Youth who have their first drink during puberty have higher levels of later drinking

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Research shows that the earlier the age at which youth take their first alcoholic drink, the greater the risk of developing alcohol problems. Thus, age at first drink (AFD) is generally considered a powerful predictor of progression to alcohol-related harm. A new study shows that individuals who have their first drink during puberty subsequently have higher drinking levels than do individuals with a post-pubertal drinking onset.

Results will be published in the October 2013 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"Most teenagers have their first alcoholic drink during puberty, however, most research on the risks of early-onset alcohol use up to now has not focused on the pubertal stage during which the first alcoholic drink is consumed," said Miriam Schneider, leader of the Research Group Developmental Neuropsychopharmacology at the Central Institute of Mental Health, University of Heidelberg, as well as corresponding author for the study. "Common thinking in alcohol research was that the earlier adolescents begin, the more deleterious become their drinking habits. However, a closer look at the statistics revealed a peak risk of alcohol use disorders for those beginning at 12 to 14 years of age, while even earlier beginners seemed to have a slightly lower risk. Since timing of puberty is not a simple function of chronological age, and also greatly differs between the sexes, the pubertal phase at first drink may therefore represent a stronger and better indicator for subsequent alcohol-related

problems than simply the age."

"Usually this type of research has to be done retrospectively, and those studies are not very reliable," added Rainer Spanagel, head of the Institute of Psychopharmacology at the University of Heidelberg. "Prospective longitudinal studies like the one here … are able to provide reliable conclusions on such a clinically and highly relevant research question. Alternatively, animal studies can be very informative – and which the researchers have also provided."

"Adolescents have their first drink at very different ages," explained Schneider. "It would be unethical to make adolescents have their first drink in the course of a study, so this variable requires a longitudinal epidemiological study or experimental animal research to assess drinking behavior. Also, the determination of the pubertal stage at AFD is not trivial; even our study had to rely on estimations. Third, it takes longitudinal studies to assess drinking data in early adulthood. Fourth, both drinking behavior and pubertal development can be traced back to common factors such as psychosocial adversity. Finally, while puberty and adolescence are overlapping time periods, with puberty being a part of adolescence, the terms cannot be used interchangeably. 'Puberty' refers to the time period during which sexual maturity is achieved. 'Adolescence' refers to the gradual period of behavioral and cognitive transition from childhood to adulthood, where adult behavioral abilities are acquired, and the boundaries of this period are not precisely defined. Girls complete puberty much earlier than boys, indicating a difference in timing of neurodevelopmental processes."

Schneider and her colleagues determined pubertal age at first drink in 283 young adults (152 females, 131 males) that were part of a larger epidemiological study. In addition, the participants' drinking behavior – number of drinking days, amount of alcohol consumed, and hazardous drinking – was assessed at ages 19, 22, and 23 years via interviews and

questionnaires. Furthermore, a rodent study concurrently examined the effects of mid-puberty or adult alcohol exposure on voluntary alcohol consumption in later life by 20 male Wistar rats.

"Both studies revealed that those individuals that initiated alcohol consumption during puberty tended to drink more and also more frequently than those starting after puberty," said Schneider.

"In other words," said Spanagel, "this study indicates that the period of puberty might serve as a risk window for AFD. Results also show a higher Alcohol Use Disorders Identification Test (AUDIT) score later in life in those individuals who had their AFD in puberty. A higher AUDIT score is indicative of a high likelihood of hazardous or harmful alcohol consumption. This information is of great relevance for intervention programs. Even more interesting, neither pre-pubertal nor post-pubertal periods seem to serve as risk-time windows. Therefore, intervention programs should be directed selectively towards young people in puberty."

Both Schneider and Spanagel noted the influence of a high degree of brain development that occurs during puberty.

"Numerous neurodevelopmental alterations are taking place during puberty, such as maturational processes in cortical and limbic regions, which are characterized by both progressive and regressive changes such as myelination and synaptic pruning," said Schneider. "Typically, an overproduction of axons and synapses can be found during early puberty, followed by rapid pruning during later puberty, indicating that connections and communication between subcortical and cortical regions are in a highly transitional state during this period."

"Puberty is a phase in which the brain reward system undergoes major functional changes," said Spanagel. "For example, the endocannabinoid

and dopamine systems are at their peak and these major neurobiological changes are reflected on the behavioral level; reward sensitivity is highest during puberty. Therefore, during puberty the brain is in a highly vulnerable state for any kind of reward, and drug rewards in particular. This high vulnerability might also affect reward seeking, or in this particular case, alcohol seeking and drinking behavior later in life."

"In summary," said Schneider, "puberty is a very critical developmental period due to ongoing neurodevelopmental processes in the brain. It is exactly during puberty that substances like drugs of abuse – alcohol, cannabis, etc. – may induce the most destructive and also persistent effects on the still developing brain, which may in some cases even result in neuropsychiatric disorders, such as schizophrenia or addictive disorders. Prevention work therefore needs to increase awareness of specific risks and vulnerability related to puberty."

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