

# Neural substrates of social and food investigation in adolescent C57BL/6 mice



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# The Significance of Studying Social Interaction-Seeking and Food-Seeking

- ❑ Social interactions and food intake are essential for humans and animals
- ❑ Studying social interaction-seeking and food-seeking has important implications
- ❑ Motivated behaviors may be regulated by overlapping neuronal populations

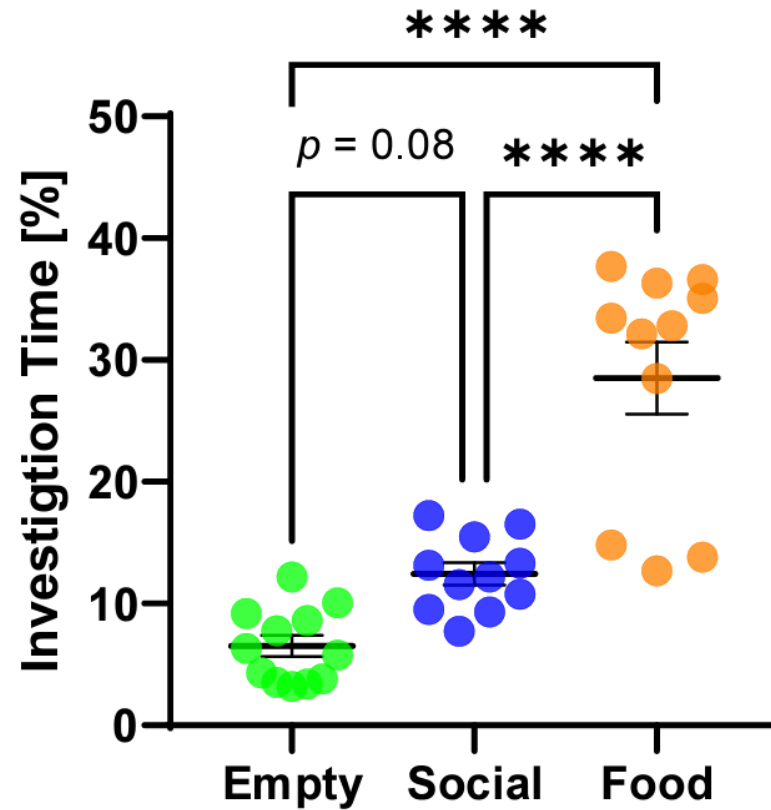


# Experimental Methods

- ❑ Male and female adolescent C57BL/6 mice
- ❑ 18hrs of combined social isolation and food deprivation
- ❑ Exposed to either a **social** stimulus (unfamiliar age- and sex- matched mouse), **food** stimulus (standard lab chow), or an **empty** corral for 10 min
- ❑ After the test, brains were collected and neuronal activation (measured by Fos induction) was examined for:
  - Orexin (ORX) neurons in the lateral hypothalamic area (LHA)
  - Tyrosine hydroxylase (TH) neurons the ventral tegmental area (VTA)
  - Oxytocin (OT) neurons in the supraoptic (SO) & paraventricular (PVH) hypothalamic nuclei

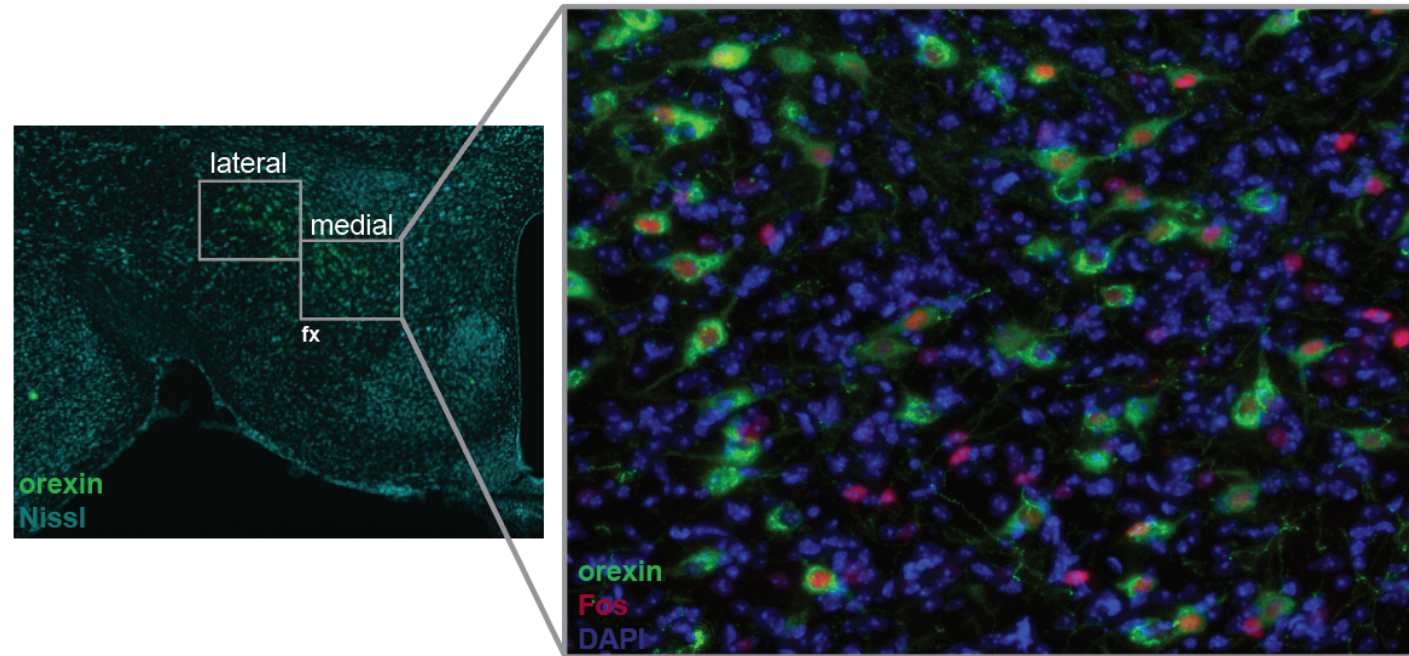


# Investigation time varied between groups



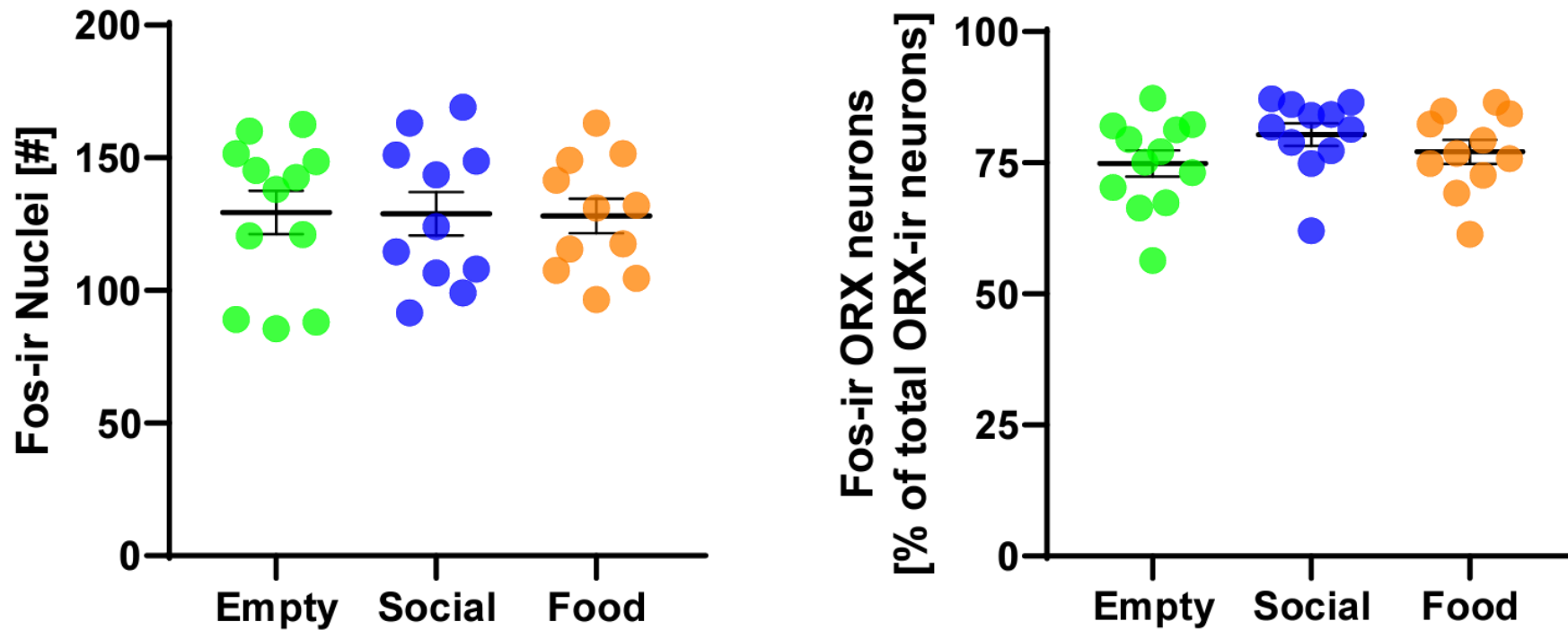
Mice exposed to a **food** stimulus spent more time investigating than mice exposed to a **social** stimulus or **empty** corral.

# Assessing activation of the LHA and LHA-ORX neurons

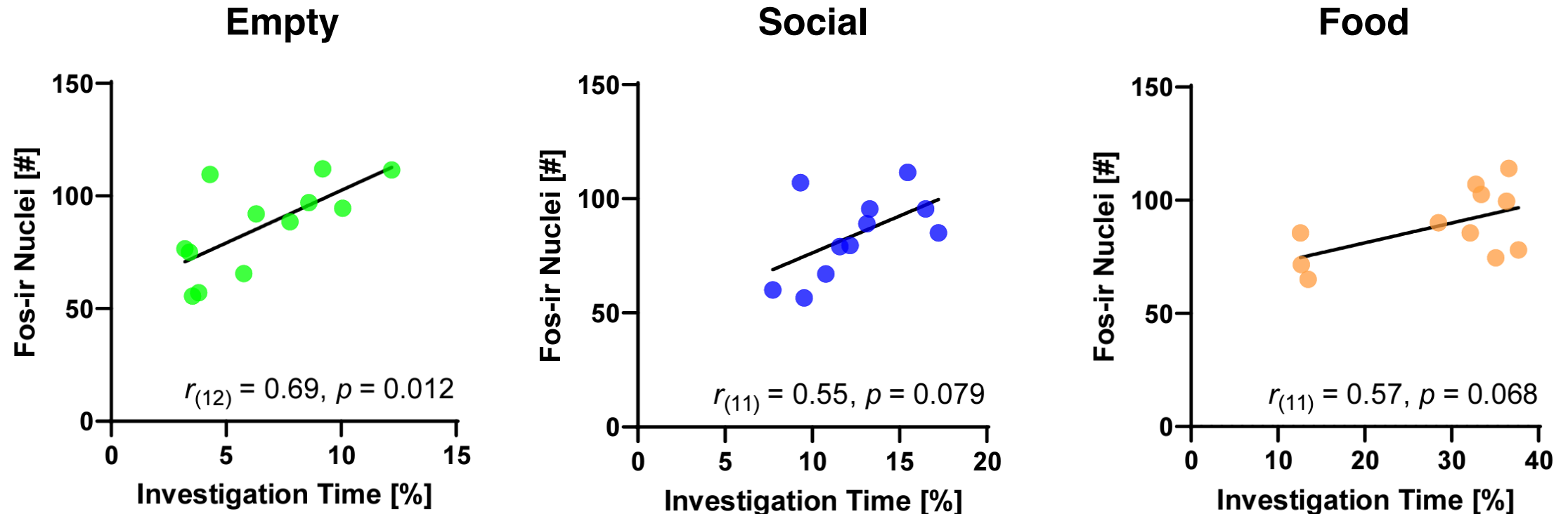


**The grey boxes indicate our sampling locations in the medial and lateral LHA.**

# Fos induction in the LHA and LHA-ORX neurons was similar between groups

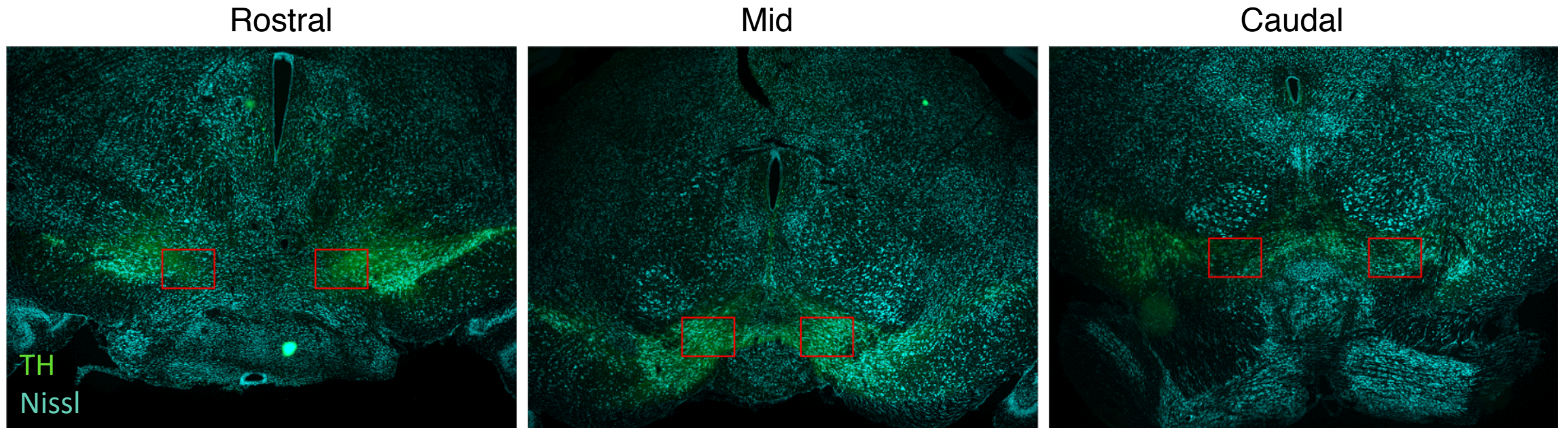


# Investigation time and medial LHA Fos induction were positively correlated across groups



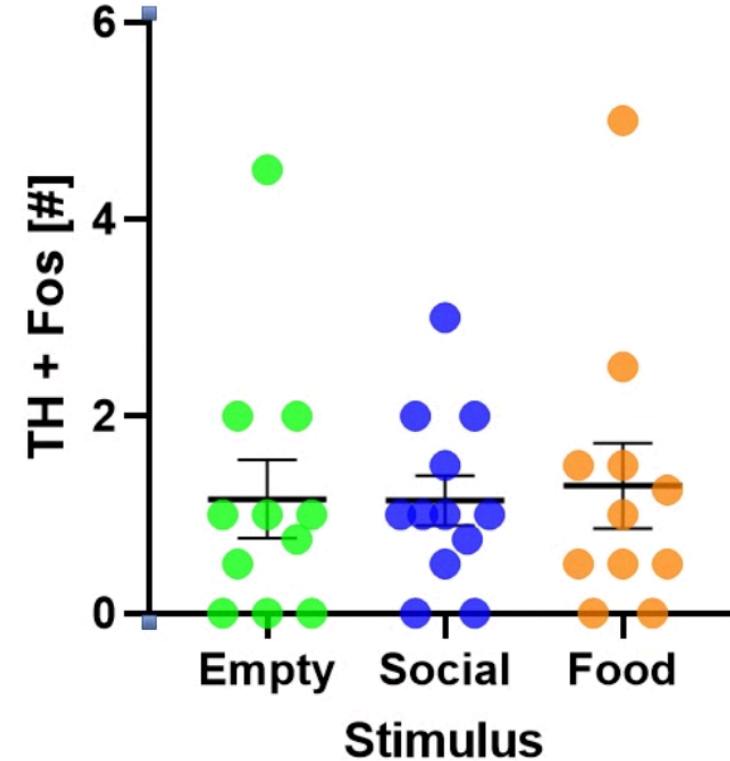
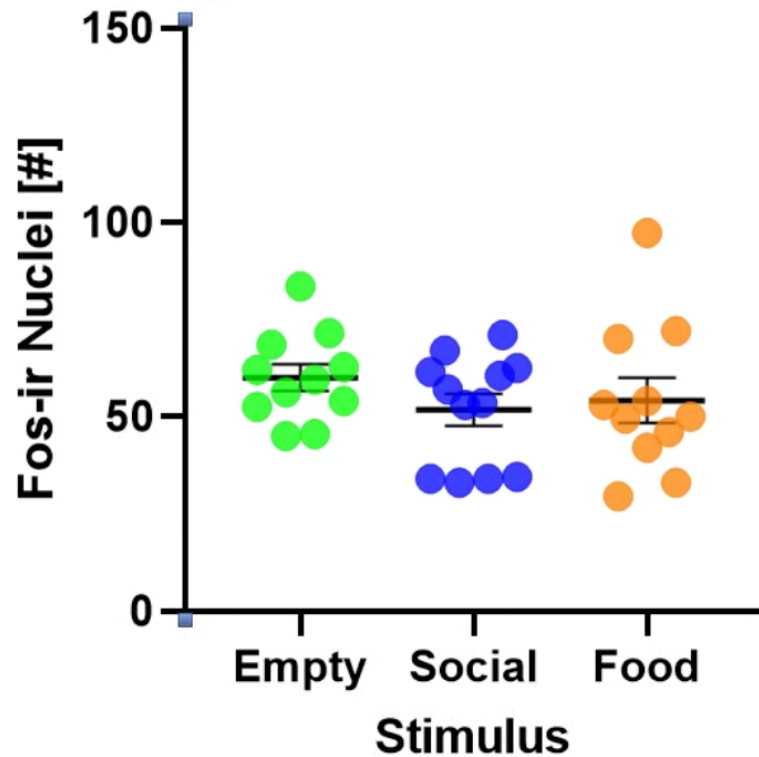
There was a positive correlation between the time spent investigating stimuli and Fos induction in the medial LHA, most notably with investigation of the **empty** corral.

# Assessing activation of the VTA and VTA-TH+ neurons

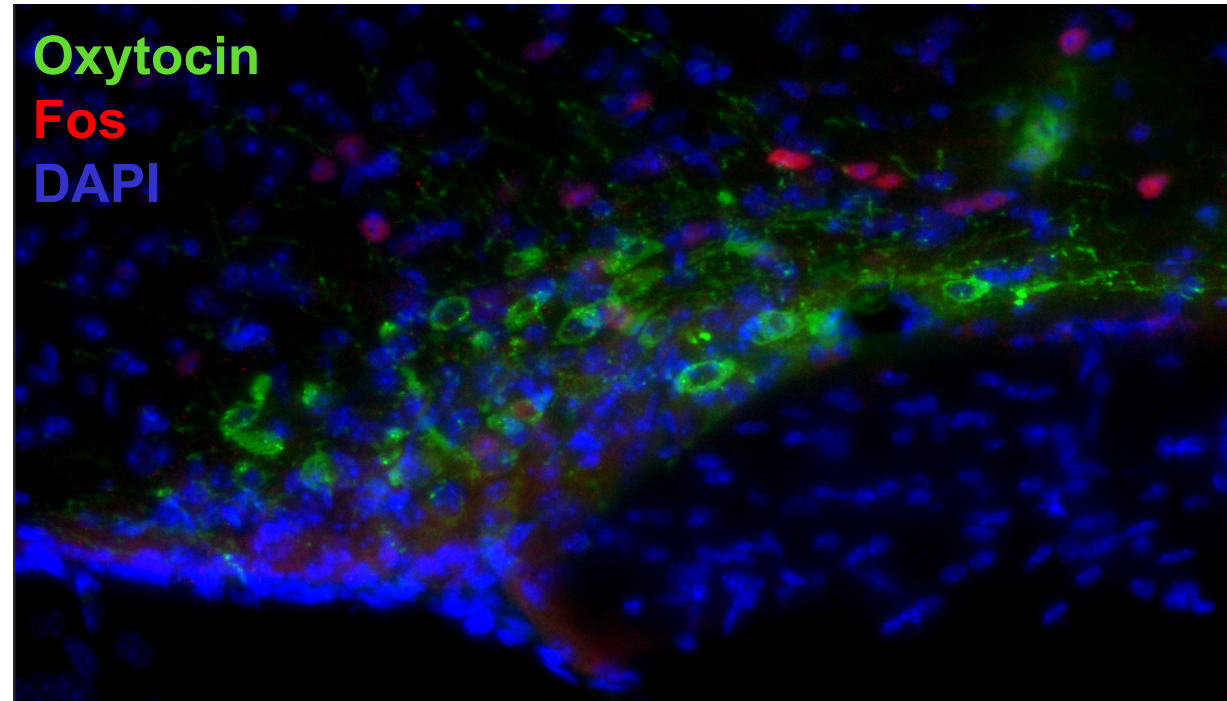
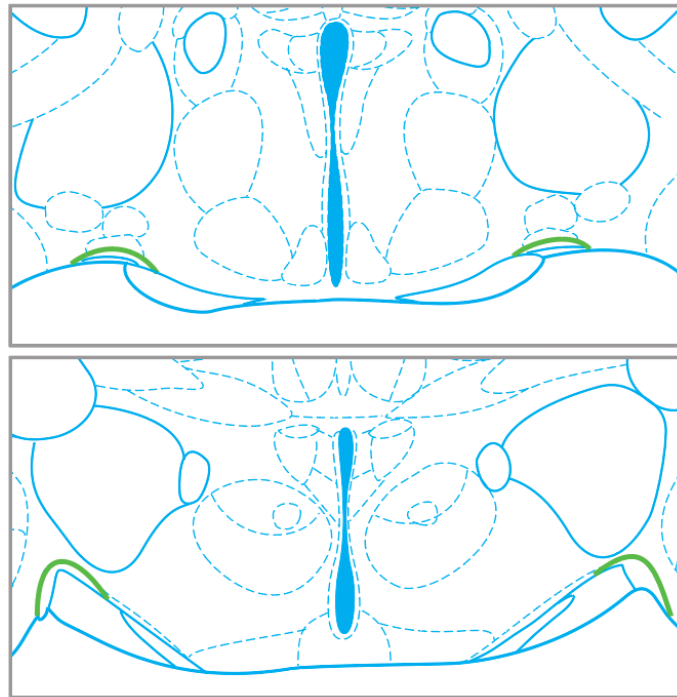


The **red** boxes indicate our sampling locations in the rostral, mid, and caudal VTA.

# Fos induction in the VTA and VTA-TH+ neurons was similar between groups

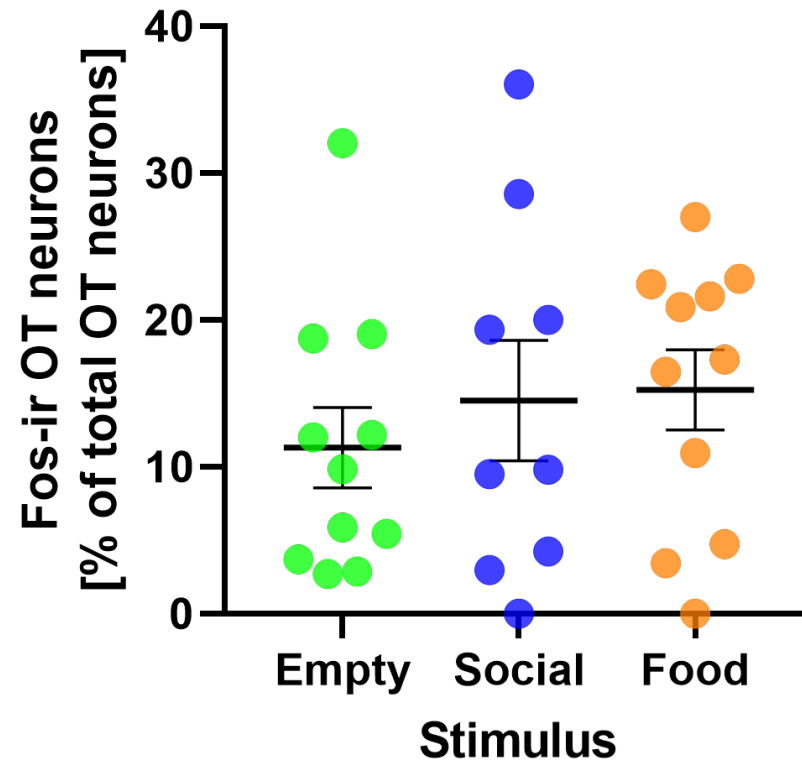
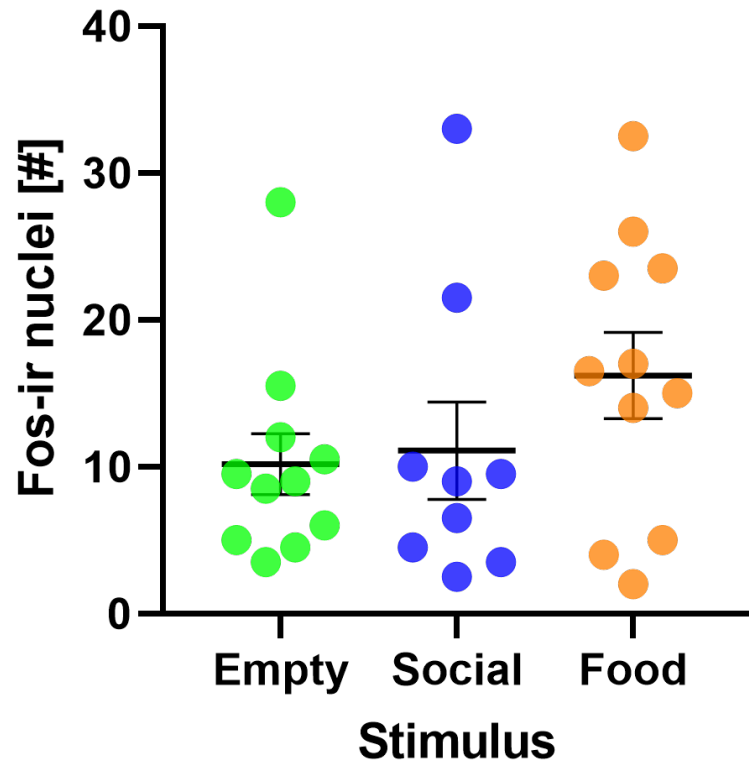


# Assessing activation of the SO and SO-OT neurons

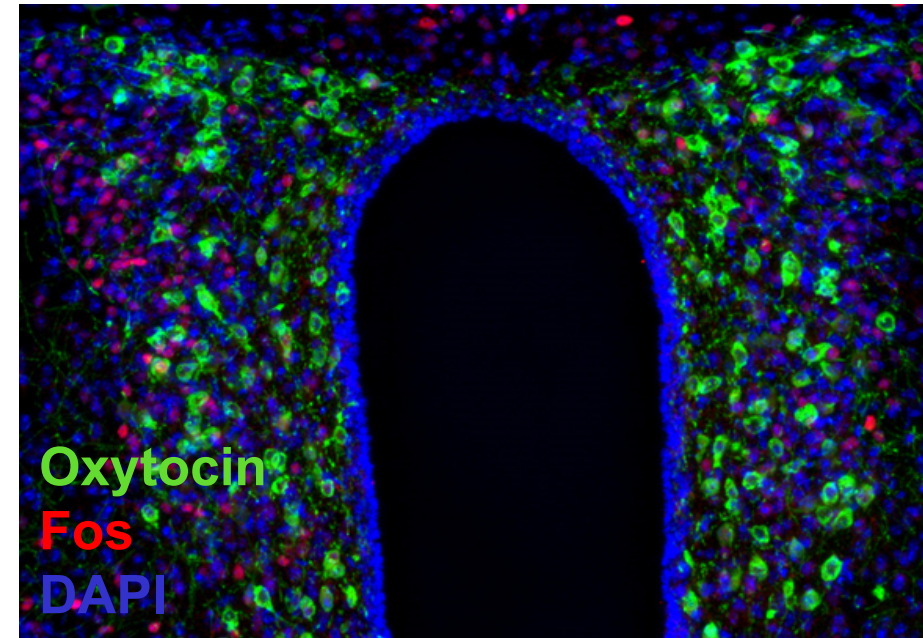
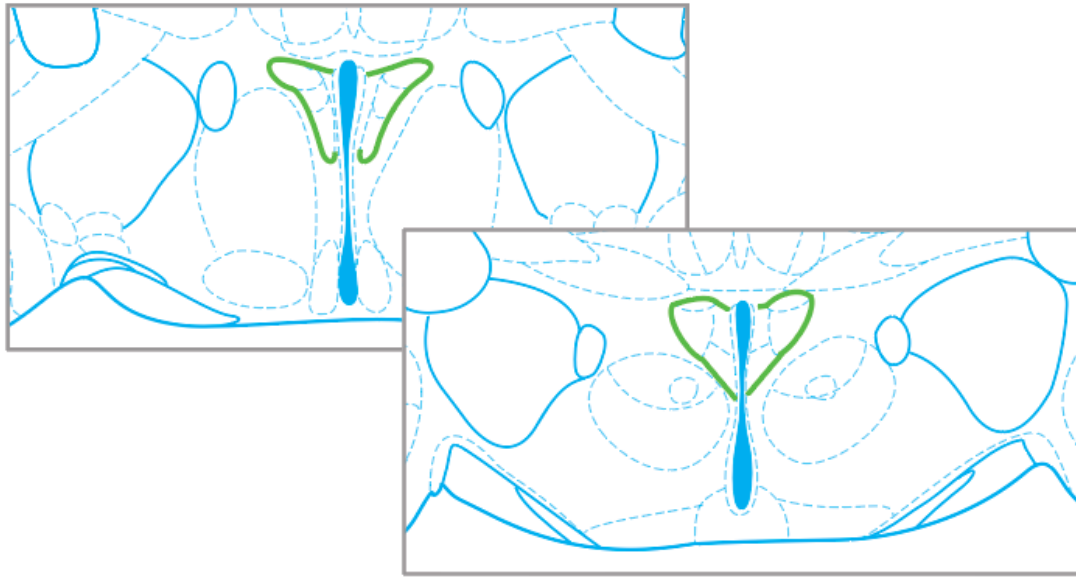


Borders (**green**, left) were drawn around the SO for 2 sections: 1 mid-rostral & 1 mid-caudal.

# Fos induction in the SO and SO-OT neurons was similar between groups

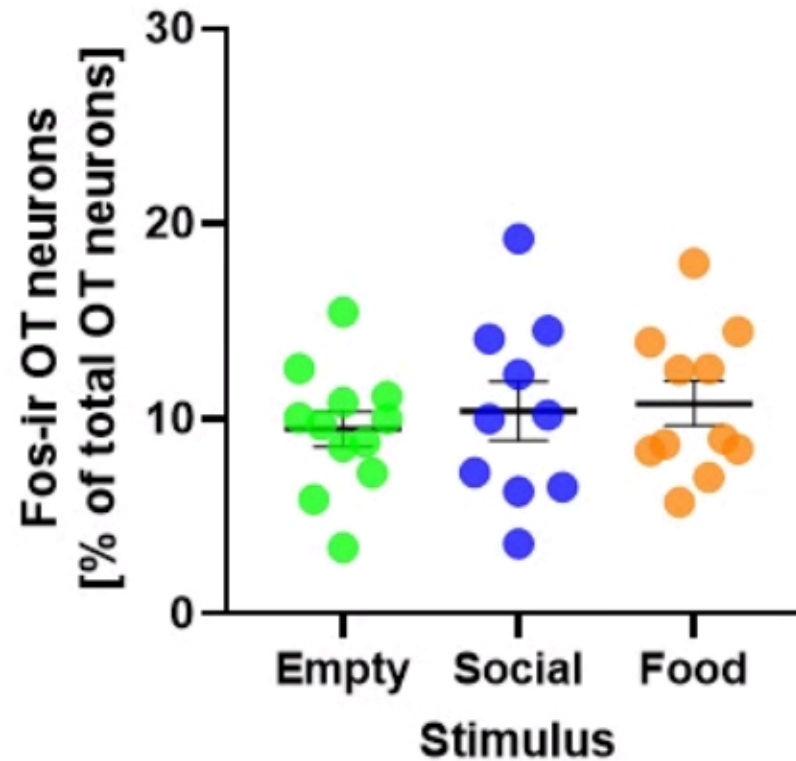
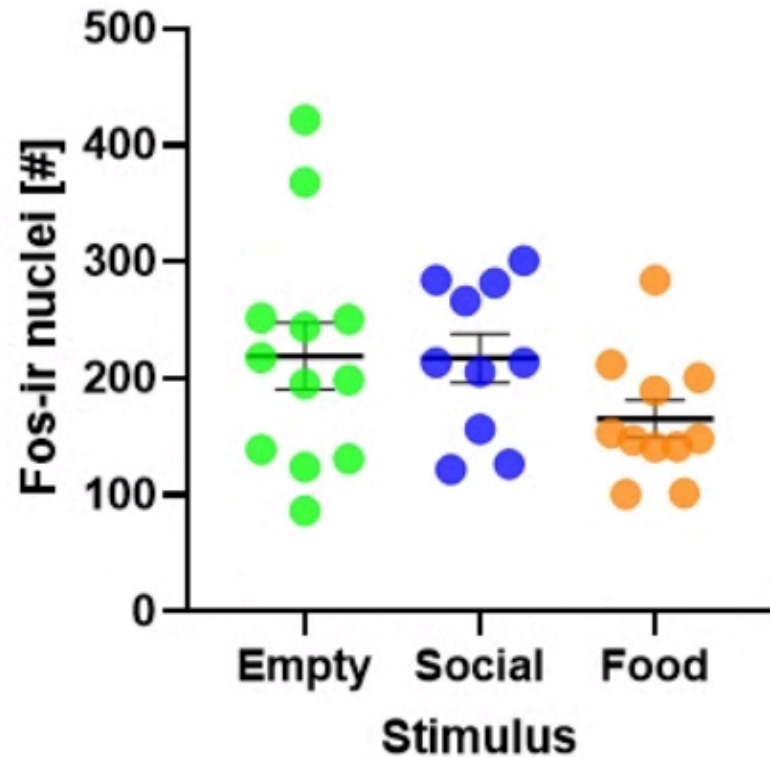


# Assessing activation of the PVH and PVH-OT neurons

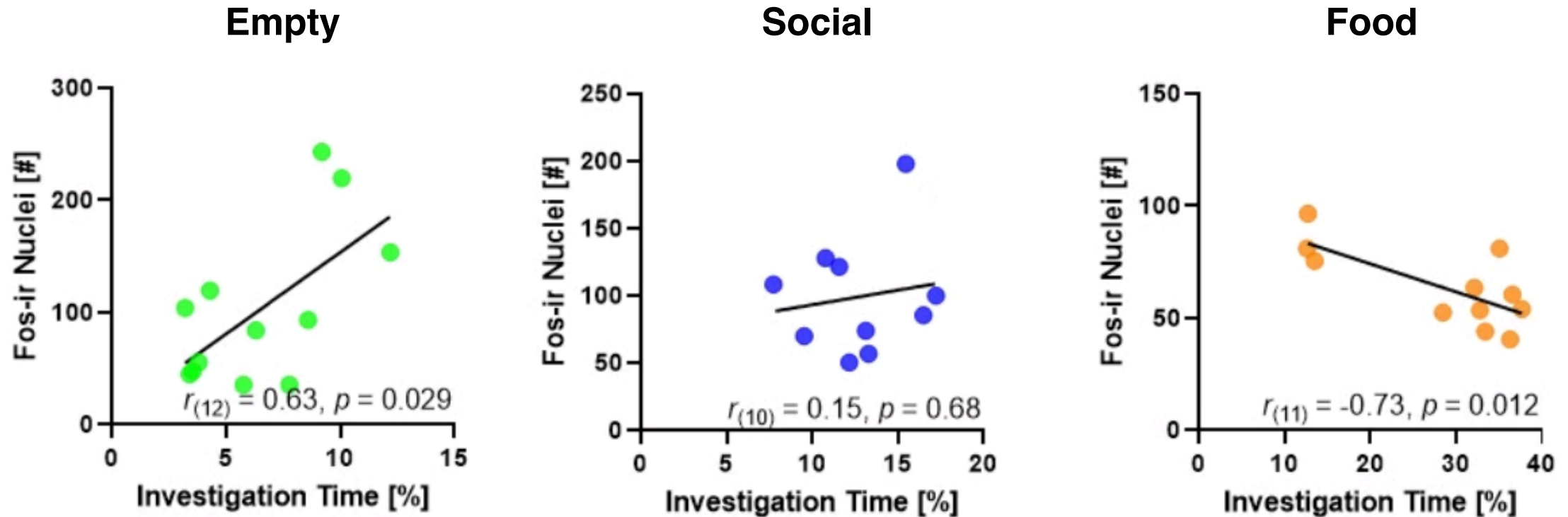


Borders (green, left) were drawn around the PVH for the 2 sections where OT was the most dense.

Fos induction in the PVH and PVH-OT neurons was similar between groups

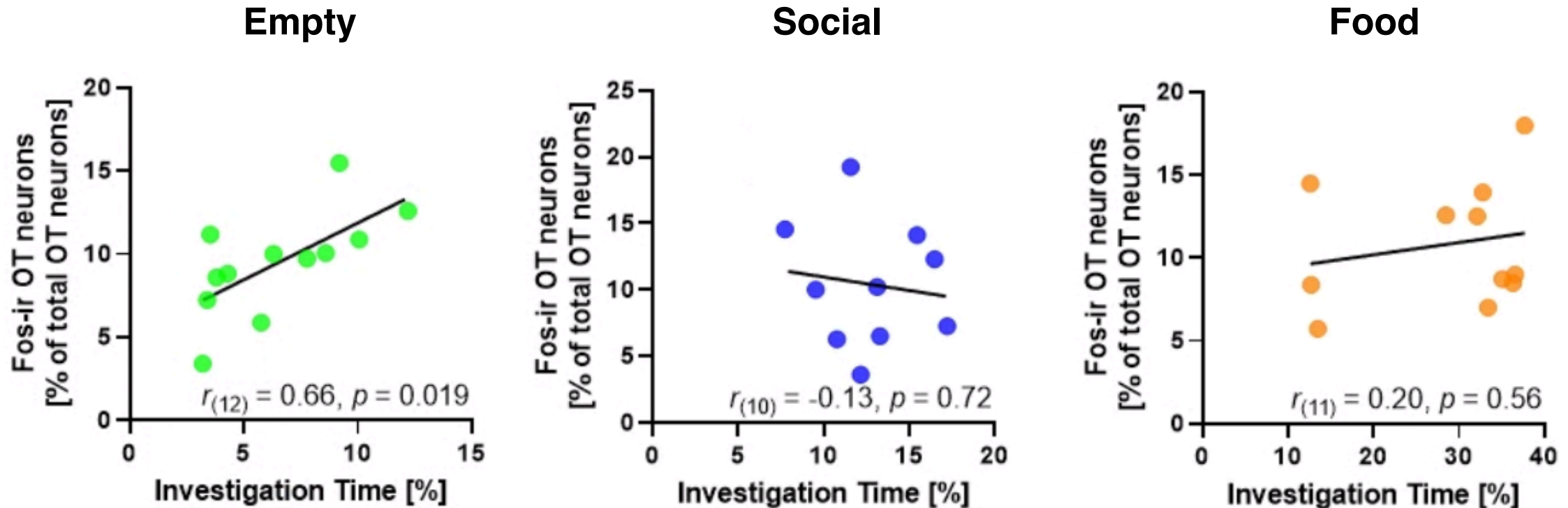


# Investigation time and rostral PVH Fos induction were differentially correlated across groups



There was a positive correlation between the time spent investigating the **empty** corral and rostral PVH Fos induction. In contrast, there was a negative correlation between the time spent investigating the **food** stimulus and rostral PVH Fos induction.

Investigation time and PVH-OT Fos induction were positively correlated for the empty corral



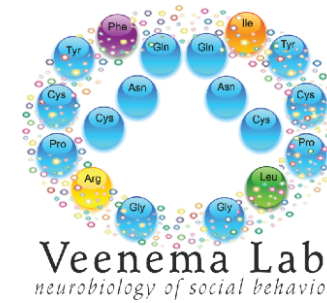
There was a positive correlation between the time spent investigating an **empty** corral and Fos induction within PVH-OT neurons.

Investigation of the **social** or **food** stimuli did not correlate with PVH-OT Fos induction.

# Conclusions & Further Questions

- There were no differences in Fos-induction between groups for any neuronal population.
  - Suggests that these neuronal populations are equally activated by a variety of stimuli.
  - Is there a different neuronal population that would be selectively activated by social and/or food?
- Positive correlation: stimulus investigation & medial LHA Fos induction
  - Suggests the LHA as a potential substrate for the motivation to investigate any stimulus
- Positive correlation: empty corral investigation & PVH and PVH-OT Fos induction-
  - Suggests the PVH as a potential substrate for the motivation to investigate an object
- Negative correlation: food investigation & PVH Fos induction
  - Consistent with the known anorexigenic role of PVH-OT neurons
- **Another question:** Was the observed Fos induction due to motivational state?
  - Follow-up Experiment: Testing mice under low motivation

# Acknowledgements



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