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Educating for Reproducibility: Pathways to Research Integrity

**HOW SOCIAL DOMINANCE AFFECTS PRE-CLINICAL MEASURES OF BEHAVIOR:
A SYSTEMATIC REVIEW OF STUDIES ON MALE LABORATORY MICE**

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ABSTRACT

BACKGROUND: The social environment contributes to individual variability in behavior and physiology of animals, but it is largely neglected in experimental designs and statistical plans in laboratory animal research. In fact, the extent to which the social environment affects common experimental outcomes is virtually unknown. Given the pervasive use of laboratory mice and culminating evidence of issues with reproducibility, understanding the effect of the social environment on common behavioral measures used in research may be of paramount importance.

METHODS: To determine whether social dominance status contributes in a systematic way to standard measures of behavior in biomedical science, we conducted a systematic review of the existing literature searching the databases of PubMed, Embase, and Web of Science. Experiments were divided into four general domains of behavior: exploration/anxiety, cognition, social, and sensory behavior. Meta-analyses between experiments were conducted for the open field, elevated plus-maze, and Porsolt swim test.

RESULTS: Of the 696 publications identified, a total of 57 experiments from 20 published studies met our pre-specified criteria. Study characteristics and reported results were highly heterogeneous across studies. A systematic review and meta-analyses, where possible, with these studies revealed little evidence for systematic phenotypic differences between dominant and subordinate mice.

CONCLUSION: This finding contradicts the notion that social dominance status impacts behavior in significant ways, although the lack of an observed relationship may be attributable to study heterogeneity concerning strain, group-size, age, and dominance

assessment method. Therefore, further research considering these secondary sources of variation may be necessary to determine if social dominance generally impacts treatment effects in substantive ways