Archives of Psychiatric Nursing xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Archives of Psychiatric Nursing

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

A Review: Associations Between Attention-deficit/hyperactivity Disorder, Physical Activity, Medication Use, Eating Behaviors and Obesity in Children and Adolescents☆

Danielle Quesada[a,*], Nasar U. Ahmed[a], Kristopher P. Fennie[b], Erica L. Gollub[c], Boubakari Ibrahimou[d]

[a] Department of Epidemiology, Robert Stempel College of Public Health & Social Work, Florida International University, 11200 SW 8th St, AHC5 (room 486), Miami, FL 33199, USA
[b] Department of Epidemiology, Robert Stempel College of Public Health & Social Work, Florida International University, 11200 SW 8th St, AHC5 (room 480), Miami, FL 33199, USA
[c] Department of Health Studies, College of Health Professions, Pace University, 861 Bedford Road, Pleasantville, NY 10570, USA
[d] Department of Biostatistics, Robert Stempel College of Public Health & Social Work, Florida International University, 11200 SW 8th St, AHC5 (room 465), Miami, FL 33199, USA

ARTICLE INFO

Keywords:
ADHD
Overweight
Impulsivity
Inattention
Exercise
Binge eating

ABSTRACT

In the past few years we have become increasingly aware of strong associations between obesity and ADHD. Both conditions are major public health issues, affecting children, adolescents and adults alike.

Objective: This review seeks to (1) examine prior research on the association between ADHD and obesity in children and adolescents; (2) discuss mechanisms and consequent behavioral attributes to gain understanding of the path association between ADHD and obesity, (3) review studies examining the role of physical activity, medication, eating behavior and gender on the relationship between ADHD and obesity in children and adolescents.

Method: PubMed, CINAHL and PsycINFO databases were used to search for studies whose subjects were children and adolescents, ages 0–17 years and whose publication years were from 2000 to 2016. After screening 31 studies were included in the review.

Results: The literature suggests that there is a significant association between ADHD and obesity. Further, the inattentive and impulsive behaviors that characterize ADHD could contribute to dis-regulated eating behaviors and a lack of motivation to engage in physical activity. In addition, it is proposed that medication, gender and physical activity play a role in mediating and moderating the relationship between ADHD and obesity.

Attention deficit/hyperactivity disorder (ADHD) and obesity are significant public health problems (Ogden, Carroll, & Kit, 2014; Cortese & Morcillo Peñalver, 2010; Faraone, Sergeant, Gillberg, & Biederman, 2003). ADHD is considered to be one of the most common neurodevelopmental disorders among children (Biederman, 2005; Visser et al., 2014). The condition is characterized as having impairing and developmentally excessive levels of hyperactivity, impulsivity, and inattention (American Psychiatric Association, 2013). Consequently, affecting an individual's behavior and making it challenging to focus on daily tasks, plans, routines and organization (Lara et al., 2009; Schei, Jozefiak, Novik, Lydersen, & Indredavik, 2016; Thomas, Sanders, Doust, Beller, & Glasziou, 2015). ADHD can be a significant detriment to the quality of life of those afflicted (Agranat-Meged et al., 2005; Birnbaum et al., 2005; Klassen, Miller, & Fine, 2004). ADHD affects an estimated 7%–11% of children worldwide and an estimated 6.4 million children 4–17 years of age in the United States; (Faraone et al., 2003; Visser et al., 2014).

Similarly, obesity affects a significant portion of the population and presents a growing threat to the health and development of children. Obesity is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex (Barlow, 2007). Obesity is present in about 17% of children and 35% of adults in the United States (Ogden et al., 2014). Preventing this condition is paramount because it is associated with the development of chronic diseases, such as heart

☆ This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
* Corresponding author.
E-mail addresses: dques001@fiu.edu (D. Quesada), ahmedn@fiu.edu (N.U. Ahmed), kfennie@fiu.edu (K.P. Fennie), egollub@pace.edu (E.L. Gollub), bibrahim@fiu.edu (B. Ibrahimou).

https://doi.org/10.1016/j.apnu.2018.01.006
Received 8 February 2017; Received in revised form 17 January 2018; Accepted 19 January 2018

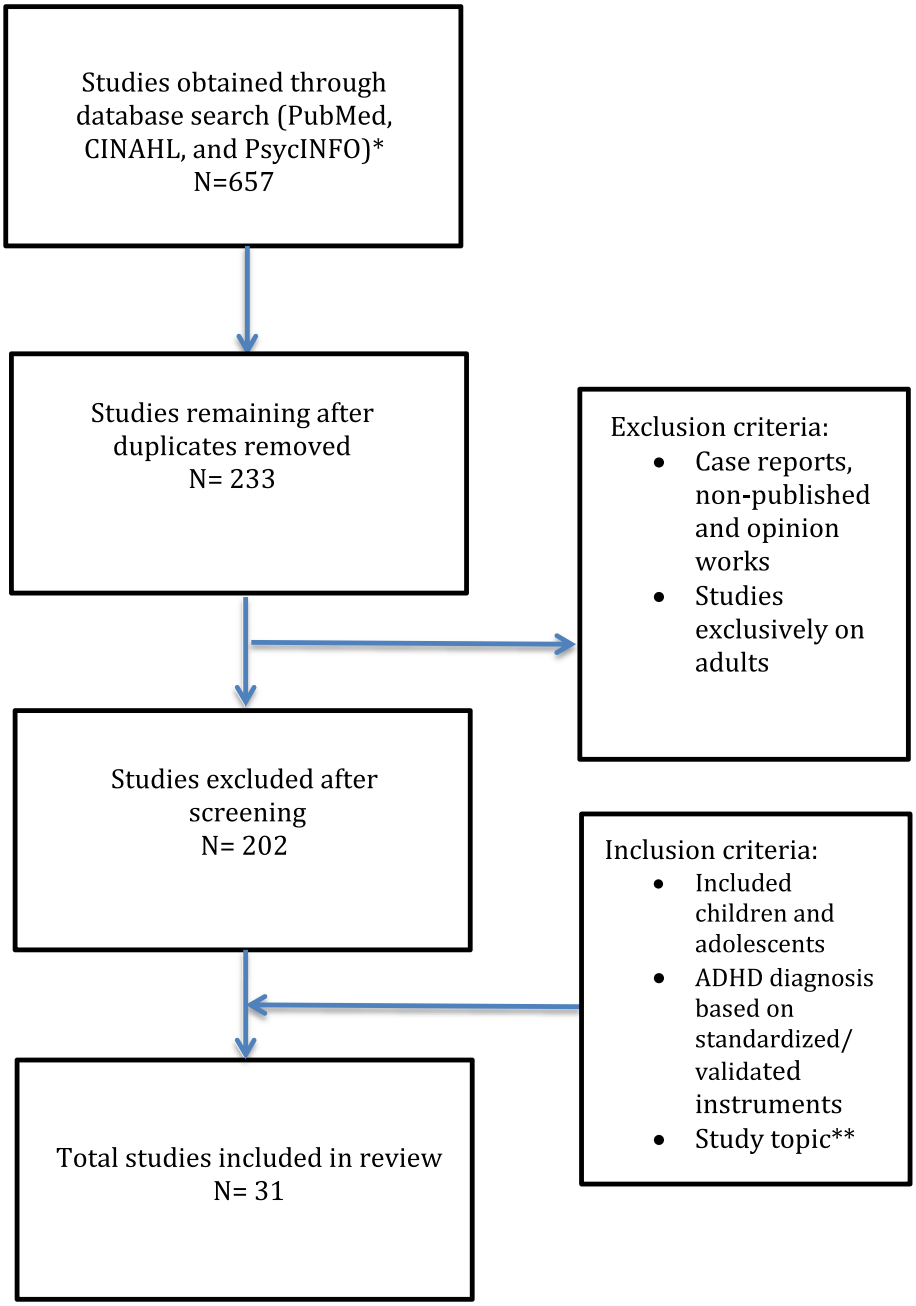

Fig. 1. Flow diagram of study selection.
*Keywords: Attention-deficit/hyperactivity disorder, ADHD, children, adolescents, inattention, obese, overweight, gender, physical activity, sedentary time, inactive, medication, and eating behavior.
**Study topics of relevance for inclusion in this review: the prevalence of obesity among those diagnosed with ADHD, the prevalence of ADHD among those who are obese, studies comparing those with ADHD versus non-ADHD, and the association if any between ADHD, obesity, physical activity, eating behavior, medication and gender.

disease, type-2 diabetes, gall bladder disorders, osteoarthritis and certain types of cancers (Freedman, Dietz, Srinivasan, & Berenson, 1999; Fagot-Campagna, Pettitt, & Engelgau, 2000; Gallagher & LeRoith, 2015; Reyes et al., 2016). Also, children and adolescents who are overweight or obese are at increased risk for lower-self esteem, problems at school, and compromised peer relationships (Schwimmer, Burwinkle, & Varni, 2003; Strauss, 2000).

Recent research suggests strong links between the two conditions. Considering the high prevalence of childhood obesity it is helpful to elucidate groups that are at increased risk. As previous studies have shown, children with ADHD may be one such risk group. Studies show that children with ADHD lack motor skills, have decreased levels of physical fitness and are at increased risk for obesity in comparison to children without ADHD (Waring & Lapane, 2008; Harvey & Reid, 2005; Holtkamp et al., 2004). Furthermore, these characteristics can persist into adulthood and cause numerous impairments in social, academic and occupational functioning, leading to further risk for negative health behaviors and health outcomes. Consequently, there is a large economic burden that falls on the families, the school system, and medical professionals of children with ADHD (Birnbaum et al., 2005; Kim, Mutyala, Agiovlasitis, & Fernhall, 2011). In addition, the economic burden that falls on the individuals and families of those affected by both ADHD and obesity is great, and even greater if considering the accompanying chronic diseases (Biederman, 2005; Dietz & Robinson, 2005; Doshi et al., 2012). The annual economic strain to the United States is estimated at $143 billion–$266 billion and it is projected to increase $48 billion–$66 billion per year by 2030 (Doshi et al., 2012; Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). Both obesity and ADHD present a great burden to public health; understanding the factors and associations that contribute to each is increasingly important in order to create and implement efficacious evidence-based prevention and intervention strategies.

Studies on both children and adults have found a significant association between obesity and ADHD (de Zwaan, Gruss, & Müller, 2011;