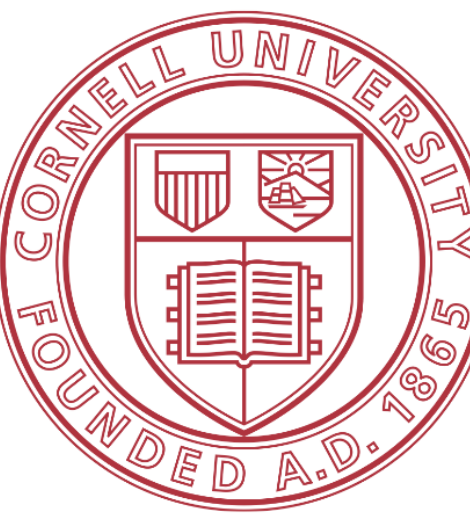


Modifying capacitation ability through lifestyle changes

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Abstract

Introduction: Reports suggest that traditional semen analysis parameters have been declining, although impacts on male fertility are unclear. Lifestyle practices and environmental exposures might be contributing to such declines. Traditional semen analysis (SA) assesses spermatogenesis, accessory gland contributions, and descriptive parameters of motility, concentration, and morphology. However, it fails to evaluate sperm function and to diagnose at least half the cases of male infertility. To fertilize, sperm must complete the process of capacitation. Cap-Score™ not only quantifies capacitation ability and functionally assess male fertility, it also prospectively predicts a man's ability to generate pregnancy.

Objective: Determine the ability of lifestyle changes to moderate capacitation ability and SA measures.

Materials and Methods: Cap-Score was determined in blinded fashion for 38 men seeking fertility assistance. Their lifestyle was subsequently changed by quitting use of tobacco, marijuana, or alcohol; avoiding laptops on laps or Jacuzzis/saunas; losing weight if obese; increasing Vitamin D intake (at least 2k/day); and starting supplements (Androferti (n=30; vitamins C, E, B12, Folate, Zinc, selenium L-carnitine, and coenzyme Q10), or Conception XR (n=8; vitamins C, E, D, Folate, Zinc, selenium, and Lycopene)). A second blinded analysis was done approximately 10 weeks after starting this change. To determine supplement impact, two-sample t-tests were done on the difference between the first and second reading. The impacts of lifestyle changes were determined using paired t-tests comparing the first to the second analysis. Linear regression was used to assess the relationship between Cap-Score and strict normal morphology.

Results: Both supplements had a similar impact on all measures (p>0.05). An increase in Cap-Score from 24.2±1.2 to 27.9±1.2 (p=0.016), corresponding to a 20% increase in a man's probability of generating a pregnancy, was observed after lifestyle changes. Lifestyle changes had no impact on the following SA measures: semen volume (p=0.527), sperm concentration (p=0.547), sperm motility (p=0.202), and total motile sperm (p=0.535). In contrast, strict normal morphology improved (1.7±0.2 to 3.3±0.5; p=0.001). No relationship was detected between Cap-Score and strict normal morphology before (p=0.566) or after (p=0.156) lifestyle changes.

Conclusions: These data support the view that promoting a man's overall health by quitting smoking, drinking, marijuana and losing weight, in combination with nutritional supplements, is linked to changes in sperm capacitation ability and an increase in male fertility.

Introduction

Traditional semen analysis (SA) parameters are declining; hypotheses as to the cause focus on worsening men's health due to environmental exposures and/or lifestyle. SA evaluates ejaculate volume, sperm motility, concentration, and morphology, but doesn't assess sperm fertilizing ability, which causes half the cases of male infertility. It is therefore unknown whether reported declines in SA values have any impacts on actual male fertility. Prior to fertilizing, sperm must capacitate. Cap-Score™ measures the capacitation ability of a man's sperm and prospectively predicts his probability of generating a pregnancy (PGP). Here, we evaluate the effects of protocols designed to improve a man's overall health on his SA and capacitation ability. The objective of the current study was to determine the ability of lifestyle changes to influence and improve capacitation ability and semen analysis measures.

Materials and Methods

- Quit:
 - tobacco
 - marijuana
 - alcohol
- Avoid:
 - laptops on laps
 - Jacuzzis/saunas
- Lose weight if obese
- Increase Vitamin D intake (at least 2000 IU/day)
- Start 1 of 2 supplements
 - Androferti (n=30; vitamins C, E, B12, Folate, Zinc, selenium L-carnitine, and coenzyme Q10)
 - Conception XR (n=8; vitamins C, E, D, Folate, Zinc, selenium, and Lycopene)

Figure 1. Study design. Cap-Score was determined for 38 men seeking fertility assistance. Their lifestyle was subsequently changed, as outlined above. A second blinded analysis was done approximately 10 weeks after initiating these changes.

Results

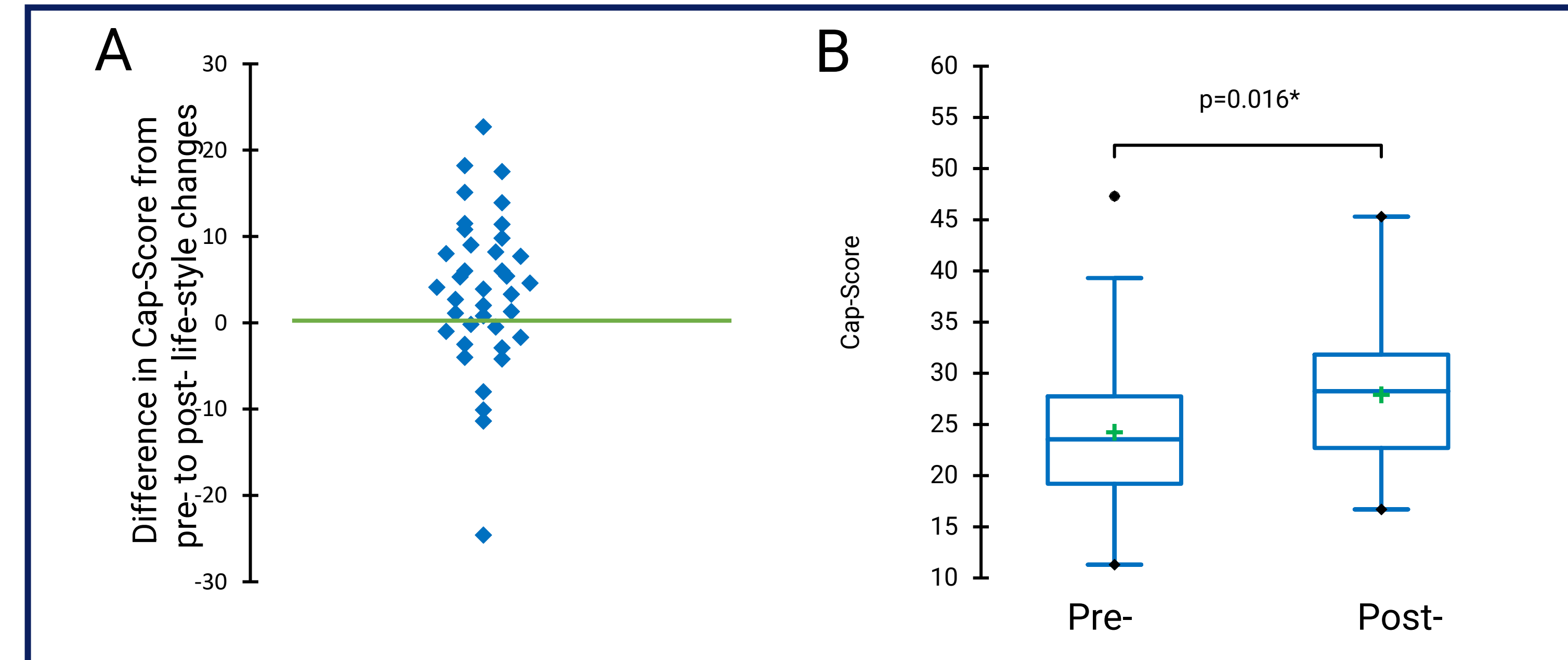


Figure 2. Impacts of improving a man's overall health on his capacitation ability. Panel A, shows the difference in Cap-Score between pre- and post- life-style change. Note that 68% of patients showed an increase, as their difference was above the horizontal green line. This suggested that improving a man's overall health can increase his sperm capacitation ability. In fact, these improvements corresponded to an increase in Cap-Score from 24.2±1.2 to 27.9±1.2 (p=0.016; **panel B**), representing a 20% increase in a man's PGP. In the "box whisker" plots, the green crosses correspond to the mean. The central horizontal bars are the medians. The lower and upper limits of the boxes are the first and third quartiles, respectively. Points above or below the whiskers' upper and lower bounds may be considered as outliers.

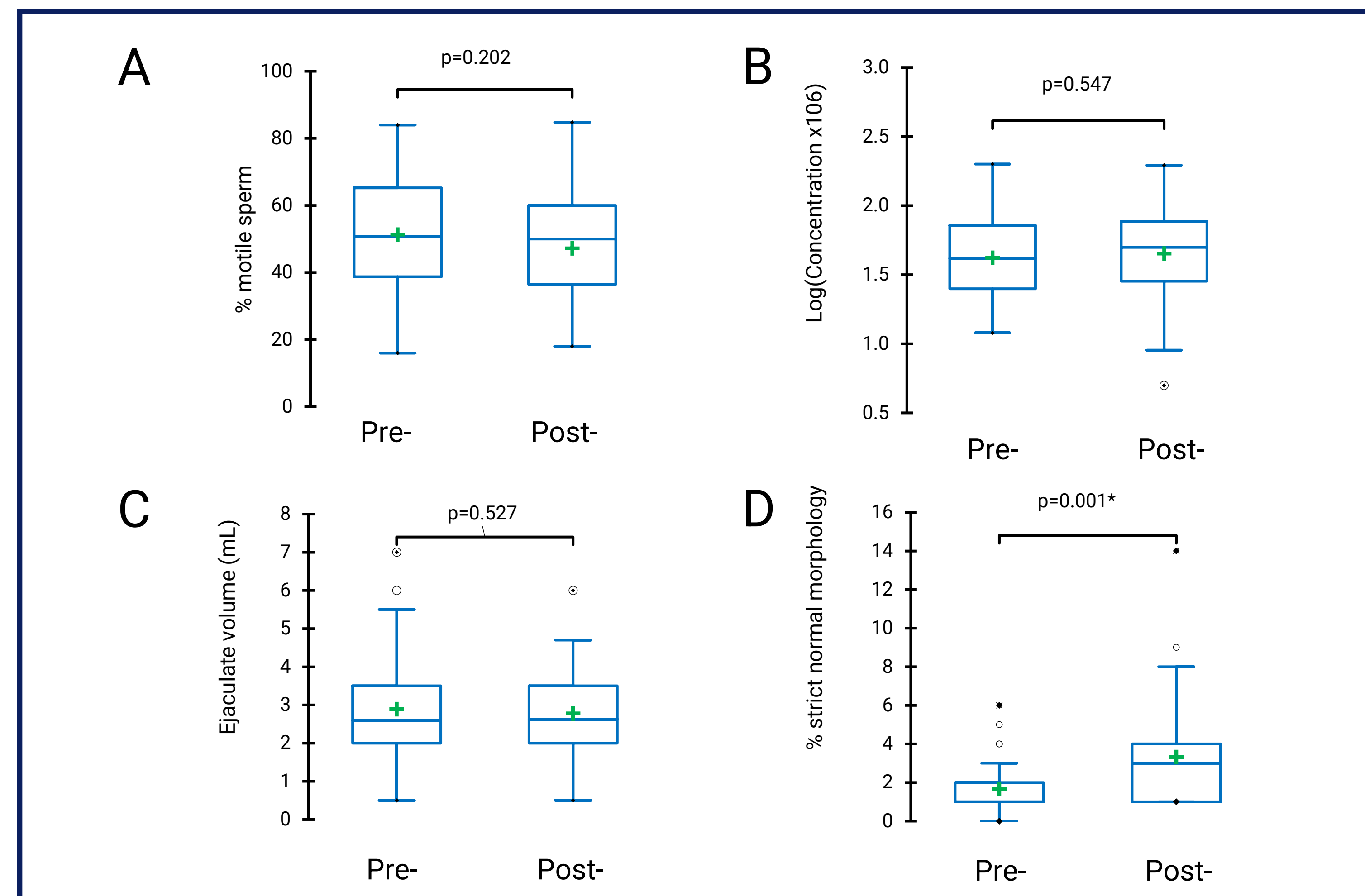


Figure 3. Impacts of Life-Style changes on traditional semen analysis measures. Lifestyle changes had no impact on sperm motility (p=0.202; **Panel A**), sperm concentration (p=0.547; **Panel B**), or semen volume (p=0.527; **Panel C**). In contrast, strict normal morphology improved (p=0.001; **Panel D**). In the "box whisker" plots, the green crosses correspond to the mean. The central horizontal bars are the medians. The lower and upper limits of the boxes are the first and third quartiles, respectively. Points above or below the whiskers' upper and lower bounds may be considered as outliers.

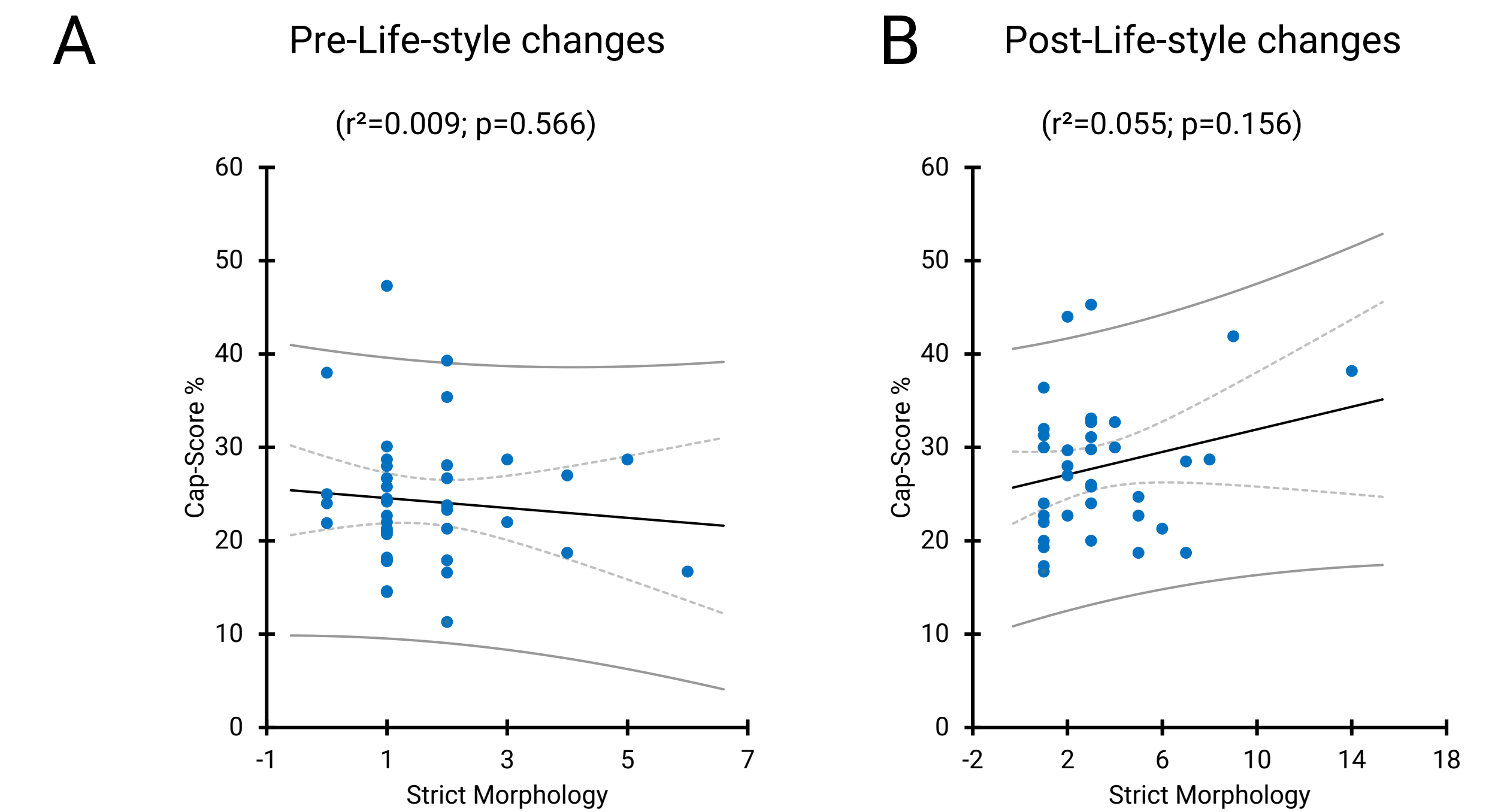


Figure 4. Assessment of relationship between morphology and capacitation ability. No relationship was detected between Cap-Score and strict normal morphology before (**panel A**) or after lifestyle changes (**panel B**). This would suggest that the two measures are evaluating separate and unique features and that strict morphology is not necessarily predictive of a sperm's ability to capacitate and thus fertilize. In these charts, the blue dots represent unique data points. The solid black line shows the regression equation, while the dotted and solid gray lines represent the 95% confidence intervals for the mean and observed values, respectively.

Conclusions

- Promoting a man's overall health:
 - Improves sperm capacitation ability and increases a man's probability of generating a pregnancy.
 - Has little impact on traditional semen analysis measures
- Strict morphology and Cap-Score evaluate separate and unique sperm features.
- Strict morphology is not necessarily predictive of a sperm's ability to capacitate and thus fertilize.

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