

Estimating Ages from Images

Adolescents experience several types of maturation, including cognitive (the development of formal operational thought), psychosocial (the stages of adolescence), and biologic. The complex series of biologic transitions are known as puberty, and these changes may impact psychosocial factors.

The most visible changes during puberty are growth in stature and development of secondary sexual characteristics. Equally profound are changes in body composition; the achievement of fertility; and changes in most body systems, such as the neuroendocrine axis, bone size, and mineralization; and the cardiovascular system. As an example, normal cardiovascular changes, including greater aerobic power reserve, electrocardiographic changes, and blood pressure changes, occur during puberty.

The normal sequence of pubertal events and perils of puberty are reviewed here. This is within the normal ranges and does not take into account Precocious Puberty or Delayed Puberty.

Tanner Stages

Conceptually, pubertal maturation can be described in terms of sequence, timing, and tempo (Puberty consists of a series of predictable events, and the sequence of changes in secondary sexual characteristics has been categorized by several groups. The staging system utilized most frequently is that published by Marshall and Tanner and the sequence of changes, commonly referred to as "Tanner stages", is described below.

Boys - development of external genitalia

- Stage 1: Prepubertal
- Stage 2: Enlargement of scrotum and testes; scrotum skin reddens and changes in texture
- Stage 3: Enlargement of penis (length at first); further growth of testes
- Stage 4: Increased size of penis with growth in breadth and development of glans; testes and scrotum larger, scrotum skin darker
- Stage 5: Adult genitalia

Girls - breast development

- Stage 1: Prepubertal
- Stage 2: Breast bud stage with elevation of breast and papilla; enlargement of areola
- Stage 3: Further enlargement of breast and areola; no separation of their contour
- Stage 4: Areola and papilla form a secondary mound above level of breast
- Stage 5: Mature stage: projection of papilla only, related to recession of areola

Boys and girls - pubic hair

- Stage 1: Prepubertal (can see velus hair similar to abdominal wall)
- Stage 2: Sparse growth of long, slightly pigmented hair, straight or curled, at base of penis or along labia
- Stage 3: Darker, coarser and more curled hair, spreading sparsely over junction of pubes
- Stage 4: Hair adult in type, but covering smaller area than in adult; no spread to medial surface of thighs
- Stage 5: Adult in type and quantity, with horizontal distribution ("feminine")

Boys Growth

- Stage 1: 5-6cm/year
- Stage 2: 5-6cm/year

- Stage 3: 7-8cm/year
- Stage 4: 10cm/year
- Stage 5: No further height increase after 17 years

Girls Growth

- Stage 1: 5-6cm/year
- Stage 2: 7-8cm/year
- Stage 3: 8cm/year
- Stage 4: 7cm/year
- Stage 5: No further height after 16 years

The Estimation of Age from Photography¹

In 1998, Dr. James Tanner [The Creator of the Tanner Scale] and Dr. Rosenbloom wrote a letter to the editor of the publication *Pediatrics* warning against the misuse of the Tanner Scale in attempts to judge the age of photographic subjects for forensic purposes. They stated that the scale was intended to identify “early and late maturers” for medical, educational, and sports purposes, not determining chronological age. The doctors warned that using the Tanner scale for determining chronological age is “wholly illegitimate”. Further, they cautioned “pediatricians and other physicians to refrain from providing “expert” advice as to chronological age based on Tanner Staging” (Rosenbloom & Tanner, 1998, p. 1494).

A 2012 study by Rosenbloom, Rohrs, Haller, and Malasanos had four board-certified pediatric endocrinologists review 547 pictures of adult women taken from a men’s magazine where all models had been certified as over the age of 18 at the time the images were taken. All four physicians agreed that the breasts in question were in Tanner stage IV for only 17 of these images, 3.1% agreement. On a further 36 images, there was agreement from three examiners, resulting in 6.6% agreement; an additional 39 images were agreed on by two examiners, 7.1% agreement; and a further 53 images were designated as Tanner Stage IV by only one examiner, 9.7% agreement; resulting in an overall error rate of 26.5% among four highly experienced board-certified pediatric endocrinologists. Rosenblum and colleagues point out that assessments of pornographic images are carried out almost totally by evaluation of breast development because in most pornographic representations the female subjects, for artistic, erotic, or other considerations, have partially or completely shaved pubic hair. These authors conclude, that “failure to appreciate the frequent persistence of TS 4 [Tanner Stage 4] breast development into adulthood and difficulty in distinguishing TS4 from TS5 [Tanner Stage 5] breast development, especially in nonclinical still or video images, has resulted in testimony that has no scientific basis” (p. 3).

We have known since 1998 (Rosenbloom & Tanner) that:

This is a wholly illegitimate use of Tanner staging: no equations exist estimating age from stage, and even if they did, the degree of unreliability in the staging [of] the independent variable would introduce large errors into the estimation of age, the dependent variable. Furthermore, the unreliability of the stage rating is increased to an unknown degree by improperly performed staging, that is, not the clinical examination but through non-standardized [sic] and, thus, unsuitable photographs (p. 1494).

Therefore, we wish to caution pediatricians and other physicians to refrain from providing “expert” testimony as to chronological age based on Tanner staging, which was designed for estimating development or physiologic age for medical, educational, and sports purposes, in other words, identifying early and late maturers. The method is appropriate for this, provided chronological age is known. It is not designed for estimating chronologic age and, therefore, not properly used for this purpose (p. 1494).

¹ Special acknowledgements to Dr. James Harris for the development of this section. Produced from personal communications between Dr. Simpson and Dr. Harris.

A study by Rosenbloom (2012) showed images of adult women taken from known, legal, pornographic sites to 16 pediatric endocrinologists who had expertise in evaluating maturation. These doctors were charged with attempting to determine whether the individuals represented in the images were under the age of 18 years. The women in the images were all documented as being over the age of 18 years at the time the images were taken. 69% of the 160 estimates produced by these experts stated that the images represented females under the age of 18. Of the 16 evaluators, 13 were female. The results of this study are as follows,

Sixty nine percent of the 160 estimates were that the images represented females <18 years of age. One individual found three of the 10 images to be of females <18 years, but Sixty nine percent of the 160 estimates were that the images represented females <18 years of age. One individual found three of the 10 images to be of females <18 years, but all others found at least six of the images to be of females <18 years of age. This included four examiners rating six images as underage, two examiners thus rating seven images, three examiners considering eight images under age, and five examiners thusly interpreting all but one image. There were no images interpreted by all examiners to be either under or over 18 years of age. (Rosenbloom, 2012, p. 469).

This study also showed that 16 pediatric endocrinologists relied most commonly on breast development for making their evaluations. Rosenbloom's study shows that *"medical testimony even by experts in adolescent development, can deem images of adult women selected for their youthful appearance to be under age 18 two thirds of the time"* (p. 470). Rosenbloom concludes that *"justice requires the avoidance of testimony that is not scientifically based"* (p. 470). Again, Rosenbloom quotes Tanner, saying that *"the Tanner scales were not designed to be used for estimating chronological age, forensically or otherwise"*.

A further study by Cattaneo et al., (2009) used 15 Italian expert evaluators, five forensic pathologists, five pediatricians, five gynecologists, and 13 laypersons to review photographs of 11 nude adult females. A second group of German experts of the same basic composition (total = 23) reviewed the same images with the same instructions; to determine which of these photographic subjects were females less than 18 years old and which were 18 years or older. All females in the photographs were over the age of 18 when the photographs were taken. All professional and lay groups underestimated the age of the models in the photographs.

The best results were obtained by forensic pathologists who correctly identified the women as being over 18 years of age in 60% and 50% of cases (for Italy and Germany respectively): Laymen (50% and 23% respectively) performed second best. Pediatricians incorrectly classed the girls as under 18 in 73% and 95% of cases respectively and gynecologists in 69% and 91% of cases. (p. e23)

It is telling that German and Italian laypeople performed this task better than Pediatricians and Gynecologists, clearly bringing into question whether any expertise at all is evident in these judgements. The authors conclude that *"forensic and medical experts should avoid such unscientific behavior which may have drastic consequences in a court of law"* (p. e23).

It must be pointed out that there are no published or available studies, in any language that support the use of the Tanner Stages for reliably assessing the age of photographic subjects. Rosenbloom (2012) gives a reason for this, stating that *"there are no studies because of the wide variation in the age of pubertal onset of approximately six years, and of progression, such that the duration from the start to completion of maturation can vary from 3 to 7 years."* {Findings from Brooke, C. G. D., Stanhope, R. (1989)}

Application in the Courts

A further example of the un-reliability of making judgments as to chronological age using the Tanner Stages based upon unsuitable representations such as digitized films and photographs was seen in the case U.S. v. Simon-Timmerman No. 09-296 (FAB). Mr. Simon-Timmerman was returning to the United States mainland from Puerto Rico. In his possession were three DVDs of a well-known Puerto Rico porn star *"Little Lupe"*. In this proceeding an Immigration and Customs Enforcement (ICE) special agent Alek Pacheco testified that the actor in the DVD's was a minor child. The agent estimated that *"Little Lupe's"* age was between 13 and 14 years old. Also testifying was a licensed pediatrician Dr. Pedro R. Juanarena,

who testified “*to a medical certainty*” that the actor depicted in the DVDs was a minor child. The adult actress shown in the films, Lupe Fuentes, was required by the prosecutor, Jenifer Yois Hernandez-Vega to fly to the mainland United States and to show proof of age at the time of filming after which the case was dismissed. However, by this time Mr. Simon-Timmerman had spent three months in pretrial detention.

In 2006, Kelly Hoose (Worcester Superior Court, Massachusetts; Judge John S. McCann; December 19, 2006) was charged with four counts of possessing child pornography after prosecutors alleged that images on his computer represented underage females. Mr. Hoose was found not guilty after the images were seen to be the property of a legitimate commercial website and one of the models appeared in court to testify that she was 20 years old when the images were taken (Murry, December 28, 2006)

Rosenbloom (2012) also refers to a recent court-martial (Court-Martial, SSgt Swearington, 2012) where “*Tanner rating, in addition to the body habitus, body hair patents, musculature, dentition, head to body ratio, overall size, maturity of facial features, ...*” Was rejected by the court and the plaintiff acquitted (p. 5).

The general unreliability and inadmissibility of visual age identification from photographs has been well known within the legal community since an influential Pepperdine Law Review article was published in 2004 that clearly reviews problems with the use of Tanner Stages, (Fradella, O’Neill, & Fogarty, 2004).

On September 7, 2011 the Arizona Supreme Court amended the Arizona Rule of Evidence 702 to switch from the Frye standard to the Daubert standard. As generally stated for Arizona Rule 702 states:

The Daubert standard generally states that a witness who is qualified as an expert by knowledge, skill, expertise, training, or education may testify in the form of an opinion or otherwise if:

- a. The expert’s scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- b. The testimony is based on sufficient facts or data;
- c. The testimony is the product of reliable principles and methods; and
- d. The expert has reliably applied the principles and methods to the facts of the case.

Referring again to the Daubert criteria stated above, the lack of any statement of methodology, the lack of any evidence of reliability or validity in the methods used, and the lack of any evidence of any knowledge, skill, expertise, training, or education qualifying a detective or nurse should be addressed.

As clearly shown above, both by experimental study of experts in the field with specialized scientific knowledge (pediatricians, endocrinologists, forensic pathologists, & gynecologists) and in practical court applications and findings that the principles and methods of chronological age determination from photographs and digital representations are not reliable. Indeed, when laypersons perform better than both gynecologists and pediatricians it begs the question if there is any expertise, knowledge, skill, training, or education involved.

The Challenges of Identifying and Classifying Child Sexual Abuse Material.

Kloess, J. A., Woodhams, J., Whittle, H., Grant, T., & Hamilton-Giachritsis, C. E. (2019).

Sexual Abuse, 31(2), 173–196. <https://doi-org.lopes.idm.oclc.org/10.1177/1079063217724768>

Abstract

The aim of the present study was to (a) assess the reliability with which indecent images of children (IIOC) are classified as being of an indecent versus nonindecent nature, and (b) examine in detail the decision-making process engaged in by law enforcement personnel who undertake the difficult task of identifying and classifying IIOC as per the current legislative offense categories. One experienced researcher and four employees from a police force in the United Kingdom coded an extensive amount of IIOC (n = 1,212-2,233) to determine if they (a) were deemed to be of an indecent nature, and (b) depicted a child. Interrater reliability analyses revealed both considerable agreement and disagreement across coders, which were followed up with two focus groups involving the four employees. The first entailed a general discussion of the aspects that made such material more or less difficult to identify; the second focused around images where there had been either agreement (n = 20) or disagreement (n = 36) across coders that the images were of an indecent

nature. Using thematic analysis, a number of factors apparent within IIOC were revealed to make the determination of youthfulness and indecency significantly more challenging for coders, with most relating to the developmental stage of the victim and the ambiguity of the context of an image. Findings are discussed in light of their implications for the identification of victims of ongoing sexual exploitation/abuse, the assessment and treatment of individuals in possession of IIOC, as well as the practice of policing and sentencing this type of offending behavior.