



**Effects of Bupropion  
(Wellbutrin) on Suicidal  
behavior, Risk Taking behavior,  
and Mood**

By David Harmon



# Research Question

Does  
Bupropion(Wellbutrin) affect  
mood, motivation and risk  
taking in a Tetrabenazine  
model of Depression?

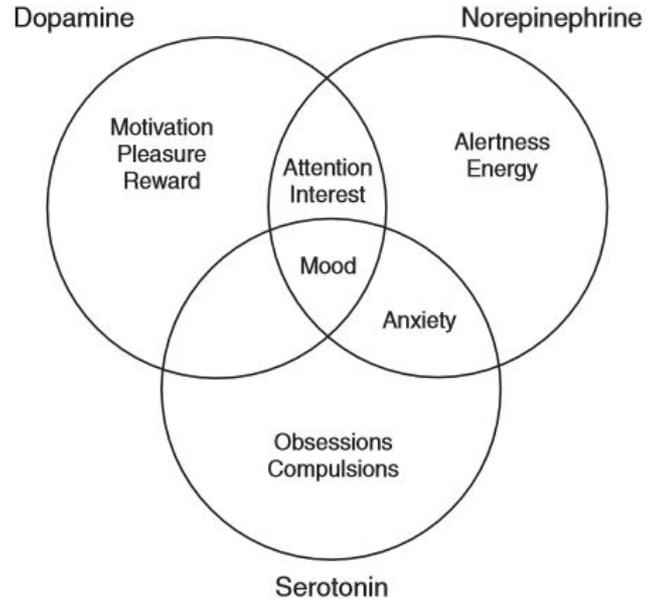
# The Present study

- In this study I will be testing to see if this drug increases risk taking behavior and suicidality in a rodent model of depression
- This increase in risk taking behavior may play a factor as to why people harm themselves while being treated with the drug

# Depression

- Depression is a mood disorder that results in reduced amounts of dopamine, serotonin, and norepinephrine in the brain
- Depression can cause negative affect symptoms (perceiving the world negatively as well as loss of positive affect symptoms (inability to feel reward and positive emotion)

Figure 1. Monoamine Neurotransmitter Regulation of Mood and Behavior<sup>a</sup>

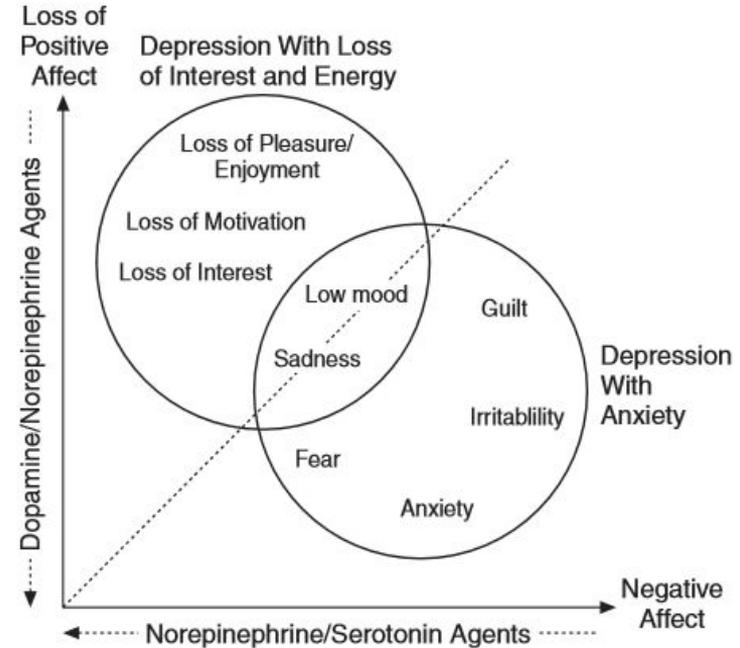


<sup>a</sup>Based on Stahl,<sup>22,23</sup> Foote and Aston-Jones,<sup>25</sup> Argyropoulos et al,<sup>26</sup> and Shelton and Tomarken.<sup>27</sup>

# Bupropion background

- Bupropion is an antidepressant used to treat Depression
- Commonly known as Wellbutrin
- Inhibits the reuptake of Dopamine and Norepinephrine
- Users feel increased motivation, effort, energy, and mood.

Figure 2. Hypothetical Model Showing Differential Actions of Antidepressant Agents on Symptoms of Positive and Negative Affect<sup>a</sup>



<sup>a</sup>Reprinted with permission from Nutt et al.<sup>24</sup>



## Bupropion's relationship with suicide

*Kriikku, 2016*

Suicide was more common among people who took Bupropion than people who took any other antidepressant

*Grunebaum, 2012*

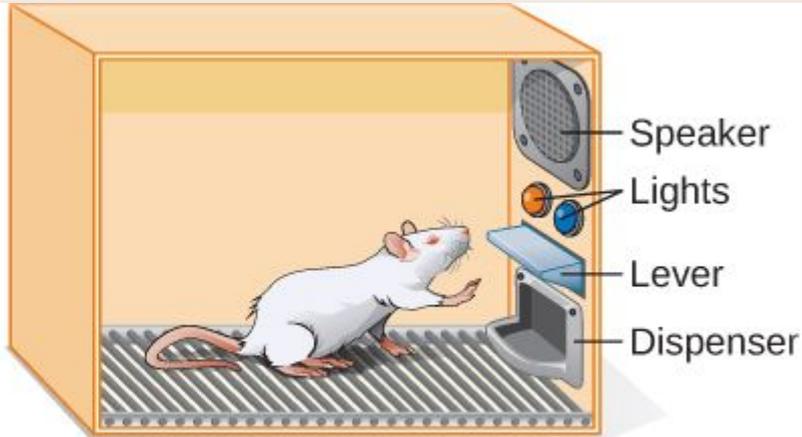
Bupropion was worse at relieving suicidal behavior and thoughts compared to SSRI's, it also increased suicidal behavior.



# Hypothesis

- I believe that a depressed rat being treated with Bupropion will show increased suicidality, mood and risk taking behavior compared to rats who are not using.
- Bupropion increases motivation and increases sensitivity to rewards but does not impact obsessions, compulsion, guilt and irritability.
- Self-harm produces dopamine and can become an addiction, therefore if someone who is using Bupropion partakes in self harm than they would feel more dopamine than usual which would reinforce them to continue that risky behavior, this can eventually lead to suicide

# Operational Definitions



- Depression = .75 mg/kg of Tetrabenazine
- Bupropion = 17 mg/kg
- Mood
  - Will be measured through a social interaction task
- Motivation
  - Will be measured through the splash test
- Risk Taking
  - Will be measured through a Lever pressing task in an Operant Box
- Suicidality
  - Will be measured through aggression and impulsivity

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# Design

## 4 groups:

- **Group Tetrabenazine**
- **Group Bupropion**
- **Group Tetrabenazine + Bupropion**
- **Control Group**

# Behavioral tasks

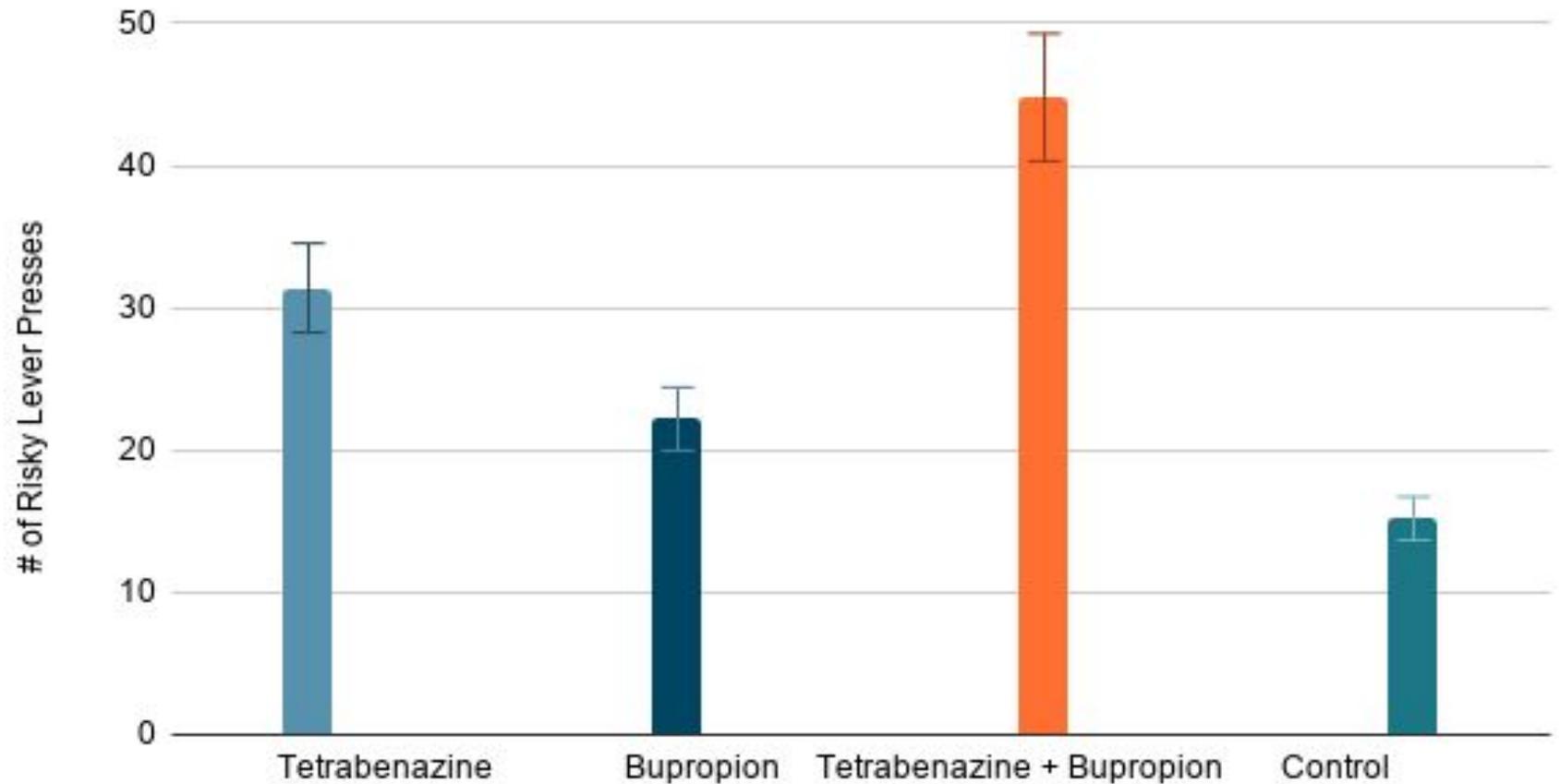
- **Risk Taking paradigm**
  - Rat is placed in an operant box and must choose between a small reward with no risk of punishment or a large reward that contains a large risk of punishment
- **The Social Interaction Test**
  - Rat is placed in an arena with another rat. Variables measured are social behavior and aggression
- **Open Field Test**
  - Rats are placed in an arena, this will be used to test impulsivity
- **The Splash Test**
  - This will be used to assess motivation

# Procedure

1. Rats will be trained on how to lever press and will be taught the Risk taking task
2. Rats will be injected with respective drug
3. They will first undergo the risk taking task
4. A week later they will receive another dosing of the drug and will undergo all other behavioral tasks

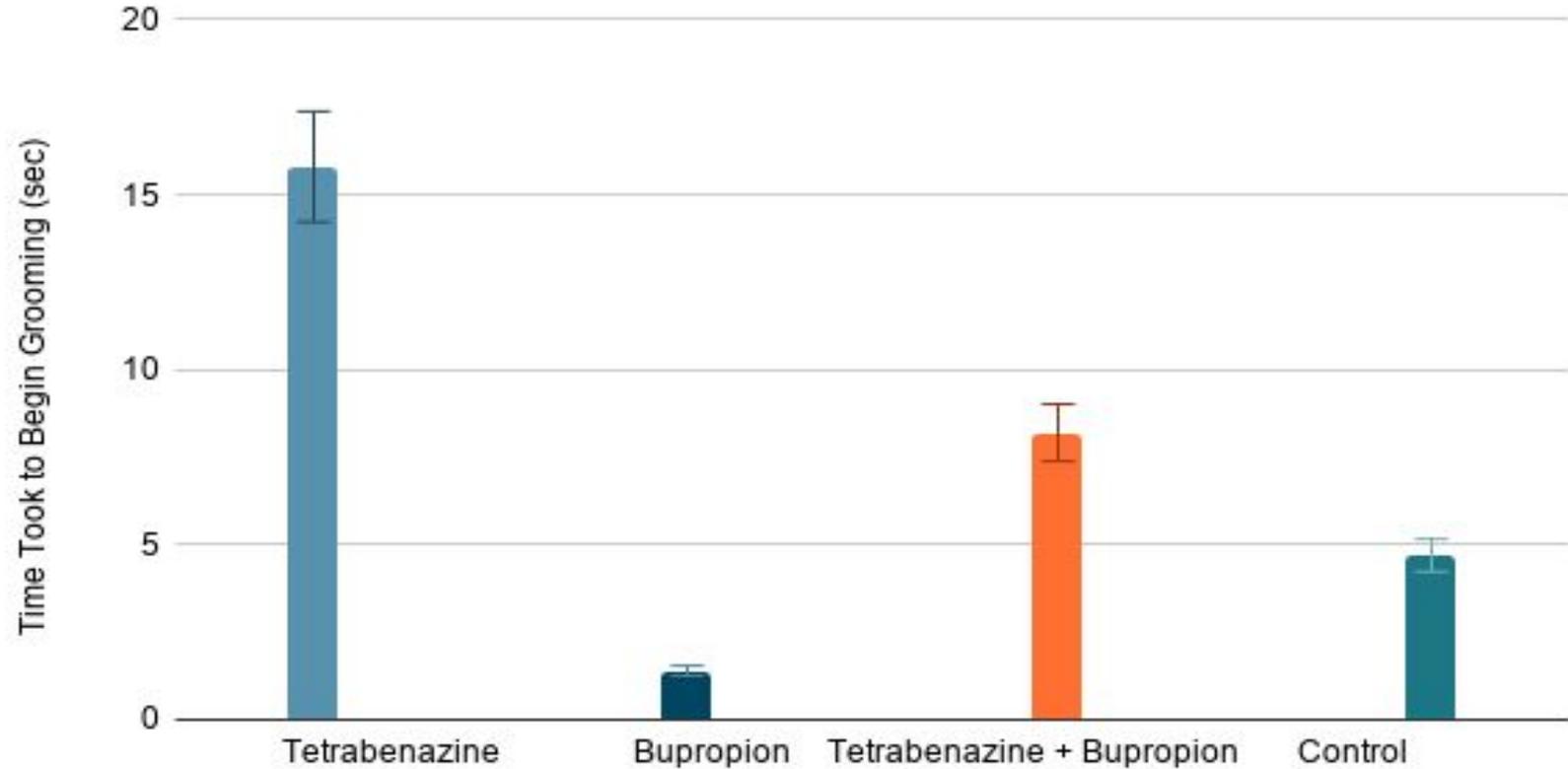
# Expected Results

## Risk Taking Behavior



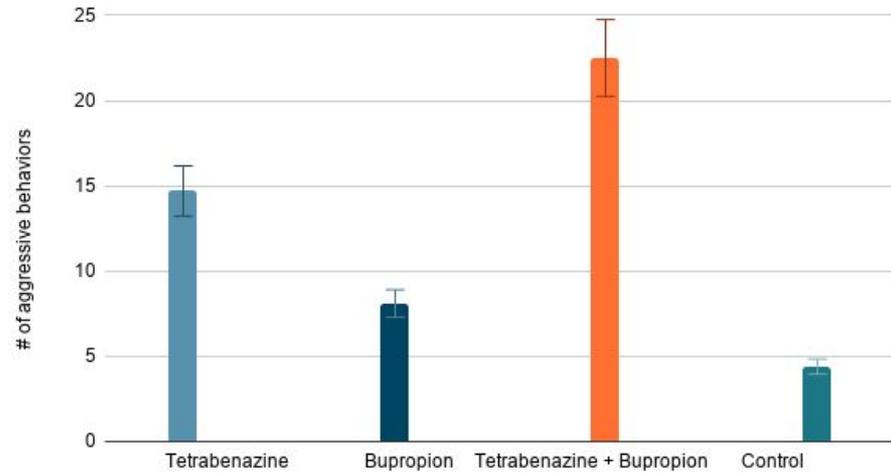
# Expected Results

Motivation

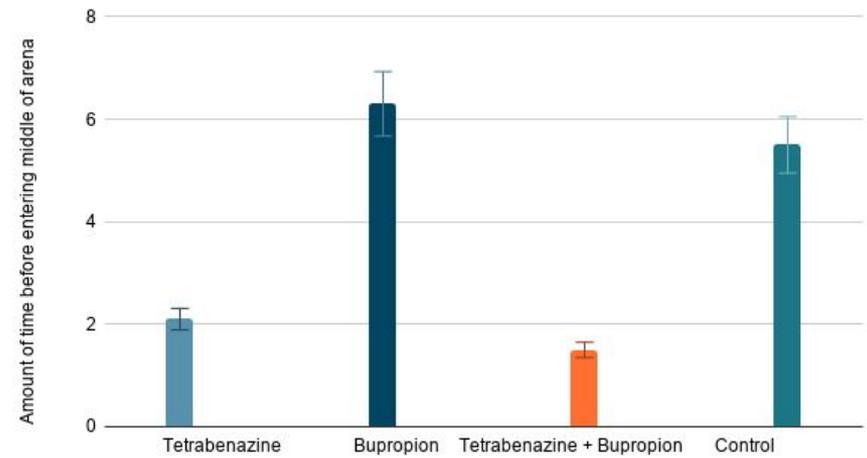


# Expected Results

## Aggression



## Impulsivity





# Discussion

- **Does Bupropion affect suicidal behavior?**
  - Yes, this drug could cause people to be suicidal because it increases motivation and effort but does not treat guilt irritability, and mood. Someone who has high motivation and effort but a poor perception of themselves and of the world may be more likely to harm themselves
- **Does Bupropion Increase Risk Taking behavior?**
  - Yes, this drug increases motivation and causes more dopamine to be released which causes people to be more heavily reinforced after performing a risky action.



# Discussion

- **How does Risk-Taking behavior increase Suicide?**
  - When a user performs a risky behavior such as self-harm while being treated with Bupropion they may be reinforced more heavily because their dopaminergic pathways are reinforcing them. Which may cause them to continue to produce that risky behavior. This eventually leads them to harming themselves more intensely and dangerously which can lead to suicide. This may be a reason as to why people harm themselves more frequently while being treated with Bupropion.



# Limitations

- I'm using rats not humans, findings can not generalize
- I am injecting the drug but it is typically taken orally



# Future directions

- Testing risk taking behavior in humans
- Testing risk taking behavior for other antidepressants

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