Evidence suggests that REM sleep muscle tone is higher in children, potentially complicating the distinction between pathologic REM sleep without atonia (RSWA) and normal developmental variants of REM sleep muscle atonia during childhood and adolescence. Furthermore, it remains unknown whether children and adolescents diagnosed with REM sleep behavior disorder (RBD), who are likely to have different etiologies than adults with RBD, have abnormal REM sleep muscle tone.

Our group recently described RBD in children. To our knowledge, RSWA metrics in pediatric RBD have not been previously described. Having these metrics available would improve the accuracy and consistency of the diagnosis of RBD in the pediatric population. We aimed to quantitatively analyze RSWA in pediatric patients with RBD in comparison with controls, with the hope of determining whether there is a true quantitative difference between them. Demonstration of a quantitative difference and, in turn, cutoff values for the diagnosis of RBD, could assist physicians in diagnosing pediatric RBD patients in an accurate, standardized way.

Methods
Quantitative RSWA was manually scored and automated REM atonia index (RAI) performed in nine clinically diagnosed patients with RBD and nine age- and gender-matched controls with primary snoring. Percentage densities of phasic, tonic and “any” muscle activity were compared in the submentalis (SM) and anterior tibialis (AT). Phasic muscle activity burst durations (SM and AT) and SM RAI in the two groups were compared using Kruskal-Wallis tests. Chi square analyses were used to compare categorical variables. Multiple linear regression analysis was performed using JMP statistical software (SAS Institute, Inc., Cary, North Carolina).

Results
Each group included six boys and three girls, with a mean age of 10 years. RAI was significantly lower in the children with RBD than in those without RBD (0.82 vs. 0.93, \( P=0.0006 \)) and combined SM/AT muscle activity was significantly higher in those with RBD, as measured by both phasic (28.5% vs. 12.9%, \( P=0.0134 \)) and “any” muscle activity (29.4% vs. 12.9%, \( P=0.0134 \)) percentage densities. SM phasic and “any” muscle activity densities were higher in the children with RBD than in the controls (16.9% vs. 8.1%, \( P=0.0423 \), and 17.4% vs. 8.2%, \( P=0.0423 \), respectively). AT phasic and “any” muscle activity densities (both 14.4% vs. 5.3%, \( P=0.1333 \)) were similar in the two groups, as were durations of muscle activity bursts for both SM (0.71 vs. 0.63 seconds, \( P=0.7911 \)) and AT (0.70 vs. 0.67 seconds, \( P=0.5317 \)).

Conclusion
Like adults with RBD, children and adolescents with RBD have significantly greater amounts of RSWA than those who do not have RBD. This is driven by higher phasic densities in the SM muscle. These results may aid in the accurate and standardized diagnosis of RBD in the pediatric population. Larger confirmatory studies of patients with defined etiologies such as narcolepsy or brain lesions will be necessary to distinguish the neurophysiologic spectrum of RSWA accompanying clinical RBD in children and adolescents and to enable comparative analyses with adult RBD.

References