



The 2D:4D Digit Ratio Index Marker for Prenatal Testosterone and Temperament in Toddlers

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INTRODUCTION

- ☞ The 2D:4D digit ratio is a marker for prenatal testosterone exposure (PTE; Manning et al., 1998). A lower ratio is associated with increased levels of PTE, and a higher ratio is associated with lower levels of PTE.
- ☞ 2D:4D ratio is thought to be a sexually dimorphic trait (Manning et al., 1998), meaning that it differs between sexes (smaller ratios - males, larger ratios - females).
- ☞ Gonadal development and digit length are both controlled for by the Hox gene. This relation conceptually links the 2D:4D ratio and PTE (Manning et al., 1998).
- ☞ The present study investigates the relationship between PTE and the development of temperament in toddlerhood using the 2D:4D digit ratio as a marker for PTE.

METHODS

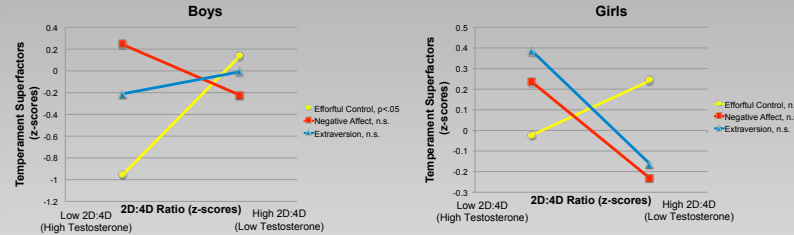
- ☞ Participants
 - Children's age = 30 months
 - 14 boys and 26 girls (n= 40)
- ☞ Measures
 - Digit Lengths from Digital Palm Print Scans using the GNU Image Manipulation Program (GIMP).
 - 2D:4D ratio computed by dividing the length of the second digit (2D) by the length of the fourth digit (4D) (Manning et al., 2000).
 - Child Behavior Questionnaire (CBQ; Parent report of temperament; Rothbart et al., 2001).

Table 1. Descriptive of CBQ Temperament Scales

Variable	Boys		Girls	
	M	SD	M	SD
Effortful Control	4.7	.30	5.0	.52
Inhibitory Control	4.2	.96	4.6	.65
Negative Affect	4.6	.64	4.5	.69
Anger/Frustration	4.7	.92	4.7	.81
Falling Reactivity/Soothability	4.3	1.24	4.7	1.06
Extraversion/Surgency	6.8	3.58	7.4	3.28
Activity Level	17.0	18.45	19.20	17.00
Approach/Positive Anticipation	4.9	.73	4.8	.87

RESULTS

Table 1. Graphical representation of 2D:4D Ratio and Temperament Superfactors Between Sexes



- ☞ Lower 2D:4D ratio was related to lower levels of Effortful Control in boys.
- ☞ Lower 2D:4D ratio was related to higher levels of Extraversion/Surgency in girls.
- ☞ There are no other observable relationships between 2D:4D ratio and CBQ superfactors which approach significance.

Table 2. Correlations between 2D:4D Ratio and CBQ Temperament Scales

Variable	2D:4D Ratio	
	Boys	Girls
Effortful Control	.73**	.13
Inhibitory Control	.32	.23
Negative Affect	-.20	-.23
Anger/Frustration	-.35	.31
Falling Reactivity/Soothability	-.46 [^]	.13
Extraversion/Surgency	.07	-.32
Activity Level	.06	-.31
Approach/Positive Anticipation	-.08	.44*

Note. $p < .10$ [^], $p < .05$ *, $p < .01$ **

- ☞ Lower 2D:4D ratio was related to higher levels of Anger/Frustration in boys and a lower levels in girls.
- ☞ Lower 2D:4D ratio was associated to Approach/Positive Anticipation in girls.
- ☞ Lower 2D:4D ratio was associated with higher levels of Falling Reactivity/Soothability in boys but not in girls.
- ☞ Lower 2D:4D ratio was associated with higher levels of Activity levels in girls.
- ☞ Lower 2D:4D ratio was associated with lower levels of inhibitory control.

DISCUSSION

Summary of Findings

☞ The putative relationship between 2D:4D and PTE is illustrated in our findings. 2D:4D is a sexually dimorphic trait and its relation to different temperament traits in one sex but not the other is illustrative of its dimorphism.

Boys

- ☞ Higher levels of testosterone are associated with low Effortful Control, high Anger/Frustration.
- ☞ Higher levels of testosterone were not associated with Extraversion. This was not as predicted.

Girls

- ☞ A trend for higher levels of testosterone associated with higher levels of extraversion.

Limitations and Future Directions

- ☞ The generalizability of these results are limited due to the small sample size, especially for boys.
- ☞ As sample size increases we hope to investigate how 2D:4D ratio predicts different configurations of temperament, specifically the interaction between Effortful Control and Negative Affectivity.
- ☞ We would also like to investigate how differing levels of PTE can affect the development of temperament configurations and subsequently adaptive or maladaptive behavior later in life.

REFERENCES

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FOR FURTHER INFORMATION

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