

Changes in early childhood irritability and its association with depressive symptoms and self-harm in a nationally representative UK birth cohort

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Background

- **Depressive disorders and self-harm increase during adolescence¹** but little is known about the developmental mechanisms which may underlie this
- **Irritability is defined as an ‘elevated proneness to anger relative to peers in response to frustration or reward omission’².** It is one of the most common reasons for referral to child and adolescent mental health services
- **Prior irritability is associated with subsequent depression, and self-harm³;** however studies have focussed on irritability in later childhood and adolescence
- **No studies have examined the association between changes in irritability during early childhood and depression.** Early childhood is a crucial period of development so important consider regarding future depression
- **Irritability undergoes normative changes during childhood³;** it is common in toddlers, but then declines. Therefore, examining changes in irritability and adolescent depression, and self-harm may indicate periods when early intervention might be effective
- **This study aims to examine the relationship between trajectories of early childhood irritability between the ages of 3 to 7 years and adolescent depressive symptoms and self-harm aged 14 years in a nationally representative birth cohort study**

Participants and Methods

This study used data from the Millennium Cohort Study (MCS), an ongoing UK population-based birth cohort of children born between 2000 and 2002 – figure 1.

Outcomes: Depressive symptoms at 14 years via the short moods and feelings questionnaire (SMFQ) a 13-item self-report questionnaire that measures DSM-IV depressive symptom severity. **Self-harm at 14 years** via response to the question, “In the past year have you hurt yourself on purpose in any way?”

Exposure: Childhood irritability at 3, 5 & 7 years measured using the sum of 4 questions; 3 from the Child Social Behaviour Questionnaire (CSBQ) (“Is easily frustrated”, “Gets over being upset quickly” and “Shows wide mood swings”) and 1 from the Strengths and Difficulties Questionnaire (SDQ) (“Often has temper tantrums”).

Analyses were adjusted for a range of confounders: maternal age, maternal education, parental social class, OECD equivalised weekly family income, family housing tenure and maternal depressive symptoms. child ethnicity and child sex, child developmental ability at age three years and childhood internalising and externalising problems at three years.

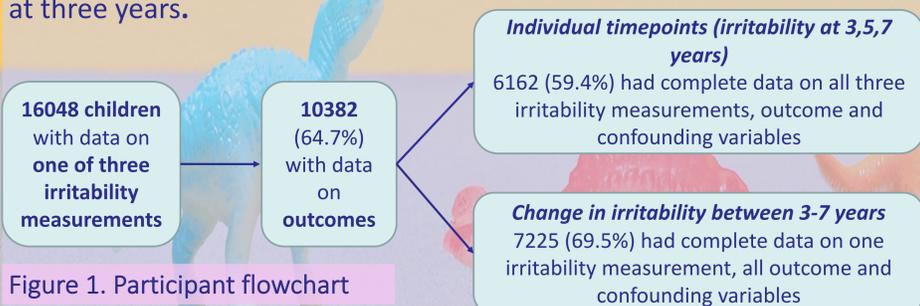


Figure 1. Participant flowchart

Statistical Analyses: 1. Investigated whether irritability at 3, 5 & 7 years are associated with adolescent depressive symptoms (linear regression) and self-harm (logistic regression)

2. Next, used multilevel mixed models to calculate the change in irritability between 3-7 years for each participant & investigated whether **change in irritability between 3-7 years is associated with depressive symptoms and self-harm at 14 years**

3. As sensitivity analyses, adjusted for prior irritability and paternal covariates. Initial analyses used complete data (figure 1); sensitivity analyses were conducted in imputed samples to examine the effect of missing data.

Results

- **Irritability at 3 years was not associated with depressive symptoms or self-harm at 14 years – table 1**
- **Irritability at 5 years and 7 years were associated with depressive symptoms and self-harm at 14 years – table 1**
- **Childhood irritability which remained high between 3-7 years was associated with adolescent depressive symptoms and self-harm – table 1**
- **Results were similar in all sensitivity analyses and in imputed samples**

Model	Irritability at 3 years n=6162		Irritability at 5 years n=6162		Irritability at 7 years n=6162		Change in irritability n=7225	
	Depressive symp Coef. (95% CI), p-value	Self-harm Odds ratio (95% CI), p-value						
Univariable model	0.15 (0.06-0.24), p=0.001	1.06 (1.02-1.10), p=0.004	0.25 (0.15-0.35), p<0.001	1.08 (1.04-1.13), p=0.001	0.26 (0.18-0.35), p<0.001	1.09 (1.05-1.14), p<0.001	0.22 (0.08-0.37), p=0.003	1.09 (1.01-1.16), p=0.019
Fully adjusted model	0.02 (-0.08-0.12), p=0.742	1.02 (0.97-1.07), p=0.410	0.20 (0.09-0.30), p<0.001	1.06 (1.01-1.12), p=0.037	0.21 (0.11-0.30), p<0.001	1.08 (1.03-1.14), p=0.003	0.31 (0.17-0.45), p<0.001	1.12 (1.04-1.20), p=0.002

Table 1. Results of univariable and multivariable regression models examining the association between irritability score at age 3, 5 and 7 years, and change in irritability between 3-7 years with depressive symptoms and self-harm at 14 years, in those with complete exposure, outcome and confounder data using population weights using population weights

Discussion and Conclusions

- **Children whose irritability remained high, or stable, between the ages of 3-7 years reported more depressive symptoms and self-harm at 14 years**
- **Strengths:** longitudinal design, large sample size, long-term follow-up, robust adjustment of confounding
- **Limitations:** attrition, residual confounding, limited assessment of self-harm at 14 years
- Failure to learn how to manage frustration in early childhood, as part of normative development could result in higher risk of depressive symptoms and self-harm during adolescence
- Support with managing irritability during early childhood, especially for children whose irritability is not decreasing from age 3 years onwards may be helpful in preventing future depressive symptoms and self-harm in adolescence

References

1. Avenevoli S, Swendsen J, He J-P, Burstein M, Merikangas KR. Major depression in the national comorbidity survey-adolescent supplement: prevalence, correlates, and treatment. *J Am Acad Child Adolesc Psychiatry.* 2015 Jan;54(1):37-44.e2
2. Wiggins JL, Mitchell C, Stringaris A, Leibenluft E. Developmental trajectories of irritability and bidirectional associations with maternal depression. *J Am Acad Child Adolesc Psychiatry.* 2014;53(11):1191-1205.e4. <http://dx.doi.org/10.1016/j.jaac.2014.08.005>
3. Vidal-Ribas P, Brotman MA, Valdivieso I, Leibenluft E, Stringaris A. The Status of Irritability in Psychiatry: A Conceptual and Quantitative Review. *J Am Acad Child Adolesc Psychiatry.* 2016;55(7):556-70. <http://dx.doi.org/10.1016/j.jaac.2016.04.014>

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