Decreases in adolescents’ figural memory performance associated with cumulative individual radiowave brain dose over one year.

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Background/Aim
The potential impact of microwave radiofrequency electromagnetic fields (RF-EMF) emitted by wireless communication devices on neurocognitive functions of adolescents is still discussed. In a previous longitudinal analysis we found changes in figural memory scores associated with higher cumulative RF-EMF brain dose in adolescents. This study aimed on following up these results using a new study population and a new approach to control for confounding from media usage itself.

Methods
Individual RF-EMF brain dose for each participant (n=842) was modelled using objective data from mobile phone operators, personal RF-EMF measurements, questionnaire data and geospatial modelling. Multivariable linear regression models were fitted on memory score changes over one year and cumulative RF-EMF brain dose as well as media usage either related or unrelated (negative exposure controls) to RF-EMF exposure. An additional laterality analysis for right ear vs. left ear/no preference phone callers was conducted since memory functions are known to be lateralized in brain hemispheres. To control for confounding of media use behaviours a stratified analysis for different media use patterns was conducted.

Results
We found decreased figural memory scores with higher cumulative RF-EMF dose score change (-0.22, 95% CI: -0.47 to 0.03) per IQR in the whole sample and in a network operator recorded sample (-0.26, 95% CI: -0.42 to -0.10). No association was seen with media usage unrelated to RF-EMF. RF-EMF brain dose was negatively correlated with figural memory in right side users (-0.39, 95% CI: -0.67 to -0.10). Using operator recorded data, verbal memory score was impaired in left side users.
Conclusions
The results support a potential adverse effect of RF-EMF brain dose on adolescents’ cognitive functions. Results of the laterality analysis are compatible with the involved brain hemispheres for figural (right side) and verbal (left side) memory.