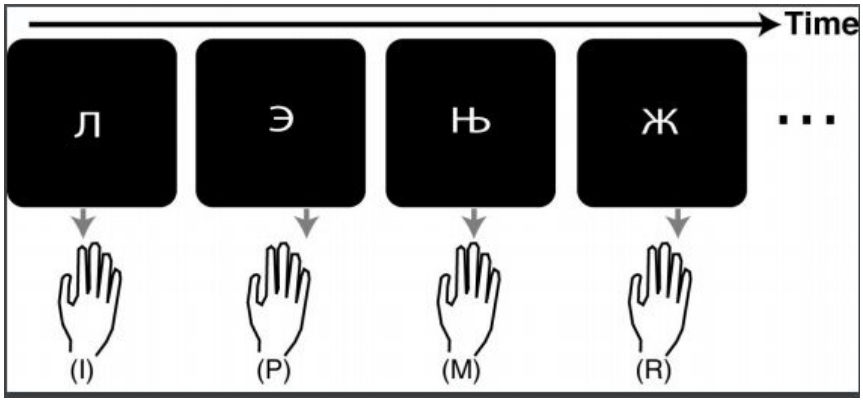
1. The text and figures below describe the results of an experiment looking at how performance in a 5-day sequence learning task associates with individual differences in obesity measures (also referred to as adiposity). Provide a single take-home message sentence that conveys the key results in a concise, accurate, and general way (i.e., without jargon).

Task:
Participants were run in a standard version of the serial reaction time task for five consecutive days, with a one-hour training session on each day. All stimuli were presented on a 23" ASUS LED monitor with a resolution of 1920 x 1080 mp, using Matlab R2012a (MathWorks, Inc., Natick, MA). The stimuli were spatially centered on the computer screen in a black background, displayed in a white font color (Fig. 1). Participants were told to respond to a set of cued stimuli presented visually on the computer screen using the right index (1), middle (2), ring (3), and pinky (4) fingers consecutively, with each finger matched to one uniquely paired cue in this order: "Ж", "Є", "Ь", and "Л" (Fig. 1A). Each experimental session consisted of a total of six trial blocks. The experimental blocks were divided into types: Random blocks and Sequence blocks (see Fig. 2A-B). The Random blocks (trial blocks 1, 2, and 5) were comprised of 264 stimuli presented in a pseudorandom order, with a restriction to minimize repetition between any two contiguous stimuli. The Sequence blocks (trial blocks 3, 4, and 6) were comprised of twenty-two repetitions of stimuli from a 12-trial sequence [1, 3, 2, 1, 4, 3, 1, 4, 2, 3, 4, 2]. Each block began at a random part of the sequence so as to minimize immediate identification of the sequential pattern. The sequence pattern remained the same for all Sequence blocks and across the five training days. The experiment was self-paced such that participants were allowed to proceed to the next trial block when they were prepared for the following series.

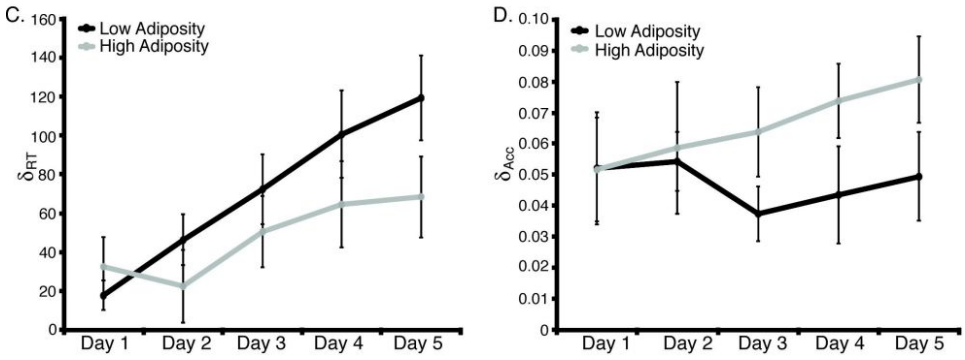


Analysis:
Sequence specific learning was measured for response time by taking the mean value in the last two sequence probes (Block 4 and Block 6; μ4, μ6) and subtracting those from the same values from the last random probe (Block 5; μ5). This measure provided information on sequence specific learning. Learning scores in response time were manually computed by subtracting the mean response time in the random probe from the average of the mean

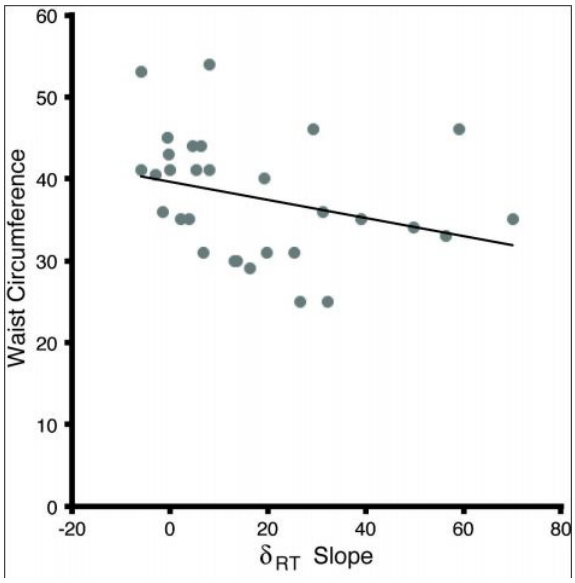
response times of the sequence probes. Likewise, learning scores in accuracy were manually computed by taking the average of the accuracy of the random probes (α4,α6) and subtracting the accuracy in the sequence probe (α5):

Results:

In order to look for group differences in learning scores for response time and accuracy, we performed a median split on our main obesity variable of interest, waist circumference, and categorized subjects into Low (N=16) and High (N=14) adiposity groups. A repeated-measures ANOVA found a significant main effect of training day on response time learning scores (Fig. 2C; $F(4, 116) = 17.55$; $p < 0.001$), as well as a significant group by day interaction ($F(4, 116 = 2.51$; $p = 0.045$). In general, the Low Adiposity group had a greater rate of learning across training than the High Adiposity group. This group effect is driven by across day learning, as 2-sample t-tests did not find a significant group difference on each individual training day (all p's > 0.10, all t's <1.68). This association between sequence learning and abdominal adiposity group appears to be specific for movement speeds. The learning scores based on accuracy performance did not show a training day by group interaction (Fig. 2D; $F(4, 116) < 1$; $p = 0.565$).



To better understand the relationship between central adiposity and response time learning, we used a linear slope analysis to estimate the rate of across day learning for each subject (the slope of the lines for learning in Fig. 2C-D above). Using a non-parametric Spearman's rank correlation test (ρS), we found a significant negative correlation between learning slope of response times and waist circumference (Table 2; $\rho S = -0.401$, $p < 0.05$). Consistent with our hypothesis, as central adiposity increased, the rate of motor sequence learning across days decreased (Fig. 3).


Waist Circumference
60
50
40
30
20
10
0
-20
0
20
40
60
80
δRT Slope