental clinic (Seattle) (2011–2012)	6-item USDA self-administered FSSM on household FS (parent report only).	Food security: FS, FI with or without hunger Medicaid receipt (proxy for SES). Frequency of fast food consumption (FFC) in past week	FI did not mediate FFC and SES as hypothesized. Some findings suggest increased FFC among FI children; though FI children with low SES had lowest FFC. Few covariates included
Khan et al. (2011)	N = 373 Ages 10–14 Vermont middle school sample (2005)	9-item child FS survey (Connell et al., 2004) (youth report only)	Food security: FS, FI, FI with hunger. Health behaviors (e.g., exercise, screen time) Perception of school meals, weight. BMI (self-report ht./wt.)	No association between FI and weight. FI adolescents less likely to participate in physical activity and eat breakfast at home. No difference between FI and FS adolescents in school meal participation
Lohman et al. (2009)	N = 1,011 Ages 10–15 Welfare, Children, and Families: A Three City Study (1999)	3-items from the Core Food Security Module (parent report only).	Food security: dichotomous, FI/FS Items for child, maternal, and family level cumulative stress	No association between FI and adolescent weight status. However, higher individual stressors associated with increased probability of adolescent overweight/obesity; no association with food security status. No main effect, but significant interaction of maternal stressors and FI and increased adolescent overweight/obesity
McLaughlin et al. (2012)	N = 6,483 Ages 13–17 Parent/child dyads National Comorbidity Survey Replication-Adolescent Supplement (2001–2004)	2-item CSFM, with follow-up questions depending on responses (youth report only)	Food security, dichotomous: FS, FI SES. Past year DSM-IV mental disorders (CIDI). SES indicators, including reported social status	FI associated with higher odds of probable adolescent mood, anxiety, behavior, and substance use disorder, and any past year mental disorder. FI associated with lower parental income, education, community equality, and lower perceived social status. Stronger association between FI and mental disorders than HH income and education level
Miller et al. (2014)	Analyzes 4 data sets on families Ages 3–17	8-item child referenced questions of HFSSM (parent report only)	Food security, dichotomous: FS, FI Family/parenting structure	Unadjusted lower probability of child FI in households with married, biological parents, similar to other studies. In models that held covariates at their means, FI was about the same for all family structures being examined. No significant difference in probability of child FI among in households with single mothers, and those where mothers were co-habiting or re-partnered

(Continues)

TABLE 1 (Continued)

Authors (Year)	Sample size/age, source study, (data years)	Food security[a] measure and source person	Key variables[b,c]	Key results, strengths/limitations
Nikolaus et al. (2019)	N = 252 Ages 13–17 Parent-child dyads (2016)	18-item HFSSM (last 30 days) 9-item child-level FS survey (parent and youth report; online survey)	Food security (dependent variable), dichotomous: FS, FI (for both measures) Grit-S Scale (perseverance and determination)	Adolescents reported more FI than adults, but there was a strong correlation between parent and child reports on FI categories. Grit-S score predicted FI among adolescents and adults
Poole-Di Salvo et al. (2016)	N ~ 8,600 Ages 12–16 ECLS-K Study data (2007)	18-item HFSSM (parent report only)	Food security, dichotomous: FS, FI Strengths and Difficulties Questionnaire (SDQ) for likelihood of mental disorders	Adjusted models showed 2-fold increase in rates of MH problems among adolescents in HH with FI. Analyses showed HFI associated with more adolescent conduct, emotional, peer and social problems
Robson et al. (2017)	N = 4,994 (un-weighted) 9–12th Graders Youth Risk Behavior Survey (CDC survey data from Penna.) (2014–2015)	Single item with 30-day reference, inquiry about frequency of hunger (youth report only)	Food security dichotomous: FS (rarely/never), FI (always/most of the time)	FI youth had increased odds of not eating breakfast daily, drinking alcohol, smoking, and getting less than 8 hr of sleep. No association of FI and weight
Rossen and Kobernik (2016)	N = 5,136 Ages 2–15 NHANES (2007–2010)	18-item HFSSM (parent report only)	Food security dichotomous: FS, FI (includes marginal FS) 24-hr diet recall (age 12+ based on self-report; younger with adult proxy)	Overall, no major differences in dietary intake based on FS status among adolescents and children. Used census tract/county data for community-level covariates (neighborhood context variables)
Shanafelt et al. (2016)	N = 791 Age: 9–10th graders, rural MN (2013–2014)	9-item child-level FS survey (youth report only)	Food security dichotomous: FS, FI 24-hr diet recall BMI, personal health, home, and school variables	No association of adolescent FI and weight, sleep, and overall diet. FI associated with being female, minority, and use of food assistance programs. Adjusted models showed FI associated with lower health status and grade point average; less likely to engage in strenuous physical activity & sports participation. Gender differences: more hunger and lower grade point average among FI girls; lower caloric intake and less added sugar in FI boys. Rural sample
Widome et al. (2009)	N = 4,746 Age: Middle/high school students Project EAT (1998–1999)	2-items adapted from the USDA Food Security/Hunger Core Module: Three-State Design with Screeners (1999) (youth report only)	Analysis by frequency categories for each of the 2 items Adapted Youth and Adolescent Food-Frequency Questionnaire (YAQ) Food availability, fast food, and barriers/benefits to healthy eating scales	FI and FS adolescents perceive difference in barriers to healthy eating; no difference in perceived benefits of healthy eating. No youth met HP2010 goals, but FI youth less likely to meet these goals, such as <30% calories from fat, fruit, calcium intake; but FI adolescents more likely to meet goals for intake of vegetables FS associated with family meals and eating breakfast Validity of adapted FS measure unknown

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TABLE 1 (Continued)

Authors (Year)	Sample size/age, source study, (data years)	Food security[a] measure and source person	Key variables[b,c]	Key results, strengths/limitations
Willis and Fitzpatrick (2016)	N = 324 Ages: 9–14 NW Arkansas middle school sample (2012)	5-items adapted from the 9-item child-level FS survey (Connell et al., 2004) (youth report only)	Food security: composite frequency scale of 0–10 for the 5 items; CES-D; Social capital; Rosenberg's self-esteem index; Perceived social class; BMI (self-reported ht./wt.)	FI is associated with weight and possibly mediated by factors such as perceived social status (significant association) and depression (nonsignificant). Validity of adapted FS measure unknown

[a]USDA FSSM = United States Department of Agriculture Food Security Survey Module.

[b]FS = food secure/security, FI = food insecure/insecurity, LFS = low food security, VLFS = very low food security.

[c]HH = household.

[d]HFI = household food insecurity.

among variables. Some studies examine associations in which FI is conceived of as the dependent variable, while others explore factors that may mediate the relationship between food insecurity and various outcomes. In the case of studies on weight status, food insecurity is positioned as an independent variable.

Most of the studies assessed food security at the household level based on parents' responses. Eleven studies incorporated youth reporting on food security, mostly using a 9-item self-administered survey validated for youth (see Connell, Nord, Lofton, & Yadrick, 2004). Evidence from this review center around five main topics: weight status, parenting and maternal influences, mental health, adolescent behavior, and methodological considerations.

Consistent with USDA data, studies in this review show significant disparities among FI households in the U.S. Adolescents in rural and urban households with persistent poverty, single parents, low parental education, and racial and ethnic minorities, experience more food insecurity that tends to persist over time (Burke, Jones, Fram, & Frongillo, 2012). For example, a longitudinal study using nationally representative ECLS-K study data from 1999 to 2007 showed that African American households with children had the highest rates of FI with 57.7% reporting FI at one or more timepoints compared with a rate of 23.9% among White households, and a rate of persistent FI over time at 23.2% compared to 13.1% among all racial/ethnic groups (Burke et al., 2012). Single mothers have among the highest rates of FI, yet they may not carry this burden alone. A study of households with children and adolescents found that the probability of child-level FI among households with co-habiting and re-partnered unmarried parents was about the same as that of single parent-headed households (Miller, Nepomnyaschy, Ibarra, & Garasky, 2014). A recent study examined the role of fathers in FI households with young children (Nepomnyaschy, Miller, Garasky, & Nanda, 2014), but fathers are rarely mentioned in the studies on adolescents in this review.

The role of weight status in predicting health outcomes is a subject of debate in food insecurity research. The studies in this review provide evidence in support of previous findings by Gundersen and colleagues that there is no direct association between food insecurity and overweight and obesity in youth; one study reported lower BMI among food insecure Latino immigrants (Baer, Scherer, Richmond, Fleegler, & Hassan, 2018; Buscemi, Beech, & Relyea, 2011; Franklin et al., 2012; Gundersen, Lohman, Eisenmann, Garasky, & Stewart, 2008; Gundersen, Lohman, & Garasky, 2009; Lohman, Gillette, & Neppl, 2016; Shanafelt, Hearst, Wang, & Nanney, 2016). Evidence suggests that the interaction of FI with other contextual factors may increase the risk for excess weight among adolescents, and it affects males and females differently. Significant relationships exist for factors such as harsh and hostile parenting practices, maternal stressors, and disordered eating practice, and increased weight in youth (Bauer et al., 2015; Lohman et al., 2016; Lohman, Stewart, Gundersen, Garasky, & Eisenmann, 2009). Furthermore, parent feeding practices are age-specific, reflecting parent concern about underweight in younger children and overweight among older children (Bauer et al., 2015). Finally, Willis and Fitzpatrick (2016) evaluated potential

TABLE 2 Longitudinal and Qualitative Studies and Research Reviews

Author (Year)	Source/data years	Measures/variables of interests	Results
Longitudinal			
Burke et al. (2012)	Early Childhood Longitudinal Study-Kindergarten (ECLS-K), 1998–2007 (K, 3rd, 5th, and 8th grades; to 13–14 year. old)	18-item USDA HFSSM using adult reporting; marginal FS is categorized in FI. (Aim is to assess persistence of FI over time and associated disparities.)	Prevalence of FI higher in HH with poverty, lower parent education, minorities (especially Blacks, with highest rates of FI), single parents; disparity persisted over time. Highest prevalence of persistent FI in rural areas; urban centers had high rates of FI and poverty. Persistent poverty HH 8 times more likely to report any FI over time
Jackson and Vaughn (2016)	ECLS-K, 1998–2007 (K, 3rd, 5th, and 8th grades; to 13–14 year old)	18-item USDA HFSSM using adult reporting; dichotomous: FI/FS, marginal FS = FS. Parent reporting on misconduct behaviors. Covariates: parenting factors, SES, neighborhood disadvantage, demographics	HH FI and persistent FI over time predicts multiple misconduct behaviors among males, but not females; based on single timepoint for measure of misconduct
Lohman et al. (2016)	N = 362 Iowa Youth and Families Study, 1989–1999 Parent/child dyads Age 13, then 23	2-item from Current Population Survey (report by parent only). Harsh parenting ("HP"; hostile physical contact, punishment, hostility). BMI parent/child. Gender	FI not associated with overweight/obesity in adolescence. Interaction of FI and HP in adolescence dramatically increased overweight/obesity (OW/OB) in adulthood in females but not males (though HP alone independently increased OW/OB in males and not females)
Slopen et al. (2010) (Prospective study)	N = 2,810 Chicago Study 1995–2002; 1997–2001 Age 4–14, then after 2 years Caregiver/child dyads	Single item for food security in past 6 months (parent report only) Poverty/income. Adolescent internalizing (anxiety, depression, withdrawn) and externalizing (aggression, hyperactivity, noncompliance) behaviors	Regardless of poverty status, children in FI HH more likely to exhibit in externalizing/internalizing behaviors, especially with persistent FI over two years
Whitsett et al. (2018)	N = 1,049 Welfare, Children, and Families: A Three City Study 1999, 2001, 2005 Age 10–14 Mother/adolescent dyads	8-item from the 18-item HFSSM; used as continuous HH variable (parent reporting only) Adolescent internalizing and externalizing behaviors Maternal depression	Adjusted models showed significant association between HH FI in adolescence and total behavioral problems and internalizing (externalizing for unadjusted models only) behaviors over six-year period. Income to needs ratio may moderate interaction of HFI and total behavioral problems
Qualitative and mixed methods			
Fram et al. (2011)	N = 26 Families: mothers and children 9–16. South Carolina rural/nonrural	6-item HFSSM completed by mother. Semi-structured interviews about food insecurity experiences among at-risk families. A priori and inductive coding and analysis	Contrasting reports of FI by parents and children. Children experience FI differently and report more on their experiences rather than about a lack of resources. Children expressed awareness of food insecurity in multiple domains; examples include being aware of lower quality food, food running out, etc.; worry/lack of worry, sadness, anger; sensations related to hunger. Child active agent in responding to food insufficiency through diet behaviors, interactions with household members, and contributing
Popkin et al. (2016)	N = 193 Ages: 13–18 year-olds receiving a form of food assistance in 10 U.S. cities	20 focus groups across the U.S. with male or female adolescents, designed to elicit observations on FI, barriers to food access, responses/coping, food sources, and neighborhood context. 6-item USDA self-administered FSSM on household FS. (youth report only)	Adolescents are aware of and describe their own and others' responses and strategies in response to FI and hunger. Other major themes in the data are the ways in which FI adolescents prematurely assume adult roles and responsibilities; engage in and justify misconduct; and are more susceptible to sexual exploitation in response to FI

TABLE 2 (Continued)

Author (Year)	Source/data years	Measures/variables of interests	Results
Shtasel-Gottlieb et al. (2015)	N = 2,350 Ages: 6–12th grades Urban, minority area outside major NE city Focus groups, N = 32 (Key informant interviews w/ adults, N = 20) (2012)	9-item USDA CFSM – total score given from 0–9, then dichotomous: FS, FI. (youth report only) Developmental Assets Profile (DAP) (with family, community, social, school, and personal domains)	Lower family assets (parent communication, spending time with parents, safe/loving/supportive home) largely responsible for correlation of lower DAP and higher levels of food insecurity. Slightly higher odds of VLFS with higher community DAP (involved in community/activities, caring/supportive neighbors, accepts diversity). School meals had protective effect
Literature reviews			
Franklin et al. (2012)	19 Studies (3 on adolescents; 1 included in this review)	Mediators of food insecurity and obesity	Studies suggest no direct association between food insecurity and overweight/obesity in adolescents, but in Lohman et al. (in this review), maternal stressors may affect the relationship. Among homeless youth, some mixed results on weight overall
Shankar et al. (2017)	23 studies, systematic review (US, UK, Canada, Australia); 6 studies addressed adolescence (2 in this review)	Food security and developmental/behavioral child outcomes	Evaluated psychosocial outcomes for adolescents. At even marginal FS levels. FI and hunger associated with negative outcomes such as depression, suicidal ideation, dysthymia, anxiety, substance use disorder, social/peer problems, school suspension, unintentional weight gain/loss, and psychological care

FI, food insecure/insecurity; FS, food secure/security; HFI, household food insecurity; HH, household; VLFS, very low food security; USDA FSSM, United States Department of Agriculture Food Security Survey Module.

mediators of food insecurity and weight status among adolescents and found that perceived social status and possibly depression play a significant role in the relationship.

Mothers' food-related behaviors and parenting are also significant aspects of adolescent FI. While FI mothers are not less likely to encourage healthy eating (Bauer et al., 2015), they are more likely to engage in unhealthy practices, a few of which are shared by adolescents, such as binging (Bruening, Lucio, & Brennhofer, 2017; Bruening, MacLehose, Loth, Story, & Neumark-Sztainer, 2012). Another study showed that adolescents in food insecure households are less likely to experience "family assets" including positive parenting and parent interactions and a safe and supportive home (Shtasel-Gottlieb, Palakshappa, Yang, & Goodman, 2015).

Regarding the association of FI with dietary intake, adolescents are the least studied child group but may be the most vulnerable (Eicher-Miller & Zhao, 2018). Available evidence shows that adolescents who experience FI are more likely to skip breakfast at home, binge, consume fast food, eat fewer vegetables and fruits, drink high-sugar beverages, and less likely to participate in family meals (Bruening et al., 2017, 2012; Khan, Pinckney, Keeney, Frankowski, & Carney, 2011; Robson, Lozano, Papas, & Patterson, 2017; Shanafelt et al., 2016; Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009). Household FI may limit adolescents' access to healthier foods with replacement by cheaper, high-calorie alternatives such as carbohydrates, fast food, or foods that can be stretched (Bruening et al., 2012; Burke et al., 2017). However, Rossen and Kobernik (2016) found no significant differences in intake between food insecure and

food secure adolescents. Another study showed that fast food consumption is no different and may even be less frequent among certain adolescents with FI (Chi, Dinh, da Fonseca, Scott, & Carle, 2015).

A recent systematic review underscores the strong relationship between mental health and psychosocial factors among adolescents in households with FI (Shankar, Chung, & Frank, 2017). Additional evidence shows that mental health and behavior among adolescents are more strongly correlated with FI than demographic variables such as income and education (McLaughlin et al., 2012; Slopen, Fitzmaurice, Williams, & Gilman, 2010). Furthermore, the magnitude of the association between household FI and mental health is stronger for adolescents compared to younger children (Burke et al., 2016). Adolescents experiencing FI, especially males, are affected by a wide range of mental health, social and peer-related, substance use, conduct, and internalizing and externalizing behavioral disorders (Jackson & Vaughn, 2017; McLaughlin et al., 2012; Poole-Di Salvo, Silver, & Stein, 2016; Slopen et al., 2010; Whitsett, Sherman, & Kotchick, 2018). FI adolescents (and their parents) may have poor self-efficacy as demonstrated by lower levels of determination and perseverance (known as "grit") (Nikolaus et al., 2019). One recent study shows that the interaction of maternal depression and household food insecurity contributed to increased behavioral problems and externalizing/internalizing behaviors among adolescents (Whitsett et al., 2018).

The behaviors of adolescents affected by food insecurity are often detrimental to health and well-being (Shankar et al., 2017). FI adolescents are more likely to smoke, drink alcohol, get less than

8 hr of sleep, exercise less, and experience other health-related social problems such as poorer access to health care (Baer, Scherer, Fleegler, & Hassan, 2015; McLaughlin et al., 2012; Robson et al., 2017; Rossen & Kobernik, 2016). Food insecurity limits their ability to engage in healthy behaviors and can even promote misconduct and unhealthy choices. Adolescents with FI report facing more barriers to exercise and healthy eating, such as problems with no one making or low availability of healthy food and issues related to a lack of time (Baer et al., 2015). FI adolescents are not less likely to see the benefits of healthy eating and are more likely to be dissatisfied with their diet and exercise habits (Baer et al., 2018; Widome et al., 2009). The findings demonstrate that adolescents with food insecurity have knowledge of and motivation to engage in healthy behaviors. The discrepancy between adolescents' desires and their resources might be a significant source of stress. The interplay of the factors discussed in this review highlight the high risk for cumulative stress among adolescents with food insecurity. FI is a major stressor that requires a behavioral response by adolescents to ensure that they have adequate food and resources, including saving and stretching foods, seeking informal help from others, and prematurely assuming responsible adult roles through employment and other self-supporting activities (Popkin, Scott, & Galvez, 2016). Food insecurity can contribute to misconduct and influence the perception of acceptable behavior in the face of hardship. For example, food insecurity contributes to illicit behavior in response to deprivation such as selling drugs, stealing/shoplifting, and gambling, and other high-risk behavior, and can predispose them to sexual exploitation (Popkin et al., 2016).

3.2 | Methodological considerations

Studies in this review lend support for the inclusion of adolescent perspectives in food security research. Previous research on adolescent food insecurity is burdened by methodological challenges associated with the reliance on adult reporting and household-level measures that fail to capture the experiences of specific children. Adolescent reporting has been shown to be accurate, and parent reports may misjudge adolescent FI and its severity (Hadley, Lindstrom, Tessema, & Belachew, 2008; Nord & Hanson, 2012). Parents often seek to protect their children from the effects of FI, which could cause them to underestimate its effects. However, researchers have pointed out a disconnect between the expectation that parents can protect their children and the vast number of negative health outcomes associated with FI (Fram et al., 2013). Evidence in this review demonstrates that food insecure youth can speak for themselves and they speak directly about what they experience in terms of food availability (Fram et al., 2011). Adolescents also demonstrate awareness of and responsibility in response to FI and act on their own to initiate practices to help with household food and resources (Fram et al., 2011; Popkin et al., 2016). Finally, research by Chavez et al. adds the elements of culture and gender to prior knowledge about what factors explain the discrepancies between adolescents' and adults'

reports of adolescent FI (Chavez, Hernandez, Harris, & Grzywacz, 2017). Researchers found significant discordance between Latino adolescent, especially males', and parents' reports of food insecurity. In general, they argue that differences in reporting reflect the level of conflict and communication between parents and children and cultural values such as *familismo* and *respeto* (Chavez et al., 2017).

4 | DISCUSSION

This review consolidates recent evidence on contextual and behavioral factors associated with adolescent food insecurity as a step toward understanding the pathways through which food insecurity might negatively affect adolescent health. Evidence reviewed here provides many possible directions for future research on parent and parenting factors, household composition and family dynamics, psychological factors, health behaviors, and stress. This review shows that the association between food insecurity and adolescent mental health is particularly strong; the relationship could be influenced by chronic stress. High cortisol levels and maladaptive neurobiological responses in adolescence in response to stressors like food insecurity may predispose adolescents to mental health problems (Lohman et al., 2009; McLaughlin et al., 2012; Whitsett et al., 2018). Peer influences are missing from the research included in this review and might be an important area for future research since adolescents may be more independent and peer-oriented in their food choices and increasingly seeking food outside their households. Two recent reviews found that peers can have a significant influence on adolescent diet and exercise behaviors (Chung, Ersig, & McCarthy, 2017; Salvy, de la Haye, Bowker, & Hermans, 2012). Findings included in this review demonstrate that adolescents should be directly involved in food security research. They are willing and reliable participants who can speak accurately about their own experiences.

Public health nurses should promote screening programs to identify food insecure adolescents and provide appropriate referrals informed by knowledge of local food resources, food assistance programs, and eligibility requirements (Flores & Amiri, 2019). In 2015, the American Academy of Pediatrics recommended screening of all children for food insecurity (American Academy of Pediatrics [AAP], 2015). Screening in primary care settings is important but insufficient since many adolescents do not get regular preventive care (Duke & Borowsky, 2018). Public health nurses can partner with communities and schools to develop strategies to reach adolescents in multiple settings. Given the strength of evidence on adverse mental health outcomes associated with food insecurity, screening for food insecurity should be considered in mental health care settings and among adolescents with mental illness. Interventions to address adolescent food insecurity should incorporate knowledge of assets that may reduce the effects of and risk for food insecurity at the household level and in the adolescents themselves, including interest in healthy eating and exercise. Nurses should also advocate for food policy and assistance programs that are responsive to adolescents' needs.

The findings of this review should draw the attention of public health nurses and other professionals to the topic of adolescent food insecurity as a high priority area in need of health research and interventions. Research across many disciplines is beginning to illustrate how social determinants like food insecurity affect health outcomes (Olshansky, 2017). With its holistic view of health and focus on population health, public health nursing is equipped to understand and address complex health-related problems associated with social and economic disadvantage.

There are several limitations in this review worth mentioning. The limitations of this review stem from the studies themselves, including variations in measures and other variables. The use of self-reports for multiple variables are subject to response bias and may affect reliability. Finally, most studies in this review used observational methods, and convenience or purposive sampling, limiting generalizability and the determination of causality.

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