

# MORE FOCUS, LESS GROWTH?

## EXPLORING THE ASSOCIATION BETWEEN GROWTH DEFICITS AND ADHD MEDICATION

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### ABSTRACT

**CONTEXT:** Attention Deficit Hyperactivity Disorder (ADHD) is the most common neurobehavioural disorder among children. Stimulant medications have been proven to have both therapeutic and adverse effects. Methylphenidate (Ritalin) is the most commonly prescribed psychostimulant, followed by amphetamines such as Adderall.

**METHODS:** Literature review assessed evidence surrounding the association of stimulant medications (methylphenidate and mixed salts amphetamines) on children's height and weight. Relevant studies were found using the following keywords: ADHD, Psychostimulants (Adderall, Ritalin), Children, Growth Deficits.

**RESULTS:** The studies reviewed concluded no statistically significant effects; the psychostimulant medications showed decreased height and weight during active treatment, but eventually normalized.

**CONCLUSION:** The literature does not show evidence of long-term stunted growth associated with stimulant use, temporary deficits can be attributed to the disorder itself. However, further study is needed.

### BACKGROUND/RATIONALE

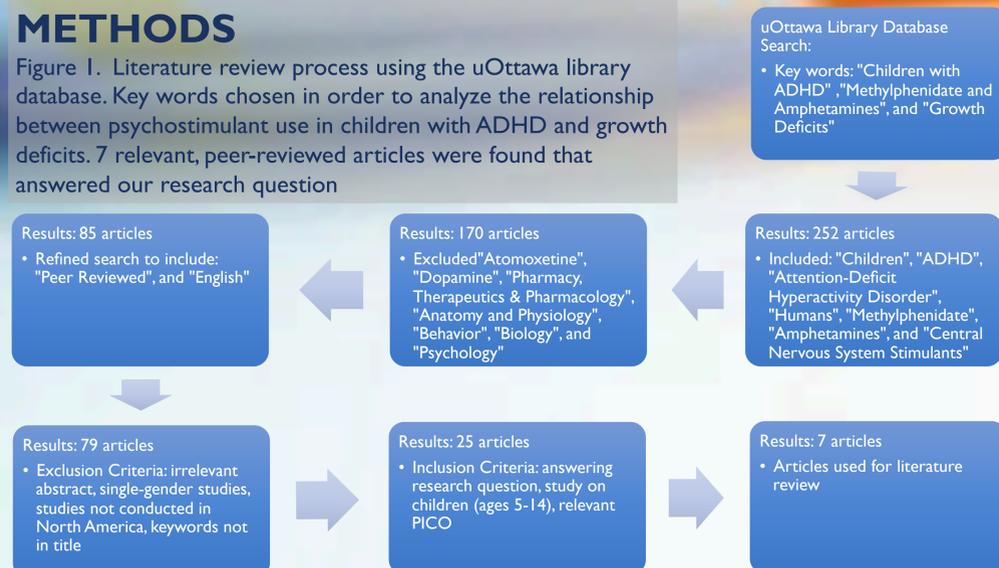
- Psychostimulants: methylphenidate and mixed salt amphetamines successfully relieve the symptoms of ADHD 75% of the time (Vitiello, 2008; Chan et al., 2016).
- ADHD prescriptions among youth from 1990-1996 increase from 1.9 per 1000 children to 11.0 per 1000 children (Miller et al., 2001).
- Current ADHD diagnosis is broad increasing over diagnosis leading to over-prescription rates (Chan et al., 2016).
- Increases in administration of these psychostimulants for an extend period of time to such a large population of children raises our concerns of its long-term effects on children's height and weight.

### OBJECTIVE

Is taking Adderall or Ritalin for more than one year associated with stunted growth in children under the age of 13, in comparison to children who are not taking psychostimulant medications?

### METHODS

Figure 1. Literature review process using the uOttawa library database. Key words chosen in order to analyze the relationship between psychostimulant use in children with ADHD and growth deficits. 7 relevant, peer-reviewed articles were found that answered our research question



### RESULTS

Table 1: Summary the relationship between long-term use of psychostimulant medications (methylphenidate and methamphetamine) and the effects on height and weight of children with ADHD.

\*Although, it was found that after 30 months (Zachor et al., 2006) and over time (Poulton et al., 2003) there was a significant growth reduction, it normalized after 3 years on the treatment.

\*\* The difference in height was not significant post-adolescence

Study	Population		Association	Significant Long-term Effects of Psychostimulant Medications on Growth?	
	Authors	Study Design			Demographic
Klein et al., 1988	Cohort	M/F (6-12)	58	Height (t=0.73) Weight (t=2.98 p<0.005)	No
Pliszka et al., 2006	Cohort	M/F (mean age 9.0 ± 2.3 years (MSA) and 8.5 ± 2.1 years (MPH))	66 (MSA), 133 (MPH)	- Dose-height relationship (r=-0.26, p=0.011) - No main effect of MSA vs. MPH or time on height Z score. No significant time x treatment interaction. - Weight: significant stimulant x time interaction (p=.029)*	No
Poulton et al., 2003	Cohort	M (mean age 7.2 ± 1.9 years) F (mean age 7.2 ± 1.8 years)	51	- After 6 and 18 months (p<0.001) - After 30 months (p<0.01)*	No
Spencer et al., 1996	Longitudinal	M/F (6-17)	124 (ADHD) 109 (controls)	- Height age-specific z score (0.21, p= 03)** - Weight: p = not significant (NS)	No
Spencer et al., 2006	Longitudinal	M/F (6-13)	178	At 21 months: - Height z score (-0.063, p=0.054) - Weight z score (-0.093, p=0.689)	No
Swanson et al., 2007	Longitudinal	M/F (7-9.9)	579	- z height (p<.005) - z weight (p<0.0001)	No
Zachor et al., 2006	Retrospective medical chart review	M/F (5-19)	81	After 36 months: - z weight (0.34 ± 1.63, p=0.140, not significant) - z height (-0.45 ± 1.15, p=0.06, not significant)	No

### DISCUSSION

- Key findings:
  - The results show a decrease in growth rates (height and weight) when treatment with Ritalin or Adderall is initiated.
  - These growth deficits in height and weight in children later normalized after 3 years of treatment use, after treatment was suspended, or after the child reached adolescence
- Are the results surprising?
  - No. Though the effects are temporary, all the studies suspected a negative effect of psychostimulants on children's growth.
  - It is surprising that many of the studies proposed that the temporary growth deficits are disorder-related rather than treatment-related. This is seen through Swanson's study, which found that the growth rebound occurs in the non-medicated group of children with ADHD.
- Our Limitations
  - We should have specified a certain subtype of ADHD so that the results can be more accurate
  - We only included studies which assessed children, only three of which were longitudinal studies. It would have been useful to find more longitudinal studies that follow psychostimulant use in childhood through adulthood to better determine the effects.
- Future Implications
  - Future research should pursue to understand the mechanism by which ADHD itself affects growth in children and apply the findings in a clinical setting.
  - Policy changes should begin by implementing a better program of closely monitoring the height and weight of children with ADHD. Including a nutrition assessment to implement the most beneficial diet for the child and their growth.
  - Though growth deficits are not a cause for concern, we suggest a revision of the diagnosis criteria for ADHD due to the over-budget expenditure on childhood behavior disorders as seen by Sparks and Duncan (2008).

### CONCLUSION

Long-term treatment of ADHD with psychostimulants such as Ritalin and Adderall in children is not significantly associated with lifelong growth deficits. Psychostimulant use in children can cause growth deficits in height and weight during the treatment then normalizes with cessation of treatment, the emergence of puberty, or treatment duration of three years or more.

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