DXA: Can It Be Used as a Criterion Reference for Body Fat Measurements in Children?

Roman J. Shypailo¹, Nancy F. Butte¹ and Kenneth J. Ellis¹

Objective: Dual-energy X-ray absorptiometry (DXA) is often cited as a criterion method for body composition measurements. We have previously shown that a new DXA software version (Hologic Discovery V12.1) will affect whole-body bone mineral results for subjects weighing <40 kg. We wished to reanalyze pediatric whole-body scans in order to assess the impact of the new software on pediatric soft-tissue body composition estimates.

Methods and Procedures: We reanalyzed 1,384 pediatric scans (for ages 1.7–17.2 years) using Hologic software V12.1, previously analyzed using V11.2. Regression analysis and ANCOVA were used to compare body fat (total body fat (TBF), percentage fat (%BF)), and non-bone lean body mass (LBM) for the two versions, adjusting for gender, age and weight.

Results: Software V12.1 yielded values that were higher for TBF, lower for LBM, and unchanged for DXA-derived weight in subjects weighing <40 kg. Body composition values for younger, smaller subjects were most affected, and girls were more affected than boys. Using the new software, 14% of the girls and 10% of the boys were reclassified from the “normal” %BF range to “at risk of obesity,” while 7 and 5%, respectively, were reclassified as obese.

Discussion: Hologic’s newest DXA software has a significant effect on soft-tissue results for children weighing <40 kg. The effect is greater for girls than boys. Comparison of TBF estimates with previous studies that use older DXA instruments and software should be done with caution. DXA has not yet achieved sufficient reliability to be considered a “gold standard” for body composition assessment in pediatric studies.


INTRODUCTION
Rising health care costs in the United States in recent years are partly attributable to an increased prevalence of obesity (1). Increases in overweight and obese status are evident in children and adults, with little or no distinction between gender, ethnicity, or social status (2–4). Recent epidemiological data indicate a threefold increase in the number of overweight children aged 6–19 years from 1980 to 2002 (5–7). Overweight and obesity tend to persist from childhood to adulthood (8–10), hence it is advantageous to direct more attention to the prevention and detection of pediatric obesity (1,11).

As there are no accepted ranges of body fat defining obesity in children (12,13), indirect anthropometric indicators, such as BMI and skinfold measurements, have been adopted for this purpose (14–17). Low cost and portability, among other factors, support the application of these indices to epidemiological studies, where measurement errors and model assumptions are offset by large sample sizes. Indeed, given the sensitivity and specificity of these indices, their utility may be limited to initial screening of weight status, to be followed by more sophisticated methods of overweight or obesity assessment (15,18).

In order to better evaluate and detect childhood obesity, investigators and clinicians may need to employ some of the more accurate methodologies available today. These include air displacement plethysmography, dual-energy X-ray absorptiometry (DXA), and possibly bioelectrical impedance analysis. DXA is increasingly being used as a criterion method for body composition assessment in pediatric populations (19–22). This methodology has achieved “reference” status for bone mineral assessment, and a similar use for soft tissue assessment of fat mass and percentage body fat has been implied, although not fully tested. This has occurred despite substantial changes in hardware and software that have produced a somewhat variable DXA frame of reference (23–26).

The most recent significant modification, involving fan-beam DXA instruments manufactured by Hologic (Waltham, MA), uses a body weight-based adjustment for bone mineral values for subjects weighing <40 kg. We have shown that this change in software altered bone mineral results for most children below 14 years of age, and for older children with certain diseases (23). In this paper we have examined the effects of this software change on the estimates of soft tissue composition in children, with a focus on body fat and percentage fat.

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We investigated how these new results affected the interpretation of body fat levels with respect to age, body weight, and gender.

**METHODS AND PROCEDURES**

A dataset, consisting of 609 boys and 775 girls who had participated in several research protocols in our center, had been obtained using Hologic QDR-4500A and Delphi-A DXA instruments, and originally analyzed using software versions 8.25 and 11.2, respectively. All of the studies were approved by the Institutional Review Board for Human Research for Baylor College of Medicine and Affiliated Hospitals. Body weights ranged from 8.3 to 48.0 kg; height from 67.7 to 171.0 cm; and age from 1.7 to 17.2 years.

Correspondence with Hologic (T. Kelly, personal communication) had indicated that bone results for subjects with a DXA-derived body weight (WT\textsubscript{DXA}) >40 kg were unaffected by the new software. To allow us to confirm this weight-based threshold, 224 subjects in our dataset had a WT\textsubscript{DXA} between 40 and 45 kg. For comparison, the maximum scale weight in our sample was 48.0 kg. Of the 1,384 study subjects, 1,160 had a WT\textsubscript{DXA} below 40 kg (502 boys, 658 girls).

Whole-body scans were reanalyzed using a workstation running Windows XP with Hologic Discovery QDR software version 12.1.3. All scans acquired on the QDR-4500A (version 8.26) had already been reanalyzed using Delphi-A software version 11.2. In order to ensure that the body image was segmented in exactly the same way for each analysis version, the original 10 regions of interest for each whole body scan were preserved. All statistical analyses were performed using XLSTAT Version 2006.5 (Addinsoft, New York, NY), and were applied to the full dataset \((n = 1,384)\), as well as to the subset of subjects with WT\textsubscript{DXA} of <40 kg \((n = 1,160)\). Regression analysis was used to compare original and reanalyzed results for total body fat (TBF) mass, non-bone lean body mass (LBM), and WT\textsubscript{DXA}.

Analysis of covariance (ANCOVA) was used to quantify the effects of age, gender, and WT\textsubscript{DXA} on the analysis results. The effects of WT\textsubscript{DXA} and age on changes in TBF and %BF estimates were evaluated for boys and girls separately. The changes in TBF and %BF were calculated by subtracting the original results from reanalyzed results \((V12.1–V11.2)\). For all statistical comparisons, a \(P\) value of <0.05 was considered significant.

The relationship between %BF and BMI was also examined for each gender. BMI is the most commonly used anthropometric index \((15,16)\) for levels of body fat. We wished to determine the effect of the new analysis on the threshold levels of risk for overweight and obesity associated with BMI. Since BMI changes with age as children mature, BMI percentiles and \(z\)-scores based on age are used to evaluate a child’s BMI within a normal population. We calculated BMI using scale weight and gender-based BMI–for–age \(z\)-scores for all of the subjects, using the National Health and Nutrition Examination Survey dataset made available by the US Centers for Disease Control and Prevention \((27)\). We used regression analysis to compare BMI \(z\)-scores with %BF for both DXA analysis versions. We also compared the distribution of %BF values within each gender group for both analyses in order to explore the ramifications of changing %BF results on the classification of obesity in a pediatric population.

**RESULTS**

The DXA-derived estimates for body weight for all subjects were unaltered by the new analysis software \((R^2 = 1.00, \text{mean difference} = 0.12 \text{g}, \text{SEE} = 0.015 \text{g})\). WT\textsubscript{DXA} and scale weight were in close agreement \((R^2 = 0.995)\). Regression of WT\textsubscript{DXA} against scale weight resulted in a slope of 1.01 and an intercept not significantly different from zero \((P < 0.05)\). Thus, WT\textsubscript{DXA} was used throughout to represent body weight, unless otherwise noted.

The DXA-based body composition values for subjects with WT\textsubscript{DXA} >40 kg were also unaltered. This confirmed our finding in a previous study of bone mineral \((23)\), which showed that only results for subjects with WT\textsubscript{DXA} <40 kg were affected by the new software. Therefore, subsequent analyses presented here, exploring effects of gender, age, and body weight, were performed using only the 1,160 subjects having a WT\textsubscript{DXA} below 40 kg. The basic anthropometric characteristics of these subjects are presented in Table 1.

TBF and LBM estimated by Hologic software versions 11.2 and 12.1 differed significantly in these subjects \((P < 0.0001)\). Differences in TBF values were greater in the smaller children, and the differences diminished with increasing TBF (Figure 1). Discrepancies between BMI estimates followed a similar but inverse pattern to TBF, with larger differences at lower LBM values. For both TBF and LBM, regression lines were significantly different from the line of identity \((i.e., 95\% \text{confidence intervals for slope did not overlap unity and intercepts were significantly different from zero})\).

**Table 1 Descriptive characteristics of pediatric population**

<table>
<thead>
<tr>
<th></th>
<th>Girls ((n = 658))</th>
<th>Boys ((n = 502))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>Mean (±s.d.)</td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>7.6 ± 2.6</td>
<td>1.7–16.8</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>26.4 ± 7.7</td>
<td>9.6–41.0</td>
</tr>
<tr>
<td><strong>Height (cm)</strong></td>
<td>123.3 ± 16.2</td>
<td>73.8–163.7</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td>17.1 ± 2.6</td>
<td>10.7–28.6</td>
</tr>
<tr>
<td><strong>BMI z-score</strong></td>
<td>0.3 ± 1.3</td>
<td>–6.9 to 3.8</td>
</tr>
</tbody>
</table>

Children with dual-energy X-ray absorptiometry–derived weight <40 kg.

\*Scale weights.

![Figure 1](https://www.obesityjournal.org/images/article/Figure1.png)
Differences between the two software versions in TBF and %BF for different WT_{DXA} ranges are presented for boys and girls in Table 2. The differences were significant (P ≤ 0.001) for each of the weight ranges listed in the Table, for both genders. The magnitude of the differences between software versions steadily decreased with increasing body weight, with the results for the two software versions in agreement by ~40 kg body weight. At the lowest body weight range, differences in TBF for girls and boys were 0.81 ± 0.53 and 0.66 ± 0.39 kg, respectively. For these same groups, %BF increased by 7.2 ± 4.6 kg and 6.5 ± 4.0 kg for boys. Including WT_{DXA} as a covariate, ANCOVA indicated that the differences in TBF and %BF differed significantly between boys and girls (P < 0.0001). Gender still showed a significant effect when analyzing the differences in TBF and %BF using WT_{DXA} and initial body fat (V11.2 TBF and %BF, respectively) as covariates (P < 0.007).

Table 2 Differences between two software versions in total body fat and percentage fat for boys and girls categorized by body weight ranges

<table>
<thead>
<tr>
<th>WT_{DXA} range (kg)</th>
<th>Girls</th>
<th>Boys</th>
<th>Δ Fat (kg)</th>
<th>P*</th>
<th>Girls</th>
<th>Boys</th>
<th>Δ% Fat</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>8–12</td>
<td>10</td>
<td>5</td>
<td>0.81 ± 0.53</td>
<td>0.66 ± 0.39</td>
<td>0.62</td>
<td></td>
<td>7.2 ± 4.6</td>
<td>6.5 ± 4.0</td>
</tr>
<tr>
<td>12–16</td>
<td>37</td>
<td>22</td>
<td>0.71 ± 0.32</td>
<td>0.61 ± 0.36</td>
<td>0.26</td>
<td></td>
<td>5.3 ± 2.3</td>
<td>4.2 ± 2.4</td>
</tr>
<tr>
<td>16–20</td>
<td>123</td>
<td>63</td>
<td>0.68 ± 0.23</td>
<td>0.48 ± 0.27</td>
<td>&lt;0.0001</td>
<td></td>
<td>3.8 ± 1.3</td>
<td>2.7 ± 1.5</td>
</tr>
<tr>
<td>20–24</td>
<td>84</td>
<td>89</td>
<td>0.57 ± 0.22</td>
<td>0.45 ± 0.23</td>
<td>0.001</td>
<td></td>
<td>2.6 ± 1.1</td>
<td>2.1 ± 1.1</td>
</tr>
<tr>
<td>24–28</td>
<td>108</td>
<td>87</td>
<td>0.52 ± 0.26</td>
<td>0.32 ± 0.18</td>
<td>&lt;0.0001</td>
<td></td>
<td>2.3 ± 1.0</td>
<td>1.2 ± 0.7</td>
</tr>
<tr>
<td>28–32</td>
<td>98</td>
<td>67</td>
<td>0.39 ± 0.19</td>
<td>0.31 ± 0.18</td>
<td>0.005</td>
<td></td>
<td>1.3 ± 0.6</td>
<td>1.0 ± 0.6</td>
</tr>
<tr>
<td>32–36</td>
<td>97</td>
<td>91</td>
<td>0.25 ± 0.15</td>
<td>0.21 ± 0.11</td>
<td>0.08</td>
<td></td>
<td>0.7 ± 0.4</td>
<td>0.6 ± 0.3</td>
</tr>
<tr>
<td>36–40</td>
<td>101</td>
<td>78</td>
<td>0.07 ± 0.08</td>
<td>0.08 ± 0.09</td>
<td>0.98</td>
<td></td>
<td>0.2 ± 0.2</td>
<td>0.2 ± 0.3</td>
</tr>
</tbody>
</table>

Hologic software version 12.1 vs. 11.2. WT_{DXA}, dual-energy X-ray absorptiometry–derived body weight.

*Analysis versions significantly different (P ≤ 0.001) for all weight bins. *P value for comparison between genders at the same weight range.

The results of the reanalysis based on age groups are presented in Table 3 for TBF and Table 4 for %BF. Similar effects as those obtained using body weight were observed as a function of age, since younger subjects tend to be smaller. The differences in TBF and %BF diminished with increasing age, with no effect evident in the 13–15 years age groups. For the 1–3 years groups, the increase in TBF in girls, due to the reanalysis, was about double that observed for boys, which also contributed to higher %BF increases for girls. Estimates of %BF and TBF with reanalysis were significantly different between boys and girls (ANCOVA with age as covariate, P < 0.0001). After adjusting for initial body fat levels (V11.2 %BF and TBF) and age in the models, gender effects on the differences in body fat values were still significant (P < 0.007).

The effects of the reanalysis on the relationships between BMI z-scores and %BF are shown in Figure 2 for girls and Figure 3 for boys. An overall positive trend in %BF was observed as a function of an increasing BMI z-score (adjusted $R^2 = 0.55$ and 0.44 for girls and boys, respectively). On average, the newer software (version 12.1) produced a systematic increase in %BF of ~1.5% for all BMI z-scores. Using ANCOVA to test the effect of the analysis version on %BF, and controlling for BMI z-score, the analysis version had a significant effect on %BF values for boys and girls (P < 0.0001).

The impact of reanalysis on the %BF distributions within each gender is illustrated in Table 5. Using the %BF limits suggested for pediatric populations (13,28,29), ~59% of the girls and 46% of the boys had normal body fat levels according to...
Thirty-three percent of the girls were “at risk for obesity,” and nine percent of the girls were classified as obese. Forty percent of the boys were “at risk” and fourteen percent were obese. After reanalysis, 45% of the girls and 36% of the boys remained within the normal range. Forty percent of the girls were “at risk” and fifteen percent were obese. Forty-five percent of the boys were “at risk” and nineteen percent were obese. Seven percent of the girls had moved into the obese category, and fourteen percent of the girls were no longer considered to be in the normal category. Similarly, an additional 5% of the boys were categorized as obese, and 10% moved out of the normal range.

**Discussion**

DXA is increasingly being used as a criterion or reference for comparison with other body composition measurement techniques (19–22), and has been considered by some to be a “gold standard” for body composition studies (17). Our focus here has been on the DXA-based estimates for TBF because of worldwide concerns of an obesity epidemic in pediatric populations.

We found that the newest DXA software affects body composition results for children with a WTDXA of <40 kg, and that girls are affected significantly more than boys. Girls would have increased TBF and %BF values at younger ages, according to the newest analysis algorithms. Boys also would have higher fat values, but to a lesser degree. Thus, compared with DXA values previously reported in the literature—especially

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**Table 4** Effect of analysis software on fat percentage (%BF) in boys and girls by age group

<table>
<thead>
<tr>
<th>Age range (years)</th>
<th>n</th>
<th>Girls V11.2</th>
<th>%BF</th>
<th>V12.1</th>
<th>Δ %BF</th>
<th>Girls V11.2</th>
<th>%BF</th>
<th>V12.1</th>
<th>Δ %BF</th>
<th>Boys V11.2</th>
<th>%BF</th>
<th>V12.1</th>
<th>Δ %BF</th>
<th>P valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3</td>
<td>11</td>
<td>26.4 ± 4.2</td>
<td>344 ± 7.5b</td>
<td>8.1 ± 3.7</td>
<td>21.4 ± 1.9</td>
<td>24.9 ± 3.4b</td>
<td>3.5 ± 1.5</td>
<td>0.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3–5</td>
<td>99</td>
<td>27.0 ± 5.7</td>
<td>312.6 ± 6.0b</td>
<td>4.1 ± 1.8</td>
<td>23.6 ± 5.4</td>
<td>27.0 ± 6.1b</td>
<td>3.4 ± 2.2</td>
<td>0.012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5–7</td>
<td>169</td>
<td>27.2 ± 6.7</td>
<td>301.6 ± 6.0b</td>
<td>2.9 ± 1.3</td>
<td>23.7 ± 6.6</td>
<td>25.5 ± 6.8b</td>
<td>1.8 ± 1.0</td>
<td>&lt;0.0001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7–9</td>
<td>141</td>
<td>28.5 ± 6.6</td>
<td>300.6 ± 6.4b</td>
<td>1.5 ± 1.0</td>
<td>23.4 ± 6.9</td>
<td>24.4 ± 6.9b</td>
<td>1.0 ± 0.6</td>
<td>&lt;0.0001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9–11</td>
<td>140</td>
<td>25.1 ± 5.3</td>
<td>261.5 ± 5.6b</td>
<td>1.0 ± 0.7</td>
<td>21.9 ± 5.1</td>
<td>22.4 ± 5.2b</td>
<td>0.6 ± 0.4</td>
<td>&lt;0.0001</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>11–13</td>
<td>75</td>
<td>23.3 ± 4.9</td>
<td>237.4 ± 4.9b</td>
<td>0.4 ± 0.5</td>
<td>20.9 ± 5.2</td>
<td>21.1 ± 5.2b</td>
<td>0.2 ± 0.2</td>
<td>0.009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13–15</td>
<td>22</td>
<td>22.3 ± 3.5</td>
<td>226.3 ± 3.6b</td>
<td>0.3 ± 0.5</td>
<td>17.3 ± 4.9</td>
<td>17.4 ± 5.0d</td>
<td>0.1 ± 0.2</td>
<td>0.261</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Children with dual-energy X-ray absorptiometry–derived body weight <40 kg.

*P value for difference in %BF between boys and girls. *Analysis versions significantly different (P < 0.0001). *Analysis versions significantly different (P = 0.004). *No difference between analysis versions (P = 0.099).

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**Table 5** Population distribution among obesity classifications based on %BF using two different DXA software analysis versions

<table>
<thead>
<tr>
<th>Obesity classification</th>
<th>%BF</th>
<th>Girls V11.2</th>
<th>%BF</th>
<th>V12.1</th>
<th>Δ %BF</th>
<th>Boys V11.2</th>
<th>%BF</th>
<th>V12.1</th>
<th>Δ %BF</th>
<th>P valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;27a</td>
<td>58.5%</td>
<td>45.0%</td>
<td>(385)</td>
<td>(296)</td>
<td>0.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At risk</td>
<td>27–36</td>
<td>33.0%</td>
<td>40.4%</td>
<td>(217)</td>
<td>(266)</td>
<td>0.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>&gt;36b</td>
<td>8.5%</td>
<td>14.6%</td>
<td>(56)</td>
<td>(96)</td>
<td>0.015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values in parenthesis indicate number in each group.

%BF, percentage fat; DXA, dual-energy X-ray absorptiometry.


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The original software (version 11.2). Thirty-three percent of the girls were “at risk for obesity,” and nine percent of the girls were classified as obese. Forty percent of the boys were “at risk” and fourteen percent were obese. After reanalysis, 45% of the girls and 36% of the boys remained within the normal range. Forty percent of the girls were “at risk” and fifteen percent were obese. Forty-five percent of the boys were “at risk” and nineteen percent were obese. Seven percent of the girls had moved into the obese category, and fourteen percent of the girls were no longer considered to be in the normal category. Similarly, an additional 5% of the boys were categorized as obese, and 10% moved out of the normal range.

**Discussion**

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We found that the newest DXA software affects body composition results for children with a WTDXA of <40 kg, and that girls are affected significantly more than boys. Girls would have increased TBF and %BF values at younger ages, according to the newest analysis algorithms. Boys also would have higher fat values, but to a lesser degree. Thus, compared with DXA values previously reported in the literature—especially
in younger children—a discrepancy might be inadvertently introduced when comparing TBF or %BF simply on account of the selection of a particular analysis software. These differences may not necessarily represent a true increase in TBF.

In addition to its increasing role as a gold standard, DXA may potentially be used to measure %BF for the purpose of assessing obesity in a clinical setting. Presently, BMI is the most commonly used obesity indicator (15,30), though it is most effective in epidemiological studies (15). Nevertheless, the use of BMI in clinical assessments is on the increase (31,32), even though its accuracy for the individual has been questioned (33). The use of BMI to estimate obesity may also be misleading in children with diseases (34). Analogous to the way BMI percentile and z-score thresholds are utilized, %BF levels can also be used to define normality, overweight, and obesity (13,28,29).

To evaluate the effect of the new analysis on classifications of obesity, %BF levels indicating “normal,” “at risk for obesity,” and “obesity” were defined. For boys we used an upper limit of 21% for normal %BF, and values >30% to define obesity. The corresponding threshold values for girls were 27 and 36%, respectively (13). These values were the means of %BF ranges determined by Taylor et al. (13), which correspond to the BMI cutoffs classifying children as overweight and obese. These values also spanned the discrete %BF values published by Williams et al. (35), who proposed that %BF values of 25 and 30% for boys and girls, respectively, were appropriate for identifying excess levels of fat.

As shown in Table 5, the change in analysis software alone caused a substantial upward shift in the percentage of children that would be classified as “at-risk” or “obese.” This outcome would have been similar if one were to choose the discrete limits proposed by Williams et al. (35). For example, if 25 and 30% fat levels (for boys and girls) were used as indicators of obesity, at least 10% of the children, regardless of gender, would be relabeled as being “obese” after application of the new software. This effect is evident in Figures 2 and 3. Reanalysis using version 12.1 shows a systematic increase in %BF across all BMI z-scores. Points at any given BMI z-score can represent children of any given age and weight, thus the reanalysis effect is consistent throughout the z-score range. BMI z-score thresholds currently in use would be associated with higher %BF values when using reanalyzed DXA data. Alternatively, to maintain consistency between %BF limits and BMI, a lower BMI would need to be used to define an obesity threshold.

If %BF is to be used as a reference or an obesity index, then DXA-based methods for its calculation need to be consistent. A change in measurement methodology—one that may include a different analysis algorithm—resulting in significant changes in the %BF estimates, would not be desirable without independent evidence to verify the error with the original values. Any technique, such as DXA, that reports on absolute measures of body composition needs to maintain a minimum level of consistency. Until that consistency is achieved, such methods should not be considered as criterion or reference measurements.

In summary, the newest software version of Hologic’s DXA instrument will have a significant effect on body composition estimates obtained for children weighing <40 kg. This represents most healthy children up to about the age of 14. Values for both TBF and %BF are affected, with estimated body fat levels increasing more substantially in smaller, younger children. This could also become a concern when examining children with diseases, as these populations are frequently smaller than their age-matched peers. The discrepancies in fat estimates are significantly greater in girls than in boys when using the newest software. The increased %BF values would also result in more children being classified as “at-risk” or “obese.” The accuracy of these effects is unknown. We are also concerned that when investigators compare TBF or %BF for their studies (using the newest DXA software) with older studies published in the literature, an unfounded conclusion regarding increasing pediatric obesity could be derived if the effects due to different software versions were not considered.

We recommend that body fat results from DXA should be carefully interpreted. In all studies using DXA, investigators should be required to clearly state the software version that generated their results, along with DXA instrument information. Comparison of DXA-derived body composition findings across pediatric studies can be limited without this information. It is our opinion that the variable nature of the still-evolving DXA technology implies that it cannot yet be considered a criterion method for body composition studies in pediatric populations. As we cannot at this point determine which software version is more accurate for the assessment of body fat, further evaluations are needed to more thoroughly investigate the relationship of this newest DXA analysis version with other independent body composition measurement techniques.

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DISCLOSURE

The authors declared no conflict of interest.

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