

# Klinefelter Syndrome. The Effects of Early Androgen Therapy on Competence and Behavioral Phenotype

Author links [RyanFlanniganMD<sup>1</sup>](#) [PremalPatelMD<sup>2</sup>](#) [Darius A.PaduchMD, PhD<sup>13</sup>](#)

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## Abstract

### Introduction

[Klinefelter syndrome](#) (KS) is the result of sex [chromosome aneuploidy](#) most often characterized as 47,XXY. The typical features of KS include tall stature, [gynecomastia](#), small firm testicles, hypergonadotropic hypogonadism, and infertility. However, abnormalities in [neurodevelopment](#), cognition, and social and behavioral functioning also can be present. The abnormalities in neurodevelopment are believed to be due in part to [androgen](#) deficiency during early development and puberty.

### Aim

To discuss the role of androgens in normal adolescent development; discuss the cognitive, behavioral, and [social functioning](#) of children with KS; evaluate the evidence for early androgen therapy in men with KS; and discuss management strategies in the development of boys with KS.

### Methods

A systematic review of early androgen therapy and KS was performed using PubMed-Medline and Scopus databases. Relevant articles commenting on social, behavioral, cognitive, and physical outcomes among infants, children, and adolescents were included for reporting and discussion.

### Main Outcome Measures

Social and behavior functioning; cognitive outcomes; adverse effects associated with androgen therapy.

### Results

3 retrospective articles and 2 [randomized controlled trials](#) addressing early androgen therapy in boys with KS were reviewed. These studies showed an improvement in several aspects of social and cognitive functioning based on validated questionnaires. Treatment strategies, potential negative effects, and limitations of the literature on early androgen therapy in boys with KS are discussed.

### Conclusion

Our findings indicate that early androgen supplementation in children with KS combined with specific educational, family, and [social support](#) improves behavioral functioning. The optimal timing of [hormonal therapy](#) might require prospective studies, but based on our data and review of the literature, the benefit of early hormonal and therapeutic intervention in KS is very encouraging.

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