

Effects of a Classroom Based Yoga Intervention on Stress & Attention in Second & Third Grade Students

School of Health and Environment: Physical Therapy Department
S. Coulombe, B. Davies, A. Potts, C. Ryan, K. Weidknecht, D. Day

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Research Question:

Will a yoga intervention in classrooms positively affect second- and third-grade children's physiological stress, perceived behavior, and attention?

Hypothesis:

A classroom yoga program will improve second- and third-grade children's physiological stress, perceived behavior, and attention.

Methods:

STUDY DESIGN :

- 10-week classroom yoga intervention
- Yoga4Classrooms® resident taught 1 30-minute class/wk
- Timeline for data collected at Week 1 and Week 10:

Saliva Sample 1	ANT-C	Saliva Sample 2	30-min Yoga class	Saliva Sample 3
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MEASURES AND COMPARISONS:

- Acute and longitudinal effects of yoga on physiological stress (salivary cortisol concentrations)
- Longitudinal effect of yoga on attention (Attention Network Test for Children (ANT-C))
- Teachers' perception of individual student behaviors at Week 1 and Week 10

STATISTICS:

- Paired t-tests ($\alpha = p < 0.05$) data are reported as mean \pm standard deviation.

Results:

PHYSIOLOGICAL STRESS:

- baseline salivary cortisol was significantly lower at Week 10 compared with Week 1 in second grade only
- salivary cortisol was significantly lower after the ANT-C test in both second and third graders
- no further reduction in salivary cortisol from post ANT-C to post-yoga in any group

ATTENTION:

- no significant changes in any ANT-C parameters

PERCEIVED BEHAVIOR:

- more statistically significant perceived behavioral changes in second vs. third grade students.
- (see Figures 1A and 1B)

Conclusions:

PHYSIOLOGICAL STRESS

- acute cortisol response for the second and third grade class (Week 1 & Week 10) was significantly lower after the ANT-C computer test was performed (Sample 2 vs Sample 1) and was significantly lower after a single yoga session (Sample 3) compared with the sample taken before both the yoga session and the ANT-C computer test (Sample 1), but not different from the sample taken AFTER the ANT-C computer test and before the yoga class (Sample 2)
- longitudinal cortisol response for the second grade class (Week 1 vs Week 10) was significantly lower before both the ANT-C computer test and yoga session (Sample 1) and significantly lower after the ANT-C computer test and before the yoga session (Sample 2). There was no difference after the yoga session (Sample 3)
- longitudinal cortisol response for the third grade class (Week 1 vs Week 10) revealed no differences between baseline and 10-week follow up samples for Sample 1, Sample 2 or Sample 3

ATTENTION

- the ANT-C data showed no significant chronic effects, though the inter-individual variability was large, suggesting potential need for more habituation to the test prior to actual data collection. Salivary cortisol concentrations were significantly lower after the ANT-C test compared with the baseline sample at both week 1 and week 10.
- findings suggest that the ANT-C test may have had a direct effect on salivary cortisol. In the second grade population, baseline cortisol was reduced after the 10-week yoga intervention. This data should be interpreted cautiously as the study was limited by lack of a control group to confirm the longitudinal change was attributed to the yoga intervention and not some other factor.

PERCEIVED BEHAVIOR

- the second graders had more statistically significant perceived behavioral changes than the third graders from Week 1 to Week 10 including: social interactions with classmates, ability to be in control of their behavior, ability to manage their anger, attention span, ability to concentrate on work, ability to stay on task, creativity, academic performance, ability to deal with stress and anxiety, confidence/self-esteem, and overall mood.
- the positively perceived behavioral changes for the third graders were statistically significant for ability to manage their anger, attention span, ability to concentrate on their work, creativity, academic performance, ability to deal with stress and anxiety, confidence/self-esteem, and overall mood. These differences may be attributed to the student's maturity level, the activity level of the students, class dynamics, and the willingness of the students to learn.
- above all, the common positively perceived behavioral change between grades two and three is the ability of the students to deal with stress and anxiety.

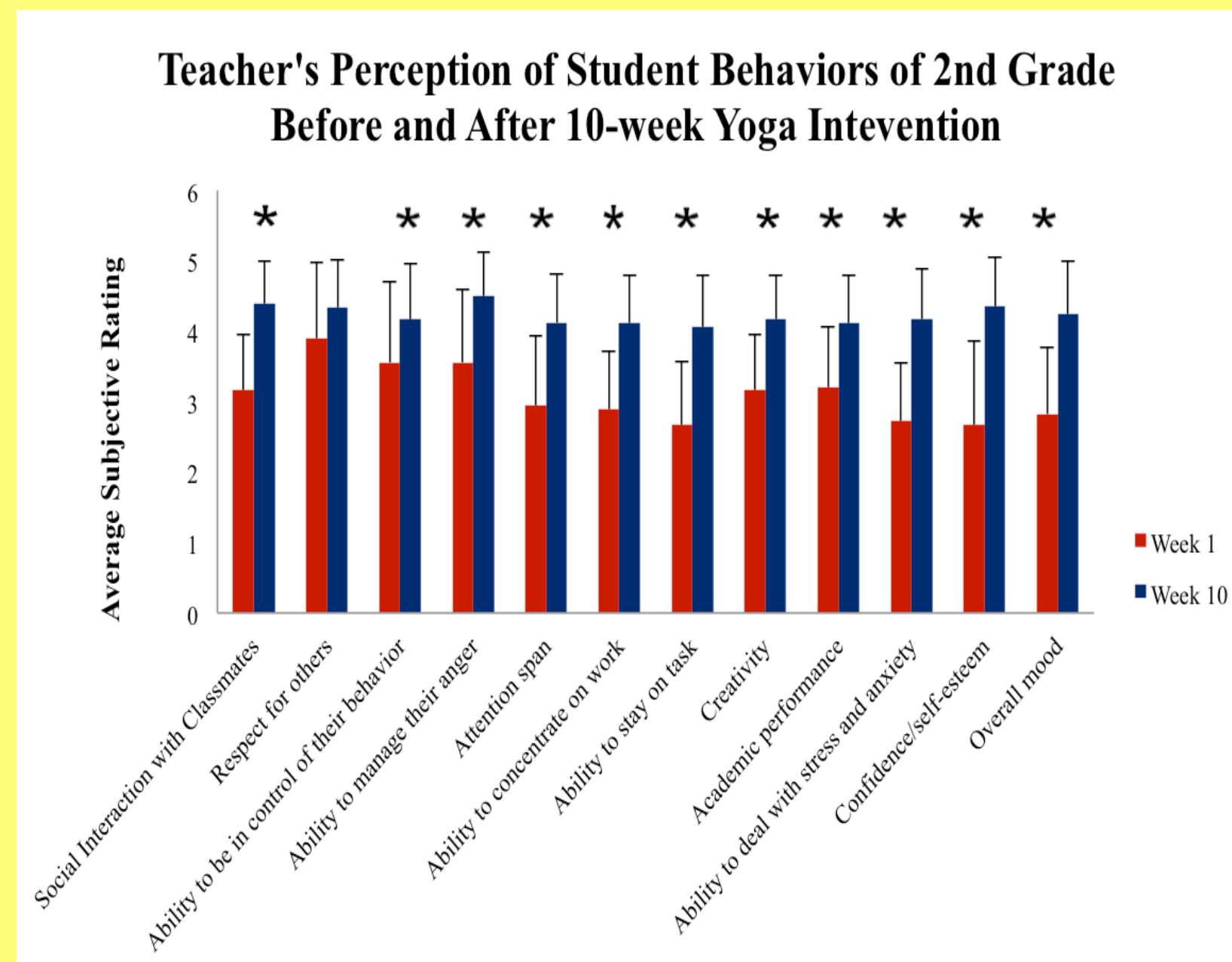


Figure 1A. Second Grade Classroom Average ratings from a 1-5 scale (1 = Poor, 5 = Good) of positive behavioral characteristics as perceived by teachers.

* $p < 0.05$ Week 1 vs. Week 10

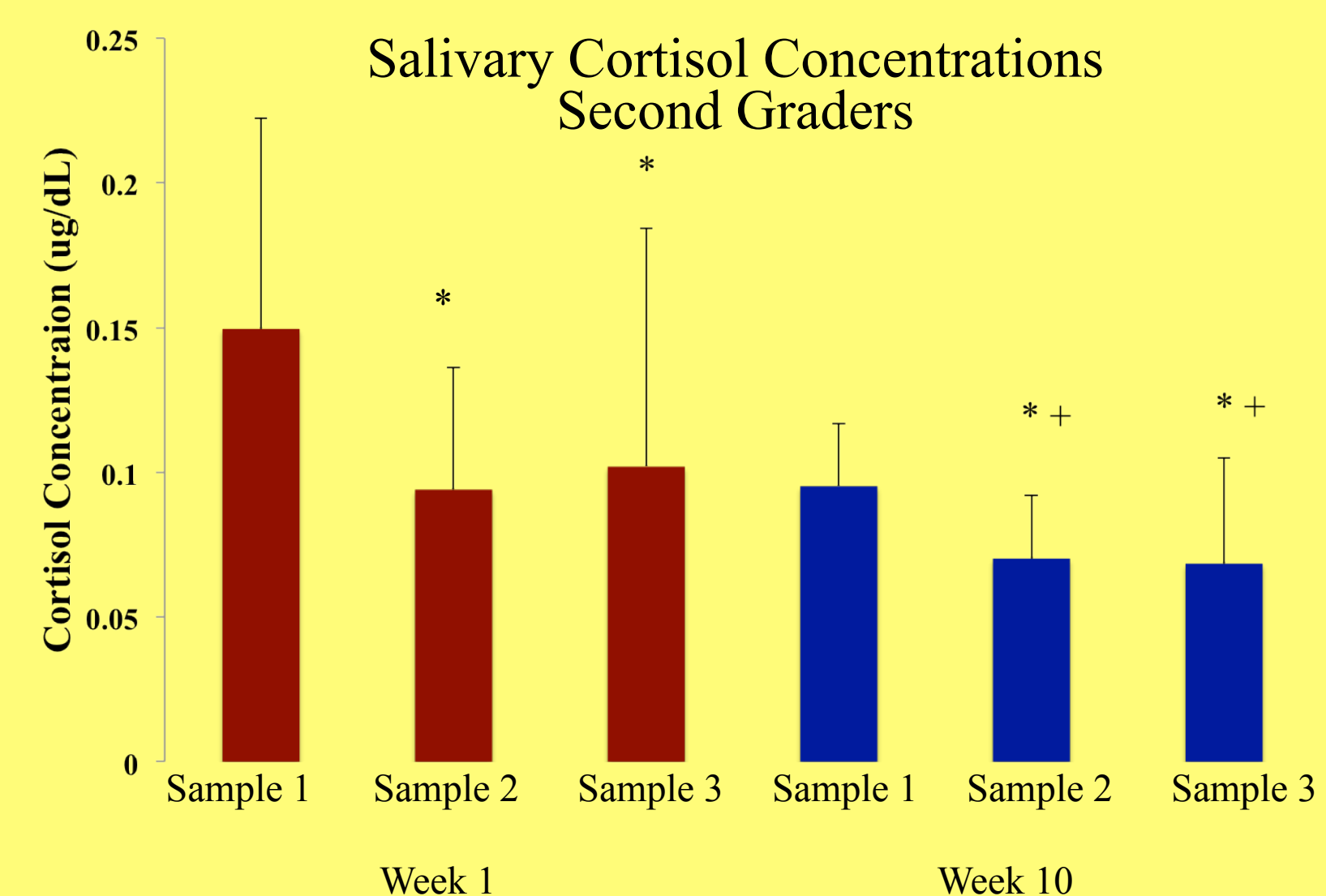
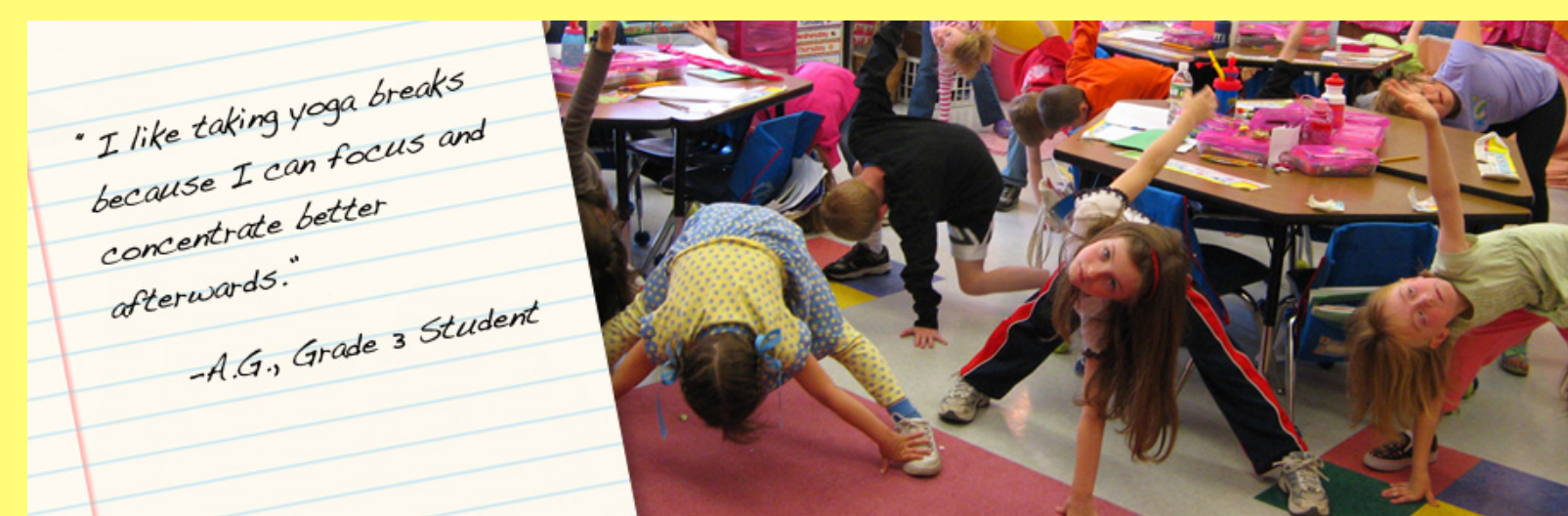


Figure 3A. Second grade classroom average cortisol concentrations Acute Responses to ANT-C and Yoga Class Within Weeks 1&10

* $p < 0.05$ vs Sample 1 within the same week

Longitudinal Effects of Yoga Intervention Between Weeks 1 and 10
+ $p < 0.05$ vs same sample in Week 1

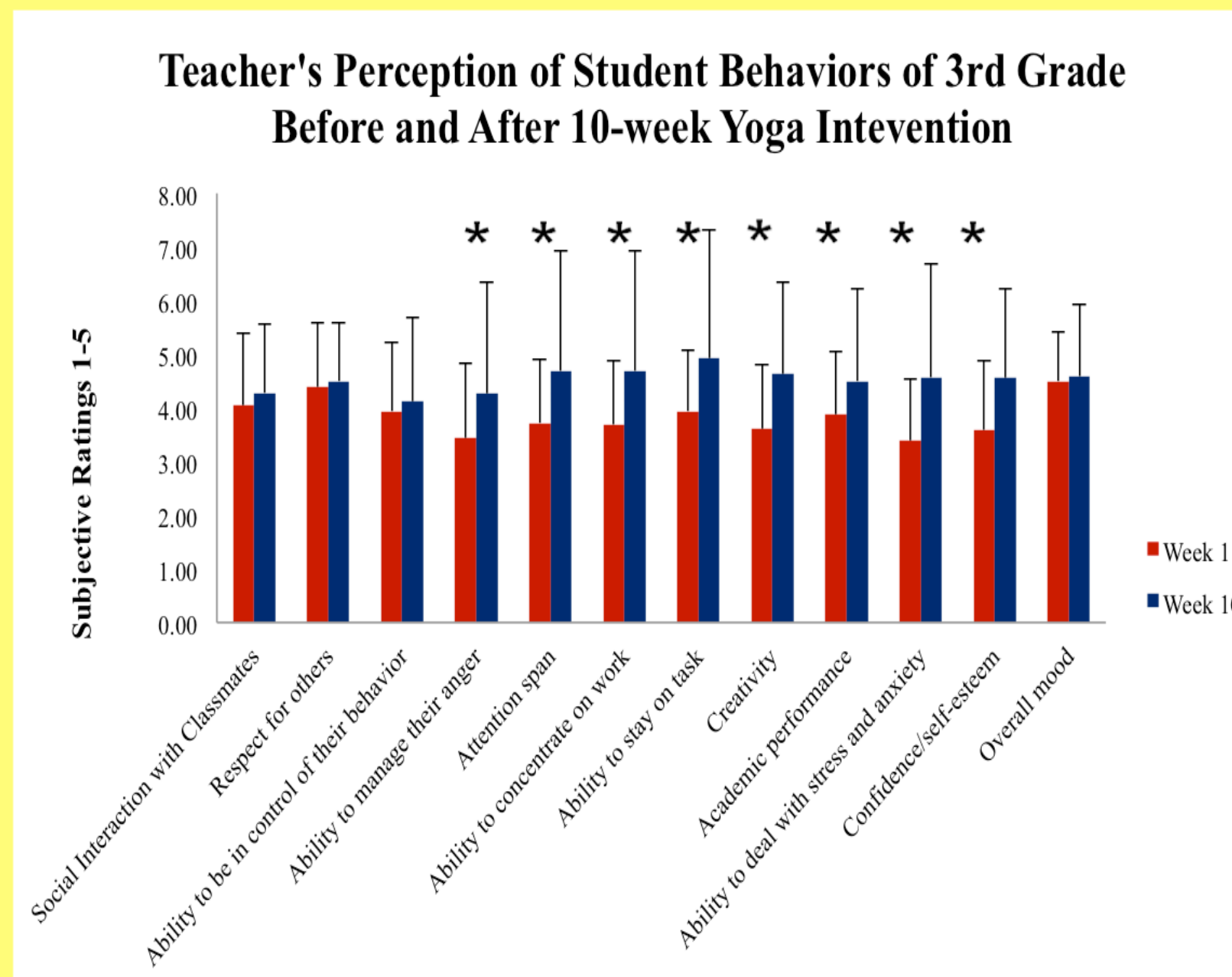


Figure 1B. Third Grade Classroom Average ratings from a 1-5 scale (1 = Poor, 5 = Good) of positive behavioral characteristics as perceived by teachers.

* $p < 0.05$ Week 1 vs. Week 10

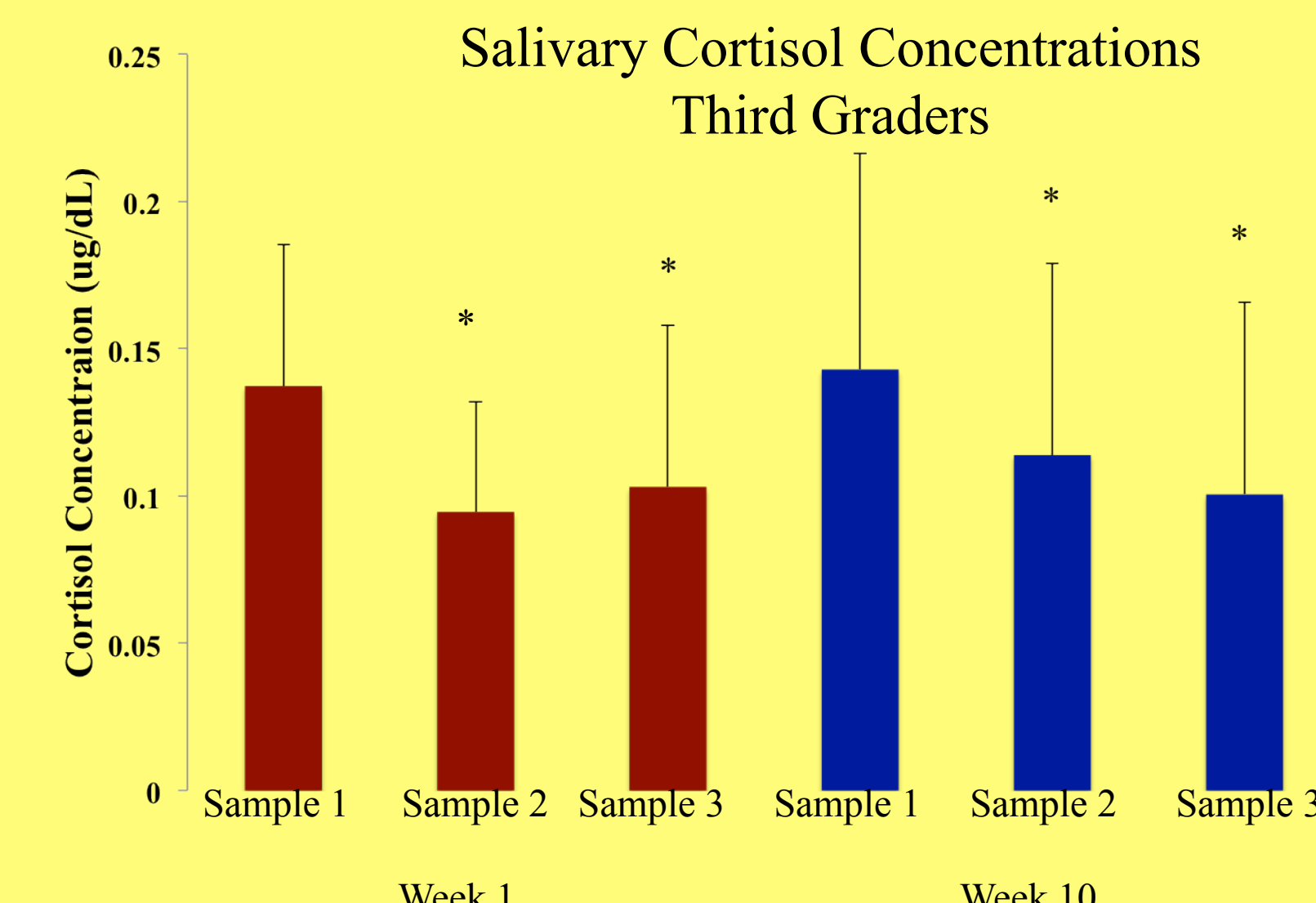


Figure 3B. Third grade classroom average cortisol concentrations Acute Responses to ANT-C and Yoga Class Within Weeks 1&10

* $p < 0.05$ vs Sample 1 within the same week

Longitudinal Effects of Yoga Intervention Between Weeks 1 and 10
No differences between Week 1 and Week 10 in 3rd graders

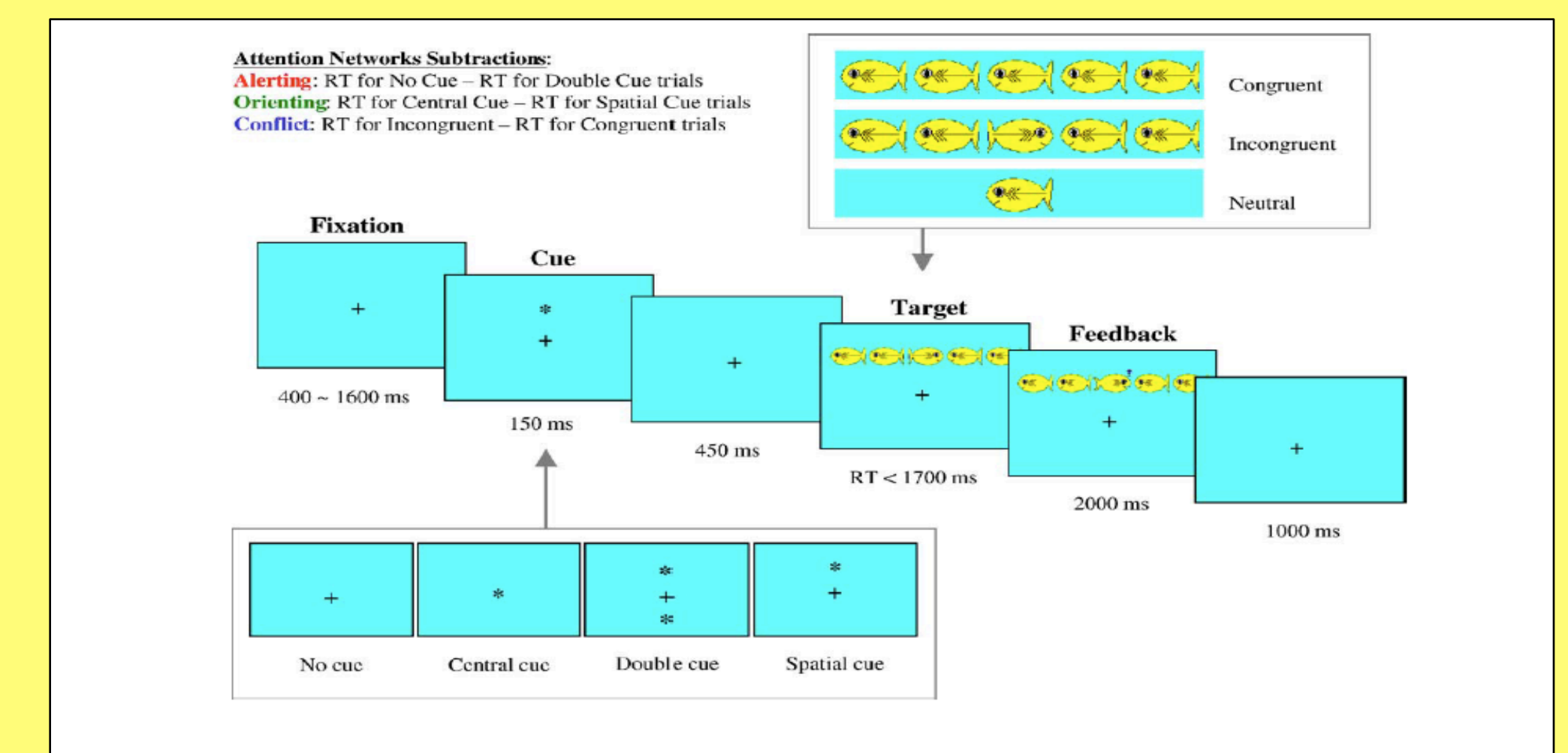


Figure 2. ANT-C Testing Illustration

