

BRIEF SUMMARY OF PRELIMINARY FINDINGS

Explanations for antisocial behaviour in adolescents: the role of pubertal development on cognitive processes



OR

'Dude who stole my brain?'



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BACKGROUND

Antisocial behaviour (ASB) is any behaviour that is contrary to the standards of the society we live in. This includes criminal behaviour, but is also any behaviour that ignores the rights of others and acting in a self interested fashion. Although a small percentage of individuals display this type of behaviour throughout their lifetime, for the majority of individuals any participation in ASB is limited to the period of adolescence.

Communities often view adolescent ASB as a serious societal problem, and each generation believes that adolescent behaviour is 'worse' than the generation before. In fact, this problem of high ASB during adolescence has existed for centuries.

In the past couple of decades, research has found that the temporary rise in ASB is not attributable to a few adolescents who are engaging in more problem behaviour, but that a very large number of adolescents are engaging in a small number of these behaviours for a few years during adolescence. We now know that among those adolescents who come into contact with the law, on average, approximately only 10% will continue this pattern of criminal behaviour as an adult; this means that 90% of adolescents grow out of their antisocial behaviour, even if it was serious enough to get themselves involved with the law.

One explanation for this temporary increase in antisocial behaviour during adolescence is that the release of hormones during puberty disrupts the cognitive processes responsible for monitoring and controlling behaviour. Recent research has found evidence that adolescents' participation in ASB is positively correlated with the age of puberty onset, rather than a particular age. Furthermore, neuropsychologists have found that the release of pubertal hormones causes a temporary deficit in executive functioning and consequently behavioural control.

Executive functioning is commonly referred to as our 'higher order brain functions', and is the term used to describe the complex cognitive processes responsible for planning, organizing, and ordering behaviour, and for deciding which behaviours are appropriate in a given situation. This includes our ability to control our impulses, take risks, think through to the consequences of our behaviour, and make appropriate decisions.

This research investigates the possibility that during puberty, adolescents experience disruption to executive functioning, and that this 'dip' in executive functioning explains the increase in antisocial behaviour during adolescence. For example, as an adult, if I see that someone has left their car keys in the ignition, I might think it would be fun to take the car for a ride around town, but when I consider the possible consequences, I inhibit this initial impulse. In contrast, an adolescent with diminished executive functioning may not foresee getting caught, and what the possible consequences of that may be; they may not consider that someone may be distressed to find their car gone missing, or even reflect on whether they know how to drive the vehicle, and thus may simply act on the initial impulse.

This research investigated whether the timing of adolescent antisocial behaviour is associated with the onset of puberty, rather than a particular age, and whether this association might be explained by a temporary disruption in adolescents' normal pattern of executive functioning development during puberty.

METHOD

Self-report data on pubertal development stage and antisocial attitudes and behaviours was collected from 323 boys and girls (9 - 17 years) in local NSW public schools. Executive functioning (working memory, response inhibition, organizing, planning, and behavioural control) was subsequently measured in a 30-minute individual interview.

Pubertal Development

Adolescents completed a self-report survey measuring five indices of pubertal development:

- 'Growth Spurt' (age when first noticed sudden increase in height)
- Skin Changes (age when first appearance & current stage of acne)
- Menarche (girls, age of menses) / Spermarche (boys, age of first ejaculation)
- Secondary Hair Growth (chose current stage from 1 of 5 line-drawn pictures)
- Breast (girls) / Genital (boys) Growth (chose current stage from 1 of 5 line-drawn pictures)

Executive Functioning

The executive functioning tests examined adolescents' ability to process information quickly and accurately and to control their responses. These measures included:

- 1) the ability to inhibit their responses, (e.g. say the colour of ink a word is printed in rather than read the colour-name word, i.e. required to say 'red' for the word **BLUE** written in red ink),
- 2) attend to, remember, and process information (e.g. memorize a string of numbers and letters read out in random order, put them in number-order first, and then alphabetical-order, and repeat back to the interviewer), and
- 3) to switch between information-processing tasks (e.g. say as many words as possible in 60 seconds, from the category 'animals', and words beginning with the letter 's', alternating between the two without repeating any words already spoken).

Participants were also administered a vocabulary test as a non-executive functioning test (to control for individual differences in general IQ).

Antisocial Behaviour and Attitudes

For the purpose of this research, antisocial attitudes were those attitudes indicative of changes in how adolescents process emotional information. On 28 items, adolescents were asked to rate how well each statement described them: 'not at all'; 'somewhat'; 'quite a bit'; or 'very well'. Adolescents rated themselves on their tendency to take risks or act impulsively, as well as on self-serving attitudes such as willingness to manipulate others, or to dodge their responsibilities.

A wide range of antisocial behaviours was investigated. Children and adolescents responded 'Yes' or "No" to between 40 and 60 items, which included:

- naughty behaviours such as nuisance phone calls,
- rule-breaking behaviour such as wagging school,
- drug taking behaviours including smoking cigarettes, and under-age drinking,
- a wide range of criminal behaviours including vandalism and theft,
- aggressive behaviours including use of weapons or participation in gang fights.

High school-aged adolescents also indicated whether they had participated in the behaviour in the past 12 months, and what age they were the first time they had participated in the behaviour.

FINDINGS

Preliminary findings of this research were presented on 15 November, at the 5th Australian and New Zealand Adolescent Health Conference, sponsored by Westmead Children's Hospital. The analyses were designed to assess whether changes in cognitive processes, which occur during pubertal development are associated with an increase in ASB. Preliminary analyses suggests that compared to pre-pubertal or post-pubertal adolescents, those adolescents who reported being in a mid-pubertal stage scored lower on tests of executive functioning, and reported higher levels of antisocial attitudes and behaviours.

As expected, executive functioning (EF) skills and antisocial behaviour increased with age (i.e. older adolescents reported more ASB and performed better on tests of executive functioning). However, when analyses were performed that controlled for age (i.e. adjusted for the age of the adolescent), the results revealed that adolescents who had not yet reached puberty, performed better on tests of EF than those adolescents who were in a mid-pubertal stage. Correspondingly, those adolescents who had progressed to a late pubertal stage (i.e. mid-puberty occurred between one to two years ago) performed better than those mid-puberty. Results also revealed that when self-reported levels of current antisocial behaviour and current antisocial attitudes were adjusted for age, mid-pubertal adolescents reported higher levels than pre- or late pubertal adolescents.

For those adolescents who had reached a mid-pubertal stage (i.e. excludes only pre-pubertal adolescents), the peak age of initial participation in antisocial behaviour was significantly positively correlated with the age of puberty onset, for both boys and girls. That is, those adolescents reporting an age of puberty onset as age 13, for example, were significantly more likely to report that their initial peak ASB participation was at or near age 13. This is despite the fact that the range for both of these phenomena occurred anywhere between the ages of 9 and 16.

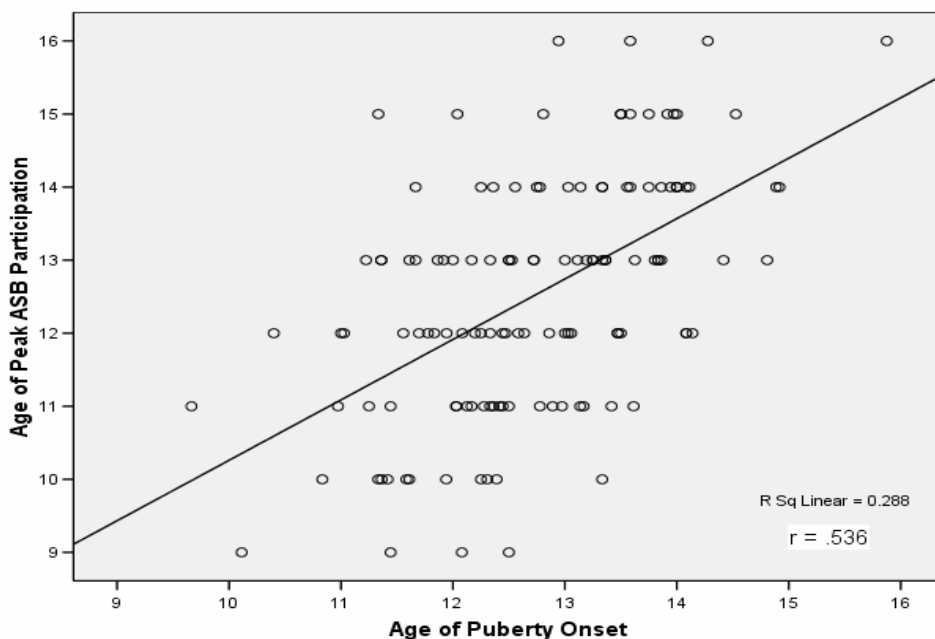


Figure 1: Correlation between Puberty onset age and peak ASB participation age for boys and girls.

DISCUSSION: IMPLICATIONS & APPLICATIONS

These research findings are only preliminary, and my research is continuing to investigate the associations between pubertal development, cognitive functioning, and antisocial behaviour and attitudes in adolescents. Some patterns are identifiable; however, closer examination of the data is required to delineate the relationships between specific types of executive functioning and antisocial behaviours, and to determine specific effects of gender, particularly in regard to pubertal development progression. I am currently also investigating the effects of pubertal timing on executive functioning and antisocial behaviour. It is expected that those adolescents who mature earlier than their peers may be more at risk for experiencing the effects of the proposed relationship between executive functioning and antisocial behaviour.

This research is important to anyone who has a relationship or guidance role with adolescents including parents, educators, youth workers, counselors, and legal authorities. These preliminary findings provide another piece of the puzzle to help us to understand and explain adolescent antisocial behaviour. Ultimately, we may be able to prevent a number of negative experiences in the community, as well as potential negative consequences to adolescents themselves, by teaching skills of 'prevention and protection'.

Parenting strategies may be influenced by the final outcomes of this research, and by future related research. Future research can examine whether the development of behavioural and cognitive strategies reduces possible risks to adolescents during this potentially critical phase of development. For example, parents may focus on helping their adolescents avoid situations in which they may be vulnerable or find themselves at risk. One way parents may do this is to establish and enforce firm boundaries not only to teach children the importance of following rules, but also to protect them from the serious consequences of making inappropriate decisions in risky situations. Parents may discuss potential decision-making scenarios their child may encounter, and practice appropriate decision-making skills with them, so that adolescents are better prepared.

This research has important implications for how we educate our adolescents as well. We may be able to prevent some poor achievements on school projects by monitoring student's progress on long-term assessment projects. Rather than expecting adolescents to have the ability to plan and organize their study habits over a two-month period, we can set short-term markers along the way to support those adolescents who may be experiencing difficulties with planning, ordering, and foreseeing the long-term consequences of their behaviour.

With further investigation into these associations between pubertal development, cognitive processes, and behaviour, we can provide useful information to adolescents themselves to help them become aware of the fact that they may experience this potentially critical developmental period during adolescence. With this awareness, adolescents can better prepare for the challenges of the adolescent years. Finally, we can all support adolescents to question and evaluate their own behaviours, and assist them to implement strategies for developing strong decision-making skills.

This is an extended abstract only; the full results from this research will be available in approximately six months time. If you would like a copy of the final paper (and background references), please contact Suzanne Czech anytime after June 1 2007 at sczech@psy.unsw.edu.au.

^o This is PhD research being conducted in the School of Psychology at the University of New South Wales under the supervision of Dr Richard Kemp.