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Cover Page Footnote

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Exploring the Association Between Nutrition and Mental Health in Adolescence: A Systematic Literature Review

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Abstract

Introduction: Throughout life, proper nutrition is important to the brain as it affects cognition and intellectual development. Studies have shown that a lack of certain nutrients can affect the body's ability to perform mentally and physically. Annually, 14% of children in the United States receive mental health illness diagnoses. However, the link between nutrition and mental health is not clear. The purpose of this systematic literature review on mental health and nutrition in adolescence is to identify any gaps that require future research efforts. **Methods:** The Elton Bryson Stephens Company (EBSCO), ProQuest, and Journal Storage (JSTOR) databases were used to search the following terms: nutrition, diet, and mental health. All search results that were published in English between 2014 -2019, conducted in the United States, peer-reviewed, and contained subjects 13 to 18-years old were included. **Results:** A total of 217 articles were identified. After the removal of duplicates and eligibility screening, only two satisfied the criteria. The reports were published in two separate journals during 2018 (n=1) and 2014 (n=1). These quantitative studies used a cross-sectional design with a survey. Common findings across the two studies are (1) nutrition knowledge and frequent family meals are positively associated with the individual social and emotional wellbeing; and (2) poor nutrition can lead to increased bullying among adolescents. **Conclusion:** The findings from this study suggest that nutrition and mental health in adolescents is not well research. Future research studies are needed to address mental health and nutrition among adolescents.

Keywords: Nutrition, Diet, Mental Health, Adolescence, Systematic Literature Review

Introduction

Mental health disorders are complex conditions that affect approximately 50 percent of American adolescents (National Association of Mental Illness, 2019). These disorders include depression, anxiety, stress, and emotional, psychological, and social impairment. According to the National Association of Mental Illness (NAMI), about 7.7 million children between 6 and 18-years old experience a form of mental illness throughout their lifetime, and 22 percent have severe impairments (2016). Several studies sought to understand possible causes of mental health disorders and identify interventions that may eliminate symptoms (Friis, Johnson, Cutfield, & Consedine, 2016; Maalouf & Brent, 2012; Moritz et al., 2016). For instance, investigators have examined how genes mechanisms shape the neuroendocrine response to stress (Ouellet-Morin et al., 2013). Other researchers have explored the possible effects of diabetes on mood change (Friis et al., 2016; Otto et al., 2018; Wherrett et al., 2018), and implications of socio-demographic characteristics on individual behavior (Gary, Stark, & LaVeist, 2007). Studies have shown that inadequate consumption of certain nutrients such as calcium, B-vitamins, minerals and protein can affect the body's ability to perform mentally and physically (Carroll, Samek, & Zepeda, 2018; Leech, Worsley, Timperio, & McNaughton, 2018). However, few researchers have studied the association between mental health and nutrition (Gary et al., 2007; Khosravi et al., 2015).

Adolescence is a period during the developmental stages when children experience drastic hormonal, behavioral, sexual, physiological, and neurological changes. Adolescents need adequate nutrition to achieve their full growth potential and decrease the odds of impaired organ development. For example, amino acids are essential for muscle growth, calcium and vitamin D accommodate bone growth, and some minerals are needed to facilitate nerve functioning (Kolb, Mychasiuk, & Gibb, 2014). One study has documented that childhood malnutrition and a deficiency in micro- and macronutrients can lead to chronic disease during adulthood (Sánchez-Villegas et al., 2015). Another clinical study has documented that supplementation with zinc and omega-3 fatty acid can reduce symptoms of depression and hyperactivity disorders (Gowda, Mutowo, Smith, Wluka, & Renzaho, 2015).

Research on mental health and its association with the environment, personal experiences, and genetic make-up (DNA) are well explored. However, there are not many conversations about how the type and quality of foods consumed may affect mental health. Therefore, the purpose of this systematic literature review is to identify

research gaps that exist that may shed light on the relationship between mental health and nutrition in adolescence.

Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009) and was conducted to summarize published empirical studies that focused on mental health and nutrition among adolescents. In September 2019, three databases Elton Bryson Stephens Company (EBSCO, ProQuest, and Journal Storage (JSTOR) were searched for articles relating to mental health and nutrition. Search terms include "nutrition," "diet," and "mental health." The search terms were chosen based on the researchers' expertise and a cursory review of the literature. Publication years were limited to 2014 through 2019 because new recommendations are published every ten years. Articles were included if they were published in English between 2014 - 2019, peer-reviewed, conducted in the United States, and studied adolescents 13 to 18-years old. All review articles and videos were excluded along with any article not published in the United States.

Data Extraction

Two investigators collected the following data from all studies: first author name, publication date, title, research aims or purpose, study design and setting, research methods, and classification of mental health and nutrition. Two screening procedures were conducted on all retrieved articles. The first screening procedure was done on abstracts to ensure the articles met the established criteria. Articles that did not meet the established criteria were excluded. For the second screening, the eligible articles were read in their entirety. At this phase, some articles were excluded because they mentioned mental health and nutrition in adolescence in the title, but the content was about the impact of maternal nutrition during pregnancy on adolescence.

Assessment of Mental Health and Nutrition Components

An open-ended questionnaire was developed to assess components of mental health and nutrition. This tool allows for a range of responses (Table 1).

Table 1: Criteria for Assessing the Studies on Mental Health and Nutrition

Components	Questions sample	Options
Mental Health	Which aspect of mental health included in this study?	Depression, anxiety, stress
Nutrition	Which aspect of nutrition is included in this study?	Food consumption, nutrients

Quality Appraisal and Methodological Quality Assessments

To ensure that coding and extraction were consistent across all articles, we first developed a coding instrument in excel. After a critical examination of abstracts, all non-relevant studies were eliminated, and the remaining full articles were reviewed. The quantitative methodological quality scale was adopted from a prior study (Lu et al., 2014), with minor changes (See Table 2).

Table 2: Critical Assessment of the Quantitative Studies n= (2)

Methodology	Description	Score	# of studies
Study design	Experimental study (e.g., randomized control trial)	4	0
	Case-control study	3	0
	Longitudinal study	2	1
	Cross-sectional study	1	1
	Did not indicate	0	0
Sample size	Large (>300)	3	1
	Medium (>100 and <300)	2	0
	Small (<100)	1	1
Data analysis	More advanced statistics (e.g., mixed models)	4	0
	Regression/analysis of covariance, Bivariate statistics (e.g., ANOVA, Pearson r, t-test)	3	1
	Descriptive only (e.g., frequency)	1	1
Control variable(s)	Included	1	1
	Not included	0	1
Data reliability testing	Reported results	1	0
	Not reported	0	2
Data validity testing	Reported results	1	0
	Not reported	0	2

Results

A total of 217 articles were identified during our first search (Figure 1). A significant portion (87, 40%) were duplications and 130 articles underwent abstract screening. After we assessed for our inclusion criteria, 116 were excluded because the articles provided nutrition information on assessment and intervention on children below our target population age. Only fourteen (n=14) articles met full criteria. Eight of these contain supplementary information about nutrition and mental health and four were review articles. For the two articles that met inclusion criteria, we extracted authors, settings, published years, study purpose, study settings, and design and selected findings, as shown in Table 3.

Table 3: Characteristics of Nutrition and Mental Health studies (n=2)

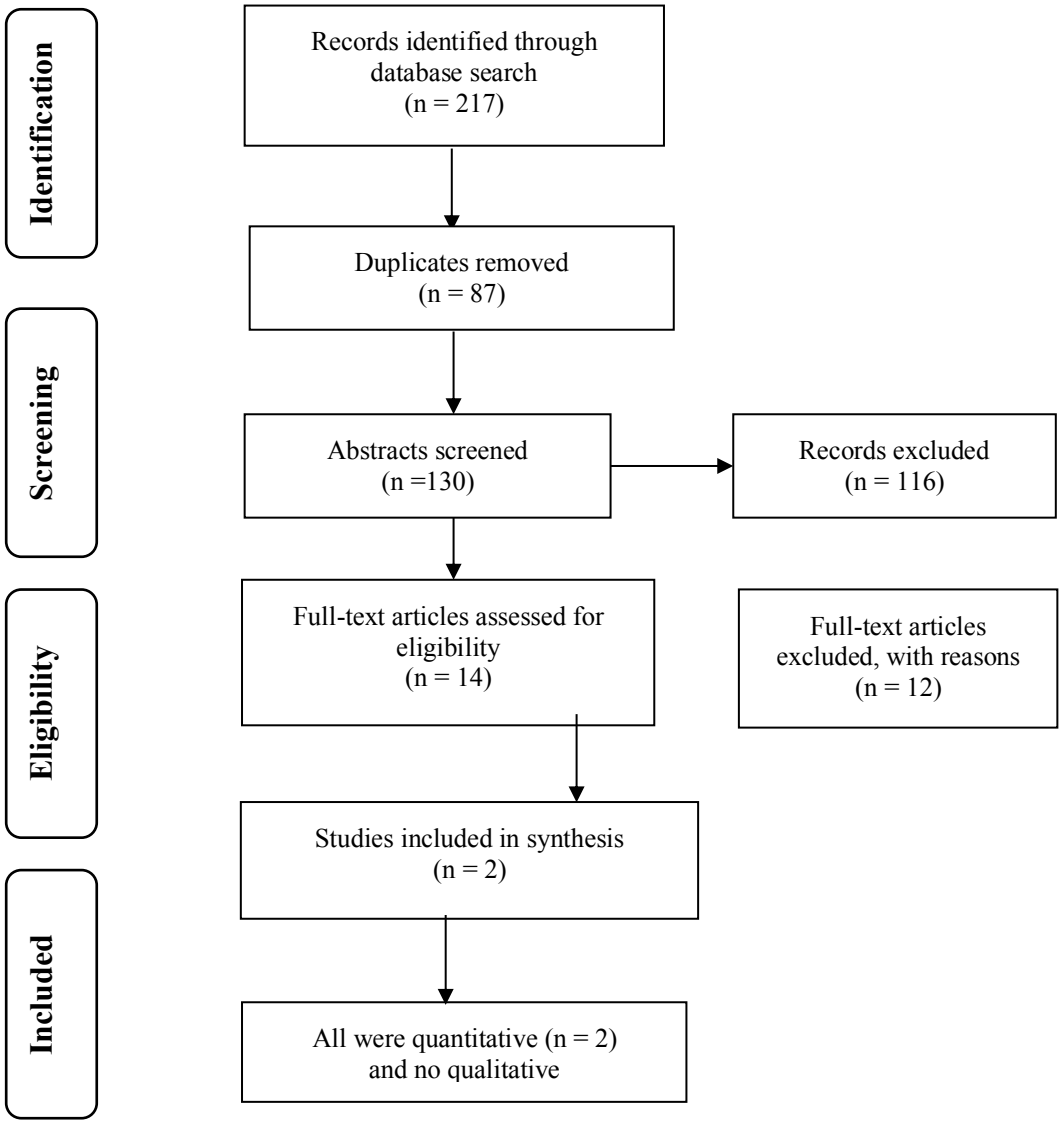
Lead Author/ Year/Journal Name	Study Purpose	Subjects/ Sample Size	Study Methods & Settings	Component of Mental Health	Components of Nutrition	Selected Findings
Judith O'Hare, (2014); *Journal of Pediatric Health Care*	To determine the relationships among body mass index, healthy lifestyle beliefs and behaviors, and mental health indicators for 5th and 6th-grade children in a Title I school	Male & Female N=45	Quantitative, School	Depression, Anxiety, and Self-concept	Whole Milk, Salty Foods	Knowledge about nutrition was not significantly correlated to any of the outcome measures in this population except activity knowledge (r= 0.459, p< .01). Higher activity knowledge was positively correlated to healthy behaviors (r= 0.375, p< .05) and significantly correlated to the child's belief that they could live a healthy lifestyle (r= 0.410, p< .01).
Rachele Pojednic (2016); *Contemporary Clinical Trials Review*	To compare behavioral health risk and protective factors (e.g. nutrition, emotional and relationship scales, vitality and energy, student engagement, stress, positive affect, self-efficacy, and life satisfaction) and academic performance between Build our Kids Success (BOKS) participants and control students.	Elementary and Middle School Students N=1490	Quantitative, School	Experienced emotions related to anger, anxiety, sadness, fatigue, and interactions with peers.	Fruits and vegetable consumption	Applying a within-school controlled study design allows for direct comparison within each individual school as well as control for between-school variation.

One article was published in the Pediatric Health Care Journal (O'Haver, Jacobson, Kelly, & Melnyk, 2014) and the other was published in Contemporary Clinical Review (Pojednic, 2016). Both peer-reviewed articles were quantitative studies and used a cross-sectional design with a survey. The longitudinal study design was used by Pojednic (2016) who evaluated a program for mental health and nutrition. None of the articles reported reliability.

Haver and colleagues studied eating behavior by analyzing frequency of fruit, vegetable, whole milk, and salty food consumption (2014). Pojednic and colleagues explored food consumption and associations with individual social and emotional wellbeing (2016). Both studies looked at anxiety and depression as it relates to food.

Pojednic (2016) examined anger, sadness, and fatigue with eating behavior, while Haver (2014) explored self-concept and junk foods.

Figure 1. Systematic Literature Search for Articles Published Between 2014 and 2019 Related to Mental Health and Nutrition in adolescents. Note. This flowchart is an adaption of Garrard, Judith (2013).



Discussion

This systematic literature review seeks to assess the current literature for research conducted on mental health and nutrition in adolescents between 2014 and 2019 and identify any gap that may influence future research. Our study retrieved articles from EBSCO, ProQuest, and Jstor. Oniel and colleagues published a systematic literature review (SLR) in 2014 that examined the relationship between diet and mental health

in children and adolescents (O'Neil et al., 2014). The researchers recommended using a longitudinal design to understand the specific biological mechanism of action as it relates to mental health (O'Neil et al., 2014).

The current study found that limited studies are being conducted on mental health and nutrition in the United States among adolescents. The most interesting finding was that no articles were published in 2015, 2017, 2018, and 2019. Since the National Association of Mental Illness (NAMI) reported almost fifty percent of adolescents experience mental illness, and food consumption has been shown to have some implication on health, there is a need to understand if there is any link between the two. A possible explanation for these results may be the lack of adequate information and research in this area. Future research must address food quality and possible outcomes as it relates to mental health.

Our methodological quality assessment revealed one study included longitudinal design. However, none of the studies reported the reliability and validity of the instruments used. Also, none of the studies used qualitative or mixed-method approach or randomization. While cross-sectional design and convenience sampling are widely used in the literature, randomized and experimental designs are the most rigorous processes in research. Therefore, future research may need to emphasize randomizing participants and validating the instrument for reliability and validity.

Although the study has successfully demonstrated needs for more research on mental and nutrition among adolescents, it has certain limitations in terms of literature search. The articles used in this study were retrieved through the Prairie View A&M library. Therefore, the search strategy may not capture all the relevant articles. Our review only employed three databases, so some relevant journals may not index such as PubMed. Also, the search terminology may not have been broad enough to capture all published research on mental and nutrition among adolescents.

Conclusion

The main goal of this study was to identify published empirical articles and determine the gaps in the current literature. The findings from this study suggest that nutrition and mental health in adolescents is not well research. Future research studies are needed in mental health and nutrition among adolescents.

Acknowledgments

We would like to thank the Prairie View A&M Library for allowing us to use their computers to retrieve these articles. Thanks to Miss Kimberly Gay and Dr. Lenna Dawkins-Moultin for their support.

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