



# Attention distractibility trait associations with self-reported attention deficit and with variation in KTN1 gene

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First aim of this study was to conduct a simple, low attention load visual search experiment with rear irrelevant distractor (Forster & Lavie, 2016) to examine its suitability for assessing attention distractibility in general population. The opposite ends of this attention distractibility trait should describe people with high and low ability to maintain focused attention. Prolonged reaction time in irrelevant distractor condition refers to low ability to maintain focused attention.

Our second aim was to explore whether attention distractibility is associated with variation in the protein kinectin encoding gene (*KTN1*, rs945270 and rs8017172), recently found to strongly affect brain development (Hibar, Stein et al. 2015; Xu & Jia, 2017). In these studies it was shown that *KTN1* gene is more expressed in the frontal lobes during prenatal period and that rs945270 C-allele carriers have larger putamen as well as lower hyperactivity scores.

## Methods

In the large population-representative sample of the Estonian Children Physical and Behavioral Health Study (n=451) self-reported symptoms of attention deficit and hyperactivity had been obtained when the participants were 15 (af Klinteberg Test) and 25 years old (ASRS Test-v1.1). Attention distractibility experiment (Fig. 1) was conducted when age of this sample was 35.

In the experiment reaction time was recorded in two conditions – with irrelevant distractor and without irrelevant distractor. Distractor cost was calculated to measure attention distractibility (RT in the distractor absent condition was subtracted from the RT in the distractor present condition, the result was multiplied by hundred and divided by the RT in the distractor absent condition).

Gene *KTN1* (rs945270) C/C genotype carriers were compared against G-allele (C/G and G/G genotypes) carriers. Rs8017172 G/G genotype carriers were compared with A-allele (A/G+A/A) carriers.

## Results

- Irrelevant distractor prolonged mean reaction time (Table 1).
- Significant positive correlation was found between distractor cost and boys' self-reported Concentration Difficulties at age 15 (Fig. 2) but not in either gender group at age 25.
- Distractor cost was significantly smaller in *KTN1* rs945270 C/C genotype as compared to G-allele carriers: Univariate ANOVA main effect of allele group was  $F(1,1)=3.8$ ,  $p<.051$ ,  $\eta^2=.009$  (Fig. 3). Main effect of gender and interaction between *KTN1* rs945270 and gender were not significant ( $p>.702$ ). *KTN1* rs8017172 did not have an effect on distractor cost. In spite of interlinkage, these loci do not influence the attention distractibility in interaction.

## Conclusion

Our behavioural findings partly replicate Forster and Lavie (2016) result (distractor interferece positively correlated with childhood symptoms of ADHD) except that we found positive correlation with childhood attention problems only in the male group.

The results also indicate that attention distractibility trait may be associated with the volume of putamen and is associated with self-reported attention deficit during school years but not in young adulthood.

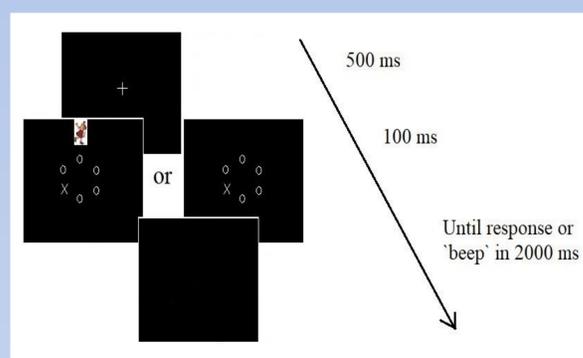


Fig. 1. Schematic depiction of the procedure of the experiment. Task: respond with the keypress whether you saw X or N among little „o“-s.

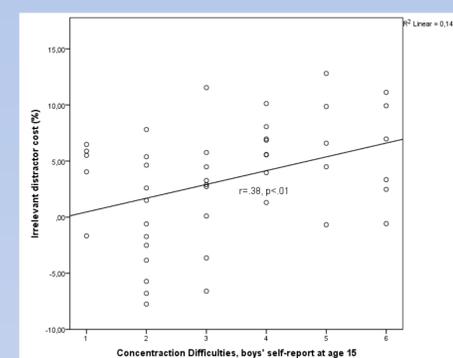


Fig. 2. Mean irrelevant distractor cost correlated significantly positively with Concentration Difficulties score in male group at age 15.

Table 1. Mean reaction times and standard deviations in both conditions.

	Distractor condition				Difference
	Irrelevant distractor		No distractor		
	Mean RT	SD	Mean RT	SD	
Correct response	484 ms	86 ms	471 ms	79 ms	13 ms***
Incorrect response	396 ms	116 ms	379 ms	117 ms	
Error rate	7%		8%		

\*\*\* Repeated measures ANOVA with mean correct RTs and a factor distractor condition (present, absent) revealed a significant main effect of distractor condition,  $F(1,450)=69.8$ ,  $p<.0001$ ,  $\eta^2=.134$ .

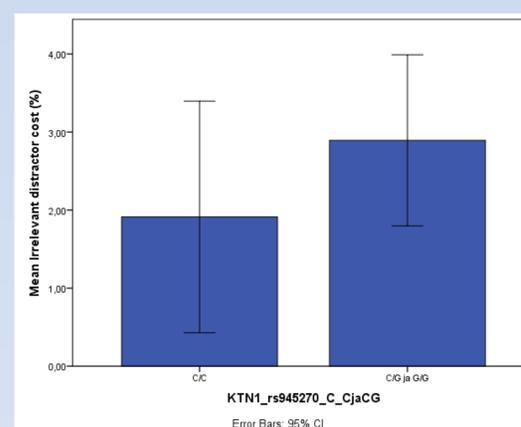


Fig. 3. Mean distractor cost in *KTN1* rs945270 allele groups.

## References

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