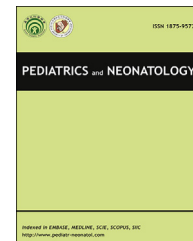


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ORIGINAL ARTICLE

Longitudinal Effects of Self-Report Pubertal Timing and Menarcheal Age on Adolescent Psychological and Behavioral Outcomes in Female Youths from Northern Taiwan

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Key Words

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development;
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Background: Early puberty is linked to adverse developmental outcomes in adolescents in Western societies. However, little is known about this relationship in an East Asian context. In addition, whether the impact of subjective pubertal timing (PT) and menarcheal age (MA) on adolescent psychosocial development persists into early adulthood remains unclear and is worthy of investigation.

Methods: A subset of data was retrieved from the Taiwan Youth Project, which recruited and followed a longitudinal cohort of 7th- and 9th-grade female Taiwanese students from 2000 to 2007. Subjective PT was defined using the Pubertal Developmental Scale (PDS), which mainly measures pubertal changes. MA was recalled by participants themselves. Various psychological and behavioral factors were recorded and measured until the age of 20, including the use of alcohol and cigarettes, psychological well-being, sexual activity, and socially problematic behaviors. A χ^2 test for linear-by-linear association and one-way analysis of variance followed by multivariate regression models were used to dissect the differential effects of PT and MA in the association with the outcome variables.

Results: In total, 1545 female participants with an average age of 14.5 (± 1.1) years were deemed valid for analysis. Among them, 257 (16.6%) participants perceived themselves as

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having early PT, defined as more than 1 standard deviation above the mean PDS score, and 82 (5.3%) had early MA (occurring before the 4th grade). In univariate analysis, participants with early PT had higher rates of smoking and sexual activity, and MA was not related to their psychobehavioral outcomes. After multivariate adjustment, only late PT was significantly correlated with lower amounts of cigarette smoking and sexual activity before the age of 20.

Conclusion: Conceptual and actual pubertal developments may be differentially associated with psychobehavioral outcomes among young Taiwanese girls. Clinical attention should be given to adolescent self-perception of sexual maturation and developmental guidance provided accordingly.

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1. Introduction

Adolescence is an important transition period between childhood and adulthood, as it is usually accompanied by sexual maturation and physical growth as well as psychological and cognitive changes necessary for coping with tasks in later adult life.¹ The effects of pubertal transition during adolescence on subsequent health and well-being are profound and decisive. During the phase of physical maturation after the initiation of puberty, a cascade of endocrine actions propels adolescents to peak in growth, strength, and fitness.² Adolescents are generally perceived to be healthy but at risk for various and diverse psychological and behavioral health problems.³

An increase in mental health issues among young people has changed public health concerns regarding problems including depression, psychosomatic syndromes, substance abuse, antisocial behaviors, and risky sexual behaviors.^{4,5} Research has particularly focused on the association between the onset and progression of sexual maturation and psychological and behavioral health consequences.^{1,6} The biological mechanisms that underlie these associations, which are still being investigated, may involve a complex interaction between gonadal hormones and neurobehavioral changes.^{7,8} Adolescents with early sexual maturation, that is, earlier onset of pubertal changes than their same-sex peers, are potentially at risk due to a greater tendency toward externalizing and internalizing problems.^{9,10} For example, early-maturing girls tend to affiliate with behaviorally troublesome peers and older male friends, sometimes leading to delinquent behavior and increased sexual activity.^{11,12} Most previous studies in this field have used either self-report ratings regarding physical changes or menarcheal age (MA) as a proxy for the onset of sexual maturation. Self-report ratings give the raters' *perception* of pubertal development rather than their *actual* pubertal stage.¹³ Only actual maturation, denoted by such physical changes as the occurrence of menarche, indicates actual neuroendocrine actions. The way a girl perceives her own sexual maturation could be multifactorial, going beyond a mere awareness of physical changes. For example, early-maturing adolescents are expected to behave more like adults and take on more social responsibility. Because the two measures are conceptually different, during puberty

they may lead to different psychological and behavioral outcomes.

Studies on this issue are relatively scarce and inconsistent in East Asian cultures, where relationship harmony and value synchronism are highly weighted. In an earlier study of a cohort of teenage students in Hong Kong, respondents reported sex differences in the association between sexual activity and the onset of puberty, defined as menarcheal occurrence or onset of nocturnal ejaculation.¹⁴ Only early-maturing boys reported a higher rate of sexually related activity in comparison with those who matured later; this difference was not found in girls. In another cross-sectional study conducted in Taiwan, the researchers measured the onset of puberty using self-reported ratings and found no association between pubertal staging and a wide range of emotional and behavioral problems, substance abuses, and suicidal tendencies in surveyed adolescents.¹⁵ In a similar finding, it was noted that early-maturing Korean girls did not manifest higher levels of depression or lower self-esteem.¹⁶ By contrast, in our previous report we found that self-rated sexual maturity status was related to adolescent psychological well-being regarding self-esteem and interpersonal relationships.¹⁷ The inconsistent results may be due to methodological differences in defining pubertal status. In addition, another question that needs to be addressed is whether the psychosocial effects of pubertal timing (PT) on adolescent development persist into adulthood. This requires further cross-cultural validation research in an East Asian context.

Using the longitudinal data from the Taiwan Youth Project (TYP), we explored the differential effects of self-reported PT and MA on young females' psychological and behavioral development. We hypothesized that subjective perception of pubertal status played an important part in youth development.

2. Methods

2.1. Study participants

Data on female participants were retrieved from the TYP, which recruited a longitudinal cohort of 7th- and 9th-grade students in 2000 and surveyed them until 2007. The TYP was launched by the Institute of Sociology, Academia Sinica,

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