

Simulating *Fear of Missing Out* (FOMO) in Rodents: Effects on Sociability and Anxiety-like Behavior in Adult Male and Female C57BL/6 Mice

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ABSTRACT

Fear of missing out (FOMO) refers to a psychological phenomenon characterized by the perception that others are experiencing rewarding situations, from which one is excluded. This fear can induce psychosocial stress, resulting in profound negative effects on both the body and brain. Importantly, chronic exposure to this psychosocial stress can increase the risk for mood-related disorders like anxiety. To date, there are no validated animal models to study the underlying neurobiology of FOMO. Therefore, in this study, we developed a novel preclinical model that experimentally simulates the experience of FOMO in mice. To do this, we placed experimental mice in housing conditions where they witness conspecifics (of the same sex and age) live in an enriched/rewarding environment for 30 consecutive days. Control mice were housed in similar conditions but did not witness other mice live in an enriched environment. We then assessed sociability and anxiety-like behaviors (per the social interaction, light/dark box and open field test). We found that animals experiencing the FOMO-like condition displayed decreased body weight-change when compared to controls. Furthermore, mice in the FOMO-like condition displayed lower sociability along with increased anxiety-like behavior when evaluated in the light/dark box assay. Importantly, no differences in locomotor activity were noted between the groups in the open field test. Collectively, these results indicate that exposure to FOMO-like living conditions results in lower sociability and anxiety-like responses in male and female C57BL/6 mice. This project provides a foundation for the future investigation on the neurobehavioral profile of FOMO-like experiences at the preclinical level.

METHODS



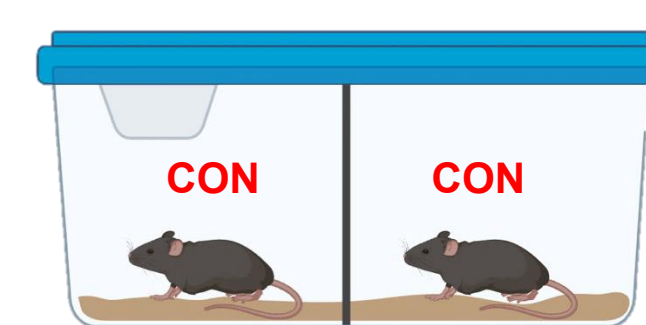
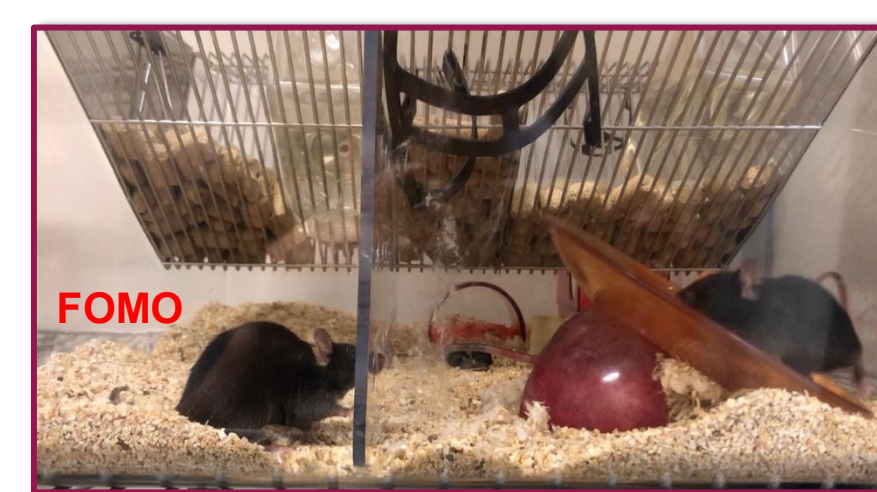
Animals

- ▶ Adult C57BL/6 Mice (Charles River)
- Postnatal Day 70
- Male and Female



Fear of Missing Out (FOMO) Model

- ▶ Mice were randomly assigned to experience 30 days of:
 - **FOMO:** Witnessing conspecifics live in a rewarding environment
 - **CON:** Control housing condition



Social Interaction (SI)

- ▶ Target absent (2.5 min)
- ▶ Target present (2.5 min)



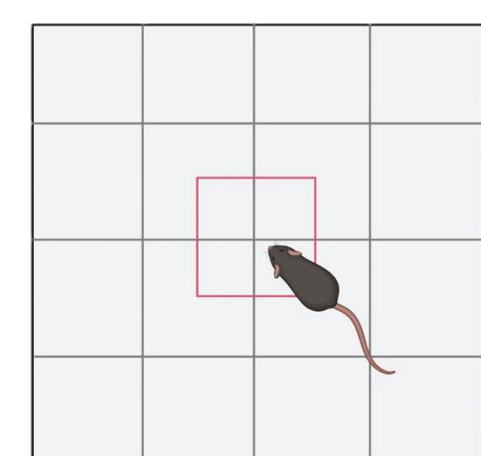
Light Dark Box

- ▶ 5-minute trial
- *Dependent variables:* latency to light side (sec)



Open Field Test

- ▶ 5-minute trial
- *Dependent variables:* velocity (cm/sec) and distance traveled (cm)



BODY WEIGHT CHANGE

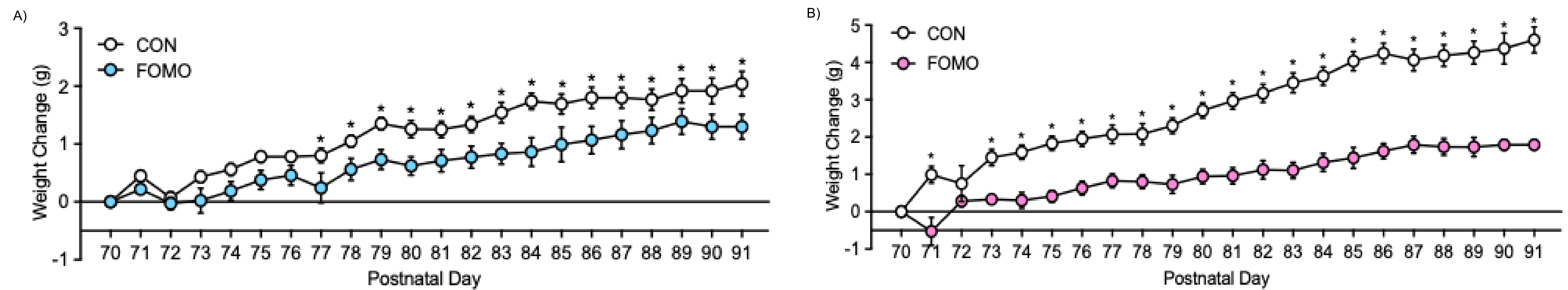


Figure 1. Fear of missing out (FOMO)-living conditions decreased body weight-change in adult male and female mice. To calculate weight change, body weight was subtracted from the initial weight taken on the first day of FOMO. **A)** When compared to controls (CON), male mice in the FOMO condition displayed decreases in body weight-gain as of the eighth day of FOMO exposure. **B)** Likewise, when compared to respective CONs, female mice in the FOMO condition displayed decreases in body weight-gain as of the fourth day of experiencing such living conditions. Data are presented as mean \pm SEM. * $p < 0.05$.

SOCIAL INTERACTION TEST

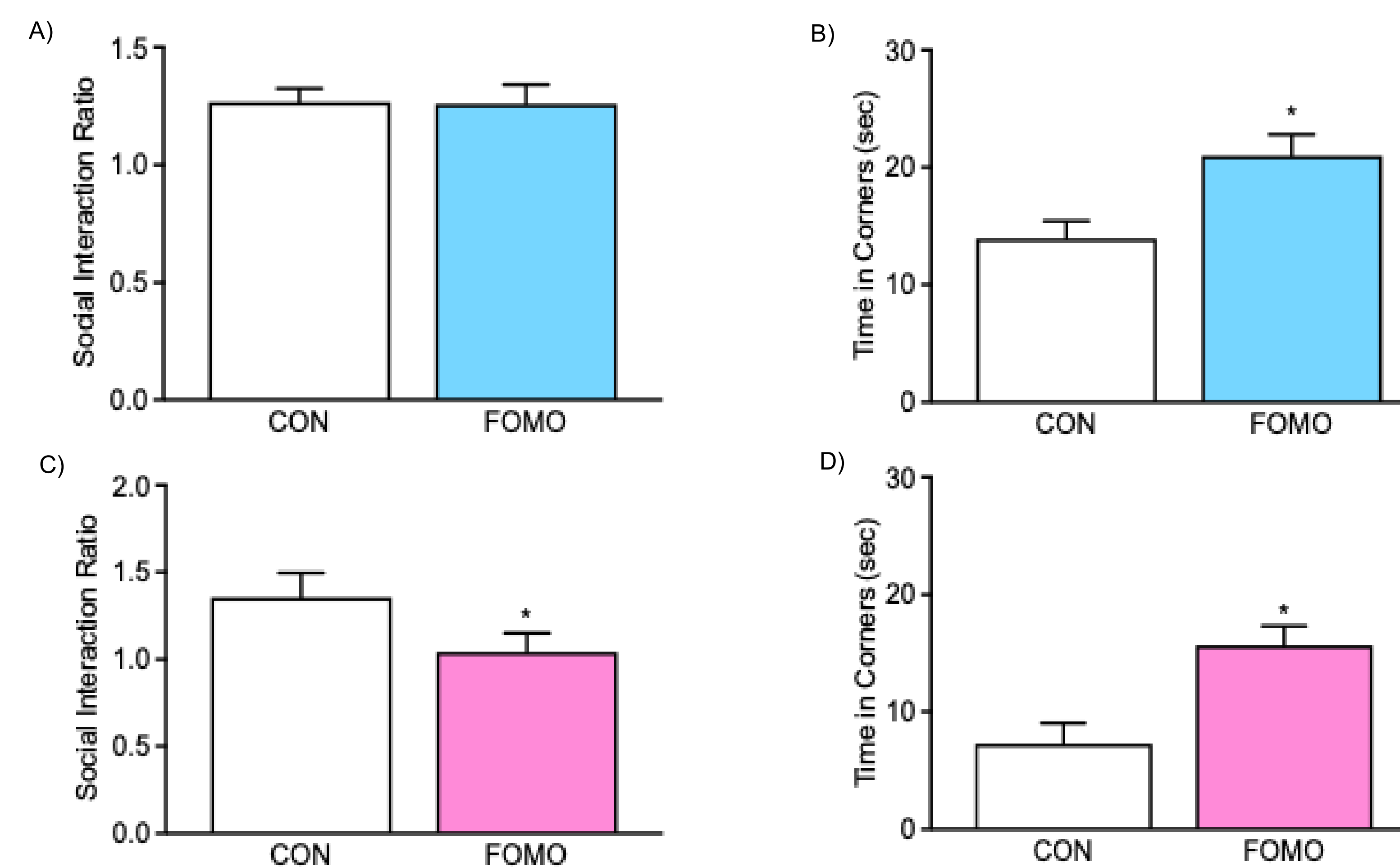


Figure 2. Fear of missing out (FOMO)-living conditions decreased sociability in adult male and female C57BL/6 mice. **A)** Adult male mice exposed to FOMO-like living conditions showed no differences from controls (CON) in social interaction ratios. **B)** Adult male mice in the FOMO experimental condition significantly spent more time in corners than their CON counterparts. **C)** Adult female mice in the FOMO living conditions displayed significant decreased social interaction ratios when compared to respective same-sex CONs. **D)** Female mice in the FOMO condition showed significant increased time spent in corners when compared to CONs. Data are presented as mean + SEM. * $p < 0.05$.

OPEN FIELD TEST

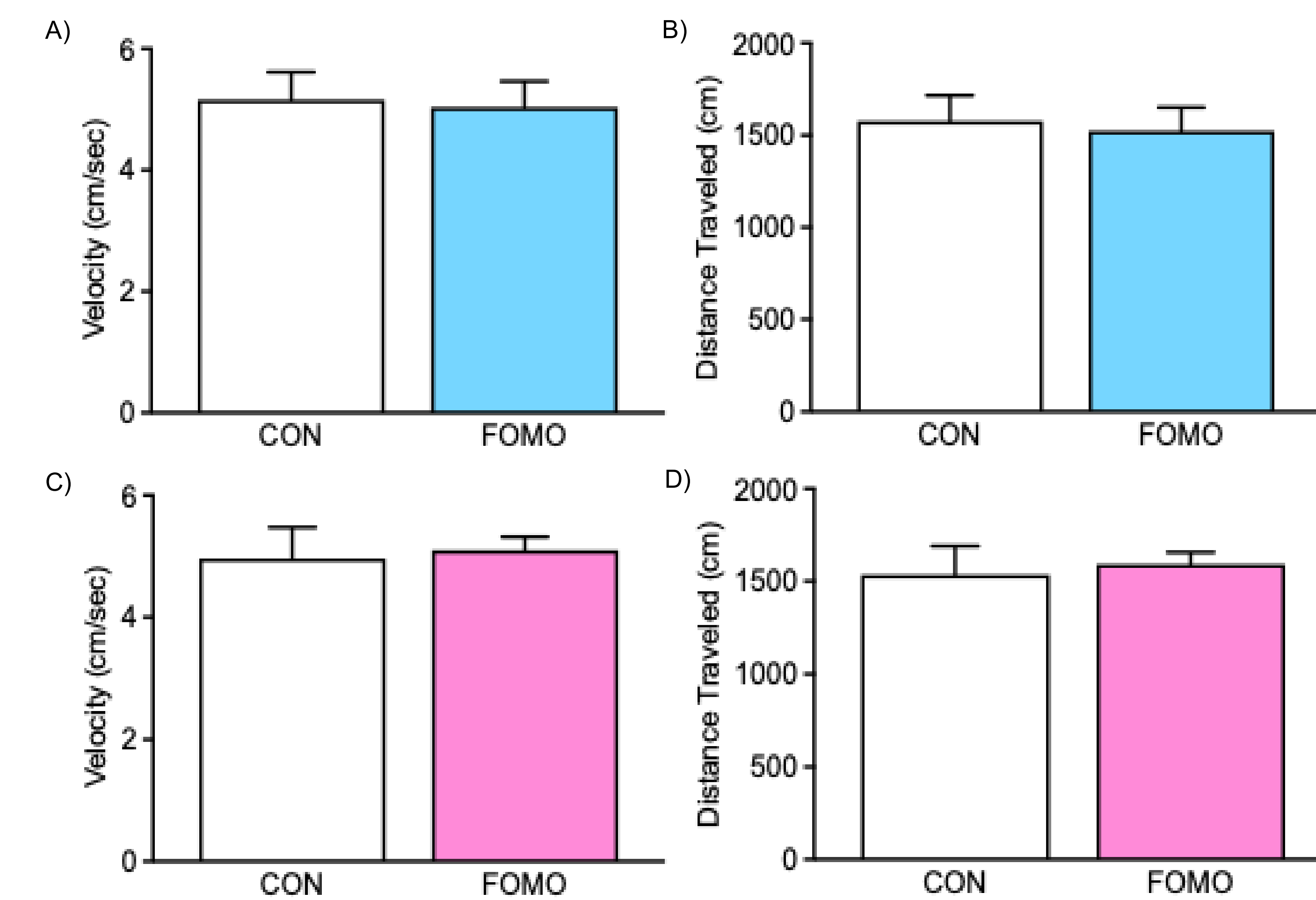


Figure 4. Fear of missing out (FOMO)-living conditions do not influence responses in the open field test in adult mice. **A)** Male mice in the FOMO condition did not display differences in velocity (cm/sec), when compared to same sex controls (CON). **B)** Likewise, no differences were noted in distance traveled (cm) between the groups ($p > 0.05$). **C)** A similar behavioral response was observed in female mice. Specifically, females in the FOMO condition did not display differences in velocity (cm/s) or **E)** distance traveled (cm/sec) when compared to respective female CONs ($p > 0.05$). Data are presented as mean + SEM.

LIGHT/DARK BOX TEST

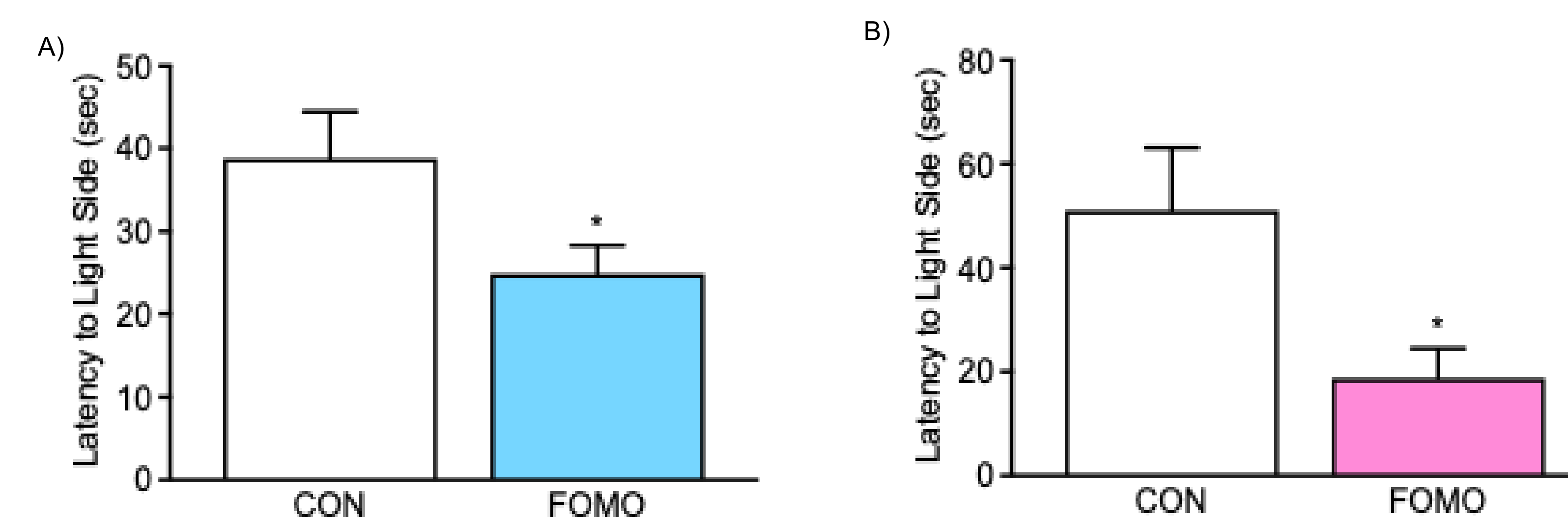


Figure 3. Fear of missing out (FOMO)-living conditions decreased exploratory behavior in the light/dark box test. **A)** When compared to controls (CON), the FOMO exposed male mice displayed decreased latency (sec) to enter the lighted compartment. **B)** Similarly, adult female FOMO mice displayed decreased latency to enter the lighted side of the testing chamber, when compared to respective CONs. Data are presented as mean + SEM. * $p < 0.05$.

CONCLUSION

- ▶ Our results demonstrate that after 30 days of exposure to FOMO-like living conditions, adult male and female mice display dysregulation in sociability and anxiety-like behavior, per:
 - Increased avoidance behavior in the social interaction test
 - Decreased exploratory behavior in the light/dark box
 - Decreased body weight gain
 - No changes in velocity/locomotor activity in the open field test
- ▶ Collectively, we demonstrate that FOMO-like living conditions induce anxiety-related outcomes in adult male and female mice. These data provide a platform for the investigation of FOMO through a preclinical approach.

ACKNOWLEDGEMENTS

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