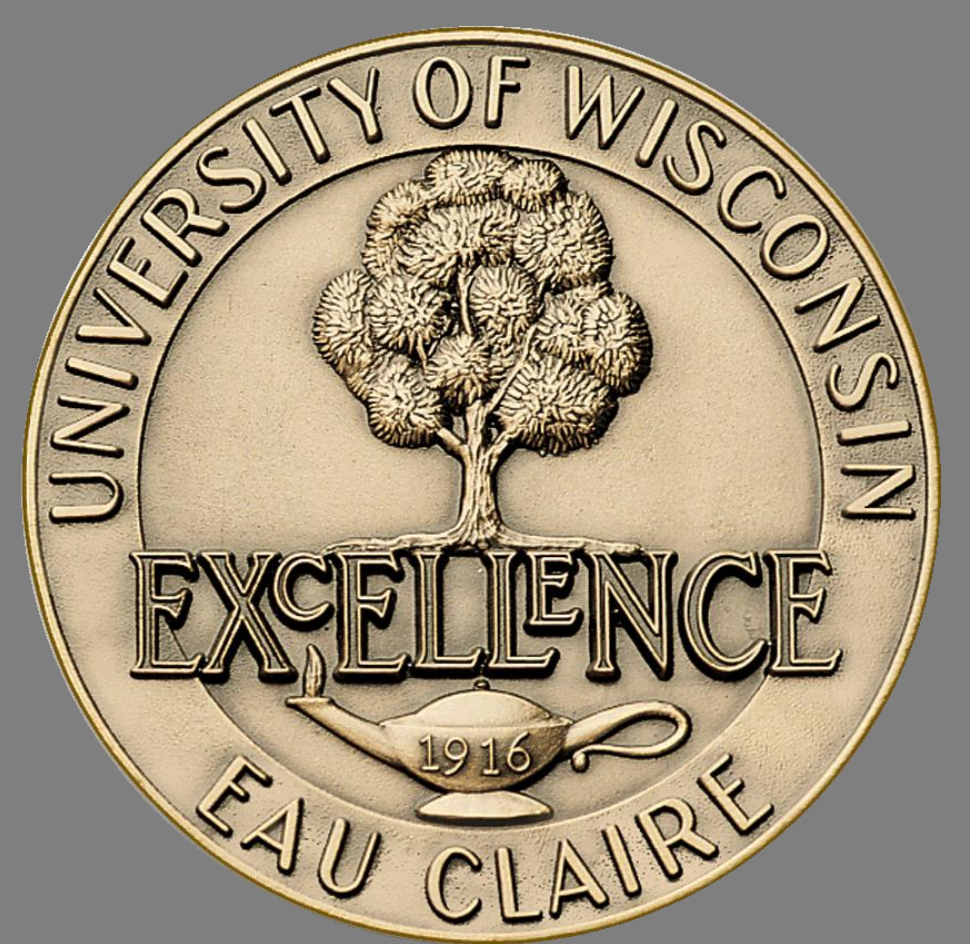




# A Behavioral and Biological Comparison of Rodent Strains Commonly Used in Research



Carlee Toddes & Carla H. Lagorio  
University of Wisconsin – Eau Claire

## Overview

The current project examined behavioral and biological differences and similarities between three major rat strains commonly used in research assays. These strains include: Sprague Dawley, Long-Evans, and Fischer-344. This review utilized our labs prior research comparing impulsivity (as measured by delay discounting) across Fischer-344 and Sprague Dawley rats. Our research was combined with several other sources noting common behavioral differences between all strains on basic behavioral paradigms. Literature comparing physical, hematological, as well as some neurological differences were also included. This survey is extremely important for researchers across domains utilizing animal models as it can lead to a more formalized guideline of strengths or weakness of different strains for use in different research assays. This review brings the scientific community one step closer to developing a formalized database which researchers may utilize when determining appropriate animal models for particular research questions.

## Behavioral Information

Sprague Dawley (SD), pigmented Long Evan (LE), and Fischer-344 (F344) rat strains display different motor skills and behaviors in research assays exploring: experimental models of traumatic brain injuries, neurobiological studies of nervous system function and behavior, and studies of behavioral responses to cortisol.

- Long Evans and Sprague Dawley rats differ in impulsivity, signal detection, and reversal learning (Turner, Burne, 2014)
- Despite prior research indicating a difference in impulsivity between Sprague Dawley and Fischer-344 strains (Turner & Burne, 2014) our lab have found no data to support this observation (see figures below).
- Long-Evan rats and Fischer-344 rats differ in response to auto-shaping, impulsivity, and place preferences (Whishaw, 2003).
- Sprague Dawley rats are more commonly used in behavioral pharmacology experiments and have a much faster task acquisition period than LE rat strains (Turner, Burne, 2014).
- Compounds such as PCP, Amphetamines, and Opioids also have different behavioral effects on different strains (Tan, 2009).
- All three strains differ on place preference tasks in response to stress (Kearns, Serrano, Weiss, Riley, 2006).

## Common Research Uses



Sprague Dawley

- Toxicology
- Aging
- Teratology
- Oncology
- Nutrition
- Diet-induced Obesity
- General Studies



Long-Evans

- Diet-induced Obesity
- Nutrition
- Behavior
- General Studies
- Metabolism
- Nutrition



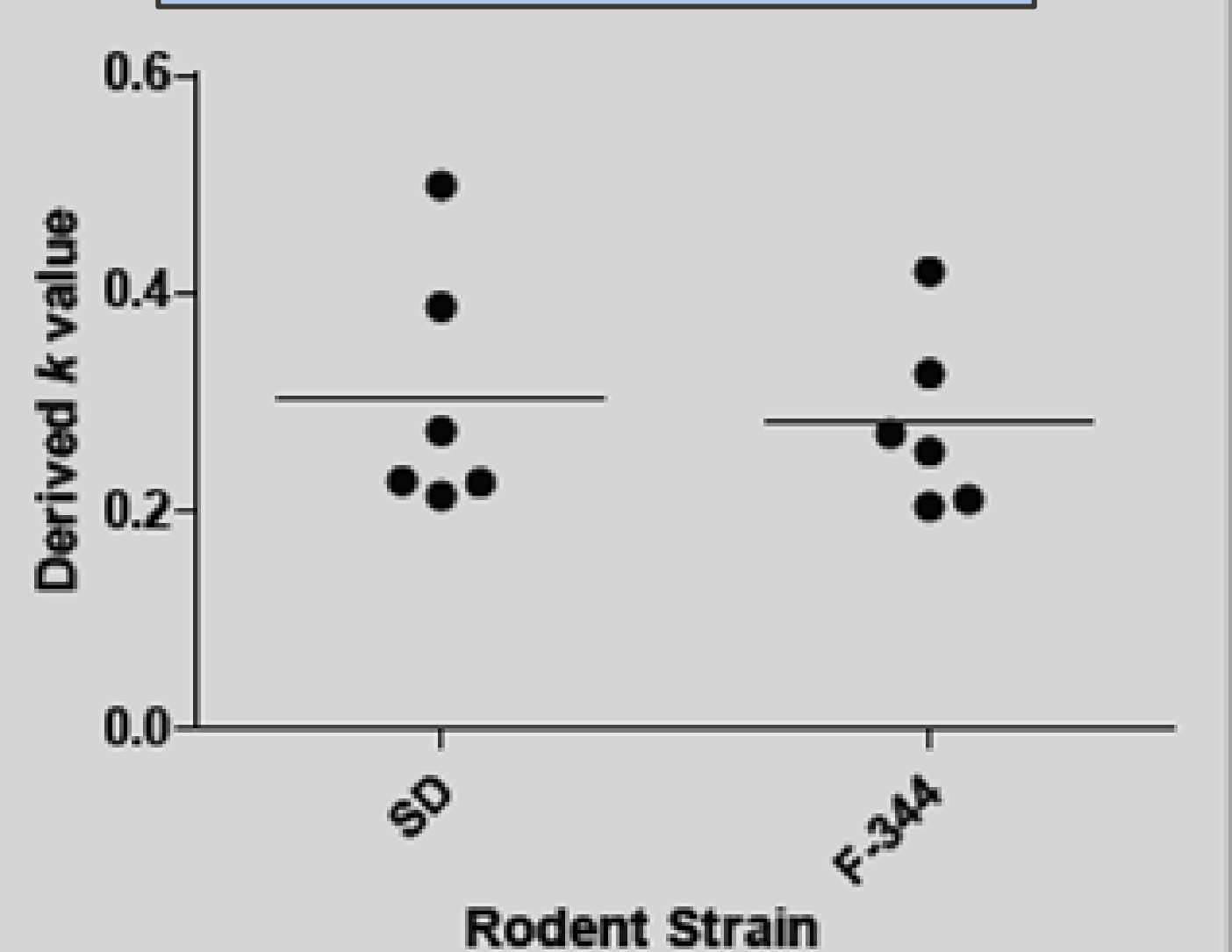
Fischer-344

- Diet-induced Obesity
- Nutrition
- Behavior
- General Studies
- Metabolism
- Nutrition

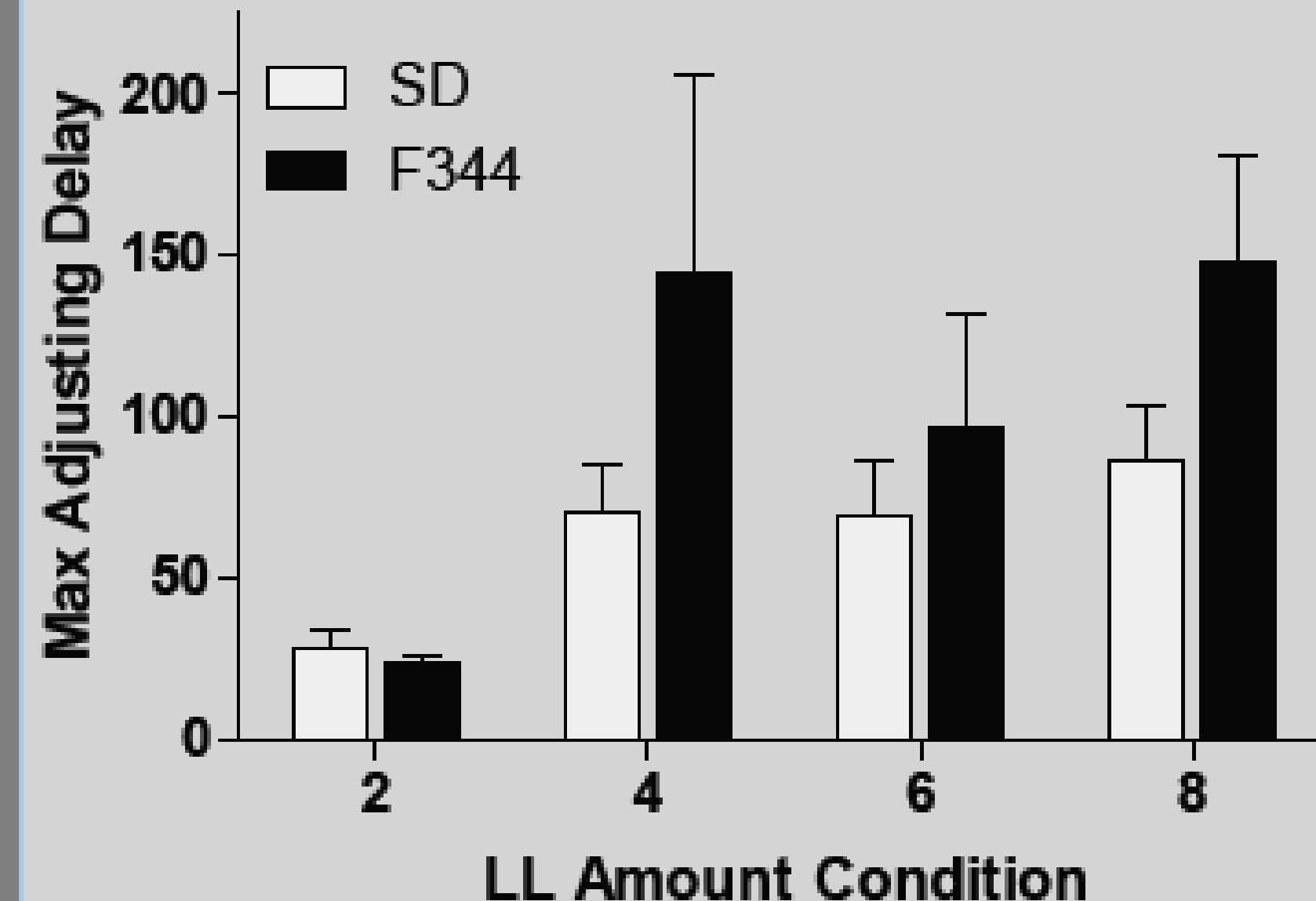
## Motor Differences

- The overall size of the motor cortex representation is greater in Long-Evans rats compared to Fischer-344 rats, and the threshold required to elicit a movement is higher in the Fischer-344 rats (VandenBerg, Hogg, Kleim, Whicshaw, 2002).
- Long-Evans rats are quantitatively and qualitatively better in skilled reaching than the Fischer-344 rats. Also, Long-Evans rats exhibit a relatively larger area of the topographic representation and lower thresholds for eliciting movement in the contralateral forelimb (VandenBerg, Hogg, Kleim, Whicshaw, 2002).
- Inbred albino F344 rats are found to be impaired in procedural spatial learning, skilled reaching, and over ground locomotion in relation to pigmented out bred Long Evans rats (Wawryko, Ward, Whishaw, Ivanco 2004).
- Overall, the two strains [LE and F-344] exhibit motor skill differences despite a great degree of physiological similarity in motor cortex (Wawryko, Ward, Whishaw, Ivanco 2004).

### Impulsivity Measure



### Within-Condition Strain Variability



### Impulsivity Assessments:

Results from the cross-strain comparisons suggest negligible differences between obtained *k*-values of each strain

- Glucose: 322.25 mmol/L
- Total Protein: 6.62 g/dL
- WBC: 9.98 K/uL
- RBC: 7.19 M/uL
- Alkaline Phosphatase: 215.03 U/L
- Aspartate Aminotransferase: 100.88 U/L
- Alanine Aminotransferase: 63.57 U/L

Sprague Dawley



- Glucose: 183.09 mmol/L
- Total Protein: 6.31 g/dL
- WBC: 9.56 K/uL
- RBC: 7.57 M/uL
- Alkaline Phosphatase: 421.65 U/L
- Aspartate Aminotransferase: 142.35 U/L
- Alanine Aminotransferase: 77.67 U/L

Long-Evans



- Glucose: 187.08 mmol/L
- Total Protein: 6.77 g/dL
- WBC: 8.73 K/uL
- RBC: 8.93 M/uL
- Alkaline Phosphatase: 425.77 U/L
- Aspartate Aminotransferase: 112.10 U/L
- Alanine Aminotransferase: 85.26 U/L

Fischer-344



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Correspondence should be addressed to: Carlee Toddes, [toddesca@uwec.edu](mailto:toddesca@uwec.edu)