

**Puberty, Mental Health
and Autism Spectrum
Disorder**

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Objectives

- Describe adolescence, puberty and factors that influence development.
- Discuss physical, psychological and social changes related to adolescence and autism.
- Explain the importance of recent pubertal timing findings especially in autistic girls.
- Understand development and mental health trajectories over adolescence.

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Autism Spectrum Disorder (ASD) DSM-V Criteria

- **Social Communication**
 - Social emotional reciprocity
 - Nonverbal communication
 - Developing and maintaining relationships
- **Restricted Repetitive Patterns of Behavior, Interests or Activities**
 - Stereotyped or repetitive movements
 - Insistence on sameness
 - Restricted, fixed interests
 - Hyper- Hypo-reactivity to sensory stimuli

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Adolescence

Adolescence is a time of significant psychological, social, emotional and hormonal changes (Spear, 2000; Steinberg, 2005) with greater emphasis on psychosocial development including peer relationships.

Adolescence is often characterized by transitions and changes in identities as youth experiment and explore who they are, what they like, and how this interacts with their environment or others (Katz-Wise et al., 2023).

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Puberty

Puberty refers to biological maturation contributing to significant changes in morphology, cognition, emotion regulation and physiological stress (Spear, 2000; Steinberg, 2005).

External Development: The emergence of secondary sexual characteristics distinguishing the sexes signals the onset of puberty, involving breast development (thelarche) in females and genitals (gonadarche) in males and pubic hair (pubarche) in both sexes.

Internal Development: Endocrine axis orchestrating gonadal steroid production and adrenal androgen production.

These changes lead to reproductive capacity and psychosocial maturation.



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Early Onset Risks

Early puberty is associated with higher risk for **mental health problems** (Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Kaltiala-Heino, Marttunen, Rantanen, & Rimpela, 2003; Waylen & Wolke, 2004).

Early onset can **extend the adolescent period**, lengthening divergence between the social environment, neural development and hormonally responsive motivational and affective behaviors (Casey, Duhoux, & Malter Cohen, 2010).



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Pubertal Measurement -Tanner Staging

Developed by Marshall and Tanner (1969), it is a brief, standardized physical exam conducted by trained study physicians .

Two measures with 5 stages:

Genitals (G1-G5 for males) and **Breasts** (B1-B5 for females) (GB stage)

Pubic hair (P1-P5 for both genders) (PH stage)

For our studies we use visual inspection only to be consistent with original Tanner staging and for maximize participation.



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Parent- and Self-Report Pubertal Assessment Measures

Pubertal Development Scale (PDS; Petersen et al. 1988). A widely-used parent-report questionnaire of pubertal status examining growth, skin changes, pubic hair and breast/voice changes across gender. Also, menses status in females.

Gender-Specific Self-Assessment Questionnaire (GSSQ; Rasmussen et al. 2015). Based on Tanner Stage gender-specific illustrations and text represented in female and male anatomical drawings.



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Comparison: Physical Exam, Parent- & Self-Report

Corbett, Muscatello, Tanguturi, McGinn, & Ioannou JADD, 2019

Participants: N=200 (TD 78; ASD 122) ages 10-13 (134 Males, 66 Females).

Measured concordance between self- and parent-report to physical exam.

Self-report: concordance slight-to-fair ($\kappa=.17-.32$).

Parent-report: slight-to-moderate ($\kappa=.21-.44$) and ASD group somewhat lower than TD group.

Pubertal assessments by parent or child are not reliable indices of precise pubertal staging; however, it is important to measure parent, child perceived development for comparison.



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Pubertal Timing in ASD/TD During Early Adolescence

Corbett, Vandekar, Muscatello, & Tanguturi (2020)

Participants: N = 239 ages 10-to-13-years (ASD 137, 35 females), TD=102, 45 females).

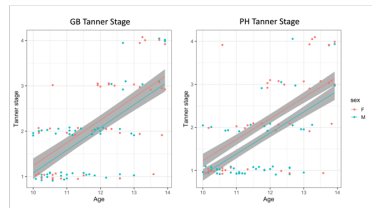
Physical exam based on pubertal stage of genital/breast (GB) and pubic hair (PH).

Statistics: linear regression using main effects of sex and age-by-sex interactions in TD and ASD groups, and main effects of diagnosis and diagnosis-by-age interactions in males and females, controlling for body mass index, SES, and race.



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Fig 1. Sex difference in genital/breast (GB) and pubic hair (PH) Tanner stage TD



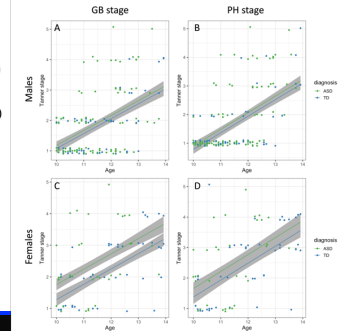
No sex differences in GB or PH stage (slopes). Sex differences (mean shift) detected in PH, not GB stage.

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Fig 2. Diagnosis differences in GB and PH Tanner stage for males & females

- No differences in GB or PH stage between groups in males (slopes)

- ASD associated with later GB stage in females throughout age range (panel C).



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Pubertal Timing Summary

Females with ASD evidence advanced pubertal onset relative to ASD males and TD females.

Findings underscore the need for an enhanced understanding of pubertal development in ASD.

Pubertal onset sets into motion a cascade of events which may magnify and further complicate an already vulnerable trajectory, especially in females.



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Pubertal Timing & Tempo in Females & Males with ASD & TD

Corbett, Muscatello, Kim, Vandekar, Duffus, Sparks, & Tanguturi (2022)

A longitudinal study on pubertal development and stress (Corbett, 2017).

Data from the first three assessments

- Year-1 (Y1) 10-13-years
- Year-2 (Y2), 11-14 years
- Year-3 (Y3) 12 - 15 years

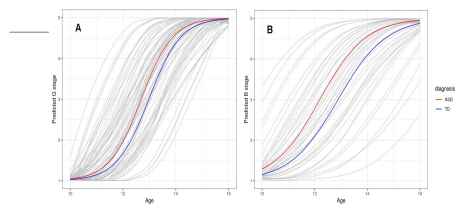
Diagnostic procedures were completed in Y1; physical exam and psychological measures completed annually.

Timing is the onset of puberty

Tempo is the pace or progression through puberty

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Timing & Tempo in TD & ASD Youth in Genital and Breast Development in Males and Females – between 10-16 years *(Corbett et al., 2022)*



(A) Male participants with ASD showed earlier G stage by ~ 3.43 months but not significant. (B) Females with ASD showed earlier B stage by ~ 8.28 months. Little evidence for differences in tempo for B or PH stage.

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Intersection of Diagnosis, Sex, Development and Mental Health

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Adolescence and Mental Health

- In general population, half of people who will suffer from mental illness will have their onset by 14 years of age (Kessler et al., 2005).
- Adolescence is a pivotal transition for youth with ASD, a condition characterized by difficulty with social competence and poor adaptability to change, including developmental transitions.
- The timing of the release of pubertal hormones contributes to individual differences in sex-biased psychopathological conditions, including depression.

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Higher depressive symptoms in early adolescents with ASD by self- and parent-report compared to typically-developing peers

Schwartzman, Corbett 2020

Depressive symptoms are higher in male and female early adolescents with ASD than their peers based on self-report.

Parents of early adolescents with ASD also report higher adolescent depressive symptoms.

Screening and intervention for depressive symptoms in ASD should occur during early adolescence.

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Diagnostic- and sex-based differences in depression symptoms in autistic and neurotypical early adolescents

Schwartzman, Williams Corbett (2022)

Participants: Study included 212 autistic and neurotypical early adolescents.

Results: ASD and female sex-assigned-at-birth pose elevated risks during adolescence.

Depressive symptoms related to interpersonal problems, negative self-esteem, and beliefs of worthlessness are more frequent in ASD.

Autistic males and females: endorsed similar severity and type of depressive symptoms, yet unique differences emerged when compared to sex-matched neurotypical peers.

Findings suggest intervention targets (e.g., interpersonal problems, worthlessness) for treating depression in autistic early adolescents.

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Overarching Summary of ASD Findings

- Autistic females enter puberty earlier than TD females and ASD/TD males putting them at risk for psychological, physical and social challenges.
- Higher rate and earlier onset of depression in ASD based on self-and parent report, especially autistic females.
- Importance of comprehensively measuring psychological variables based on self-report, parent-report and clinical-report.
- Depression symptom profiles may change over time and warrant additional research through rigorous randomized studies.

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Objectives

Describe adolescence, puberty and factors that influence development

Adolescence and puberty time of significant physical, psychological, social and hormonal changes that can be influenced by a variety of factors.

Discuss physical, psychological and social changes related to adolescence and puberty

Developmental changes in physical development, brain changes, independence, and social relationships.

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Objectives Continued

Explain the importance of recent pubertal timing findings especially in autistic girls

Some girls with ASD experience advanced pubertal onset which can set the stage for mental health challenges.

Understand development and mental health trajectories over adolescence

Mental health symptoms change over adolescence based on diagnosis (ASD) and sex (females).

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Implications & Strategies

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Addressing Puberty in Girls & Boys


- Start the conversations with the child *prior* to the onset of puberty
- Teach about body parts and function using formal terms
- Teach and support good hygiene (e.g., body odor, acne, shaving)
- Public and Private Behavior
- Moods and Feelings
- Peers and social support

See Healthy Bodies Toolkit

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Healthy Bodies
Vanderbilt Kennedy Center Resources

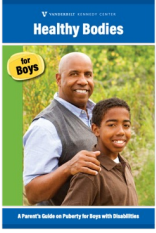
Healthy Bodies for Girls
<https://vkc.vumc.org/healthybodies/files/HealthyBodies-Girls-web.pdf>



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Healthy Bodies
Vanderbilt Kennedy Center Resources

Healthy Bodies for Boys
<https://vkc.vumc.org/healthybodies/files/HealthyBodies-Boys-web.pdf>



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Puberty, Sex & Sexuality for Parents

- Describe puberty and provide resources
- Discuss sex, sexuality consent and safety behavior
- Relationships and verbal and nonverbal behaviors
- Social Media and Staying safe

See Healthy Bodies Toolkit

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Sex, Gender & Sexuality
Definitions and Content Examples

- **Terms:** Learn, use and understand appropriate terms to normalize development and aspects of identity
- **Sex:** A person's biological sex which is based on genitals, chromosomes and hormones
- **Gender:** How one feels inside and express gender
- **Sexuality:** Who a person is attracted to

See Healthy Bodies Toolkit

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Puberty, Sex & Sexuality
Vanderbilt Kennedy Center Resources

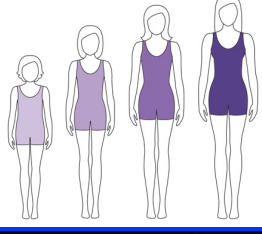

Puberty, Sex, and Sexuality: An Introduction for Autistic Teens and Adults Toolkit
<https://vkc.vumc.org/healthybodies/>

Navigating Puberty, Sex, & Sexuality: A Guide for Supporting Autistic Teens and Adults Toolkit
<https://vkc.vumc.org/assets/files/resources/sexuality.pdf>

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Current Research - Female Development Study
Longitudinal Study of Girls 6 – 12 years of age with ASD, TD and Intellectual Disability
R01 HD107695

- Pubertal: Timing, Tempo, Sex, Gender
- Physiological – RSA, Cortisol
- Social: ERP Hyperscanning
- Hormonal: Estradiol, Testosterone, DHEAS

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Thank you!



SENSE Lab
Making SENSE of Adolescence

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