Sizing Systems for Children’s Wear in the United States

Su-Jeong H. Shin*, Ph.D. & Cynthia L. Istook**, Ph.D
*Texas Tech University, Lubbock TX, USA., **NC State University, Raleigh, NC, USA.

Keywords: apparel, fit, sizing systems, toddler, children’s wear.

There are about a thousand companies that make children’s apparel such as Carter’s, OshKosh B’Gosh, Gerber Children’s Wear, and Gymboree. Many adult apparel producers, including Kohl’s, Levis Strauss, Patagonia, Old Navy, and Gap, operate children’s apparel divisions. In the past, this group of young consumers reported that their special needs are often ignored by retailers (Dickerson, 2003). However, children these days have become more opinionated in their choices for products. In a large retail store, each age or size grouping is often in a section of its own, usually within the infants’ and children’s department. According to Dickerson (2003), both manufacturers and retailers of children’s wear have made more effort to serve this market, recognizing its huge buying power.

Children’s clothing sizes are divided into seven basic size ranges to accommodate the differences in body proportions and ranges of height and weight of children in different age groups. Size ranges are related to the age or stage of growth. Toddler’s wear is sized 2T, 3T, and 4T. From children’s size 4, the sizes for the two genders diverge. Children’s sizes for girls go from 4 to 6X, while sizes for boy’s go from 4 to 7. Some apparel manufactures have child fit models to help develop their own sizing systems. However, there is a limitation when following this process since there is no guarantee that fit models will be the same size as the child population in the United States. Apparel manufacturers are searching for available children’s anthropometric data for developing children’s sizing systems. Apparel manufactures often rely on children’s anthropometric data from the National Center for Health Statistics (NCHS) and the American Society for Testing and Materials (ASTM) standard.

Current children’s body dimensions are considerably different than those of the past. American children over the past decade have become significantly heavier (Stone, 2007). According to Smith & Norris (2004), the body sizes of U.K. and U.S. children have changed during the past three decades. The Health Survey for England 1995-1997 (DoH, 1999), the National Health and Nutrition Examination Surveys (1996) on the health and diet of the U.S. population, and a study conducted by Snyder (1977) supported this observation of changes. According to Stone (2007), this trend has led manufacturers and retailers to respond. After years of neglect, the children’s industry is recognizing that overweight children make up an increasing segment of the fashion market and retail chains are rushing to add larger sizes (Stone, 2007). However, just enlarging sizes cannot be the whole solution to the fit problem because children have different body proportions at different stages of growth. For example, two children of the same height and weight may require garments from different ranges, because one still has toddler proportions and the other has a small boy proportions.

Children’s apparel consumers have difficulties finding appropriate sizes of children’s clothing because apparel manufacturers are using sizing standards that are based on old records of children’s sizes. The major sources of published anthropometric data on children are now over
two decades old. The most reliable source for the apparel industry, ASTM D5826 (Standard tables of body measurements for children sizes 2 to 7) was developed from data published by the U.S. Department of Commerce. The data was based on original research conducted by the U.S. Department of Agriculture (O’Brien, et al, 1941) in the 1930s. The ASTM standard tables take into consideration children’s growth patterns reflected in the 1980 charts for the National Center for Health Statistics and the 1977 Anthropometric study of U.S. Infants and Children conducted by the University of Michigan (Snyder, 1977).

Several studies using children’s Body Mass Index (BMI) are available from the fields of health and nutrition (Lynch, et al., 2000). However, the information is limited only to height and weight. ASTM (American Society for Testing and Materials) standards for children’s apparel products have little, if any, relationship to real data because of insufficient information of current body dimensions of children. Problems of clothing sizes and fits are commonly reported in the United States.

A number of national sizing projects (SizeUK, 2002; CAESAR, 2000; SizeUSA, 2003) have been conducted during the last decade to gather anthropometric data to gain a better understanding of the adult population. These national sizing survey projects have been conducted to gain much needed information about the adult population. However, children were deemed to be too difficult to measure with either 3D body scanners or with traditional tape measurements in the national sizing projects. Therefore, there was no way to portray the shapes of the current children population. Auburn University (NTC S04-AC01) gathered data on overweight twins in the teen’s markets using [TC]²’s 3D body scan technology (Ulrich, et al., 2006), and it was reasonable to expect that children of today had differently shaped bodies than the past. However, no attempt has been made for understanding body dimensions of the toddlers and preteens.

The purpose of this study was to understand current children’s body dimensions in the ages of 2-5 and to investigate if current standard sizing systems would be valid for developing children’s wear patterns. A pilot study of children’s body dimensions for sizing was developed to obtain a better understand the needs in order to update the children’s clothing sizing systems. In this study, National Center for Health Statistics (NCHS) and ASTM D 5826 (Standard Tables of Body Measurements for Children, Sizes 2 to 6x/7) were investigated. The National Health Examination Survey (NHANES) conducted by NCHS included the growth and development of children. However, the surveys were limited to the following health-related areas: cardiovascular and respiratory disease, vision, hearing, mental illness, growth, infectious diseases and immunization status in children, obesity, dietary intake and behavior, nutritional status, disability, skin diseases, environmental exposures, physical fitness, and their health-related topics. Therefore, data from National Center for Health Statistics (NCHS) was invalid for use in the children’s wear sizing systems. ASTM D 5826-00 (Standard Tables of Body Measurements for Children, Sizes 2 to 6x/7) was compared to the current children’s body dimensions data obtained in the pilot study.

A pilot study was conducted to obtain current children’s body dimension data between 2006 and 2007 in Texas, the United States. During the period, 40 children aged 2-5 and their parents participated in the pilot study. The survey consisted of two sections. In the first section, parents
were asked to fill out the survey form that included questions about their children’s clothing sizes. Clothing items included pants, t-shirts, overall pants, and jackets. Parents were also asked if they have ever felt they had any problem with the fit of children’s clothing. In the second section, 34 body dimensions of each child were measured with a traditional measurement tape. The measurement method was based on ASTM D 5826-00 (Standard Tables of Body Measurements for Children, Sizes 2 to 6x/7).

The demographics of the children were the following: Girls (47.5 %) and boys (52.5%), and ages from 2 to 5 years old. Overall, 22.5 % of the children were 2 years old, 27.5 % were 3 years old, 12.5% were 4 years old, and 37.5 % were 5 years old. The majority was Caucasian (65 %), with the remainder being Asian (22.5%), and Hispanics (12.5%).

In the first section, 69.4% of parents answered that they were frustrated about the current availability of sizes in children’s clothing. Parents felt that different brands offered different sizes and they had varying fit problems. When specific clothing items were identified, in the jacket item, 67.5 % wore bigger sizes than their age and 5% wore smaller sizes. In the pants item, 55% wore bigger sizes and 12.5 % wore smaller sizes. In the survey, parents mentioned their children’s shapes mentioning that they felt that their children might have different body shapes than other children. They also felt that they could let their children wear bigger sizes to accommodate these shapes, but found that this caused a problem in pants due to increased crotch length and leg length. Problems with sleeve length and shirt length were also commonly mentioned in the survey. The 3 and 4 year old groups were discovered to be the age groups that have the biggest issues in fit, while 59.2% of the 5 years old group had no problem with the fit of clothing. In this study, 83% of the 3 year olds and 70% of the 4 year olds wore bigger sizes than their age. Parents of children 3 and 4 years old often mentioned finding toddler sizes of the clothing. For the ages of 3 and 4, 3T or 4T were often found to be too small for the ages. Size 4 and 5 would also not fit for the age of 3 and 4.

In the second section, a single factor analysis of variance (ANOVA) was used to investigate body dimension differences between boys and girls. The results show that there was no significant body dimension difference between girls and boys (p=0.05), except the following body dimensions: Elbow girth, Back width, and Neck base girth.

A T-test was used for two sample comparison ASTM children’s body measurements and current children’s body measurements from the pilot study. The results show that there were significant differences in the following dimensions: Weight; Hip girth; Armscye circumference; Upper arm; Elbow girth; Ankle girth; Total vertical trunk length; Total crotch length; Head circumference; Crotch height; Ankle height; Across shoulder width; Arm length; Scye depth; Foot length; Head and neck length. The average weight of all age groups (Weight 33.48 ASTM < 38.81 Average, p=0.05) and hip girth (22.65 ASTM < 23.72 Average, p=0.05) was bigger than the standard while the average crotch height (Crotch height 16.73 ASTM < 15.09 Average, p=0.05) was significantly shorter than the standard. The shorter crotch height was shown in the age of 2 (Crotch 14.25 ASTM > 11.75 Average age2, SD =1.76) and the age of 3 (Crotch 15.75 ASTM > 14.19 Average age3, SD =1.10).

When each age group was compared to the ASTM, 3 years old age group and 4 years old age group had significant differences from the ASTM standard. The 4 years old group had
differences of the following body dimensions: Weight (34.50\text{ ASTM} < 49.12\text{ Average age 4}, SD =10.34), Height (40.25\text{ ASTM} < 43.72\text{ Average age 4}, SD =2.46), Total crotch length (17.88\text{ ASTM} < 21.73\text{ Average age 4}, SD =2.73), Hip girth (23.00\text{ ASTM} < 26.30\text{ Average age 4}, SD =2.33), and Chest girth (24.57\text{ ASTM} < 22.00\text{ Average age 4}, SD =1.82). The 3 year old had significant differences in the following body dimensions: Weight (30.50\text{ ASTM} < 36.25\text{ Average age 3}, SD =4.06), Height (37.25\text{ ASTM} < 39.55\text{ Average age 3}, SD =1.62), Total crotch length (16.75\text{ ASTM} < 18.94\text{ Average age 3}, SD =1.55).

The 5 years old age group was found to be heavier (Weight 39.50\text{ ASTM} < 43.15\text{ Average age 5}, SD =2.58). However, the height, chest girth, waist girth, neck base girth, wrist girth, and knee girth were not significantly different than data from the ASTM standard (p=0.05). This indicates that current children’s body dimensions have significantly changed in the United States.

In summary, there was a significant change in children’s growth between ages 2-5. Ages 3 and 4 have significant differences in body dimensions and shapes. Parents reported frustration with finding the right sizes for their children. According to the above test results, current sizing system standards for toddlers and preteen were not valid for current children’s wear. Thus, sizing systems should be updated to be able to apply for the current children’s wear. Children anthropometric data should be updated to support these standards. Further study should be carried out for defining children’s body proportions and shapes. Their garments should be designed accordingly with understanding children’s body proportion changes in each age stage.

References
Snyder, L.(1977) Anthropometry of Infants, Children, and youth to Age 18, University of Michigan.
Stone E. (2007). In fashion Fun Fame Fortune, Fairchild publications, Inc. NY.