

# Adherence With Multiple National Healthy Lifestyle Recommendations in a Large Pediatric Center Electronic Health Record and Reduced Risk of Obesity

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## Abstract

**Objective:** To evaluate the utility of a routine assessment of lifestyle behaviors incorporated into the electronic health record (EHR) to quantify lifestyle practices and obesity risk at a pediatric primary care center.

**Patients and Methods:** Participants included 24,255 patients aged 2 to 18 years whose parent/caregiver completed a self-report lifestyle assessment during a well-child examination (January 1, 2013, through June 30, 2016). Cross-sectional analyses of age, race/ethnicity, body mass index, and lifestyle assessment responses were performed. Outcome measures included prevalence of patients meeting consensus recommendations for physical activity; screen time; and dairy, water, and fruit/vegetable consumption and the odds of obesity based on reported lifestyle behaviors.

**Results:** Prevalence of meeting recommendations for lifestyle behaviors was highest for physical activity (84%), followed by screen time (61%) and consumption of water (51%), dairy (27%), and fruits/vegetables (10%). Insufficient physical activity was the strongest predictor of obesity (odds ratio [OR], 1.65; 95% CI, 1.51-1.79), followed by excess screen time (OR, 1.36; 95% CI, 1.27-1.45). Disparities existed across ages, races/ethnicities, and sexes for multiple lifestyle habits. Youth who met 0 or 1 lifestyle recommendation were 1.45 to 1.71 times more likely to have obesity than those meeting all 5 recommendations.

**Conclusion:** Healthy behaviors vary in prevalence, as does their association with obesity. This variation is partially explained by age, sex, and race/ethnicity. Meeting national recommendations for specific behaviors is negatively associated with obesity in a dose-dependent manner. These findings support the assessment of lifestyle behaviors in primary care as one component of multilevel initiatives to prevent childhood obesity.

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Preventable chronic disease is responsible for most American deaths, many of which are influenced by lifestyle habits contributing to obesity.<sup>1</sup> Often these unhealthy practices develop in childhood, leading to obesity and associated complications<sup>2</sup> that track into adulthood.<sup>3,4</sup> Because the etiology of weight gain is multifactorial,<sup>5</sup> prevention efforts must be diverse as well, which includes expanding the role of health care systems in providing lifestyle

counseling education,<sup>6,7</sup> using the capabilities of electronic health records (EHRs),<sup>8-11</sup> and incorporating other provider-based strategies.<sup>12-16</sup> Indeed, national health care professional organizations encourage primary care providers to provide healthy lifestyle assessment and counseling,<sup>17</sup> and documentation of these services is required by the Centers for Medicare and Medicaid Services and the Healthcare Effectiveness Data and Information Set.<sup>18</sup>



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With increasing use of EHRs, opportunities are emerging for improved surveillance of health outcomes, such as childhood obesity, at the local and population level.<sup>9,19-21</sup> However, less is known about the utility of EHR-based behavioral assessments to monitor lifestyle practices. There is growing momentum in health care systems to track exercise levels in EHRs<sup>7,10,11</sup> due to the clear role of physical activity and cardiorespiratory fitness in improving health<sup>22-27</sup> and preventing/treating obesity.<sup>28-32</sup> The assessment of physical activity level as a vital sign in the EHR using a brief (<30 seconds) question (eg, "Please describe your level of physical activity in minutes per day and days per week.") has generally resulted in good concurrent validity and strong correlations with longer, more detailed physical activity questionnaires,<sup>33</sup> in addition to clear discriminant validity to identify chronic diseases associated with low levels of physical activity.<sup>8</sup> The EHR-based assessment of other lifestyle behaviors associated with a healthy body weight, such as fruit and vegetable consumption, sedentary time, and consumption of energy-dense beverages, is less common<sup>34</sup> and has not been rigorously evaluated.

This study presents the results of a lifestyle assessment occurring in a large, ethnically diverse pediatric primary care clinic to quantify physical activity level, screen time, and consumption of dairy, water, and fruits and vegetables in children and adolescents. The primary objective of the study was to measure the prevalence of patients meeting recommendations for the assessed health behaviors by age, race, and sex. The secondary objective was to determine the association between the lifestyle assessment responses and childhood obesity.

## METHODS

The study was conducted as a cross-sectional review of EHR data from January 1, 2013, through June 30, 2016, at a large Midwestern pediatric primary care clinic based in a tertiary care children's hospital. Patients included were children 2 to 18 years of age whose parent/caregiver completed the lifestyle assessment during a routine well-child visit. The study sites included 1 adolescent and 6 pediatric primary care clinics in a single health care system. Study approval for all

the procedures was granted by the Children's Mercy Institutional Review Board.

The lifestyle assessment was developed as part of a larger childhood obesity initiative,<sup>35-37</sup> which included a systematic review of the available evidence at the time of behaviors associated with an overall healthy lifestyle for children. The lifestyle assessment was incorporated into the health system's EHR as 5 questions assessing level of physical activity,<sup>38</sup> amount of sedentary time,<sup>39</sup> dairy consumption,<sup>40</sup> water consumption,<sup>41</sup> and fruit and vegetable consumption<sup>40</sup> (Supplemental Table, available online at <http://www.mayoclinicproceedings.org>). These questions were administered to the parent/caregiver by the nursing staff via interview during the check-in process for the yearly preventive examination for children 2 years and older. Sex and race/ethnicity were reported by the parent/caregiver to administrative staff on arrival at the clinic, and height and weight were measured at the same visit as when the lifestyle assessment was administered by nursing staff. Obesity was defined as a body mass index equal to or greater than the 95th percentile for age and sex.<sup>42</sup> Insurance source was queried from the EHR. Race was not reported for 135 patients, language was missing for 149 patients, and insurance status was unknown for 31 patients.

Of 33,580 patients who provided lifestyle data, 9324 were excluded due to incomplete questionnaires (>1 missing response) and 1 was excluded due to unknown sex, leaving 24,255 patients included in the final analysis. Most excluded patients attended 1 specific clinic (the adolescent clinic) that inconsistently implemented the lifestyle assessment. Compared with included patients, excluded patients were older (41.6% vs 16.7% aged 12-18 years;  $P<.01$ ) and more likely to be nonwhite (85.1% vs 83.5%;  $P<.01$ ), English speaking (78.3% vs 77.0%;  $P<.01$ ), and outside the body mass index reference category (40.7% vs 37.5%;  $P<.01$ ).

Descriptive frequencies were used to describe the demographic features and weight status of included patients, as well as the prevalence of adherence to national recommendations regarding health behaviors. Adherence to recommendations was determined using the definitions detailed in the Supplemental Table. For some behaviors, the criteria for meeting recommendations lacked a scientific consensus or were difficult to accurately assess in a patient

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