

Gender Differences in Risk Tolerance and Patient Preferences When Considering Deep Brain Stimulation Surgery

Michelle E. Fullard, MD, MS; John D. Rice, PhD; Dan D. Matlock, MD, MPH



Building Interdisciplinary Research Careers in Women's Health

BACKGROUND

- Deep brain stimulation (DBS) surgery is a highly effective surgical therapy for Parkinson's disease (PD) that demonstrates substantial and sustained improvements in motor symptoms and quality of life with low complication rates.
- Despite being a proven therapy for PD, women make up only 23-30% of recipients, a discrepancy that is not accounted for by differences in PD incidence. This is especially concerning since women with PD report overall lower quality of life and higher disability compared to men.
- Prior studies have shown that when considering DBS, women are more likely to hesitate and wait, expressing strong fear of complications and are more likely to decline surgery for patient preference. Based on these studies, it was suggested that women receive DBS surgery less often than men because they are more risk averse.
- Objective:** The objective of this study is to determine if there are gender differences in risk tolerance for DBS and if certain sociodemographic factors influence risk tolerance.

METHODS

- Data Source:** Data used in this study came from the Fox Insight Study, an online clinical study in which PD participants complete questionnaires at predetermined time points.
- Survey:** The threshold technique was used to determine the maximum acceptable risk for 15 risk-benefit pairs regarding a novel neurostimulation device.

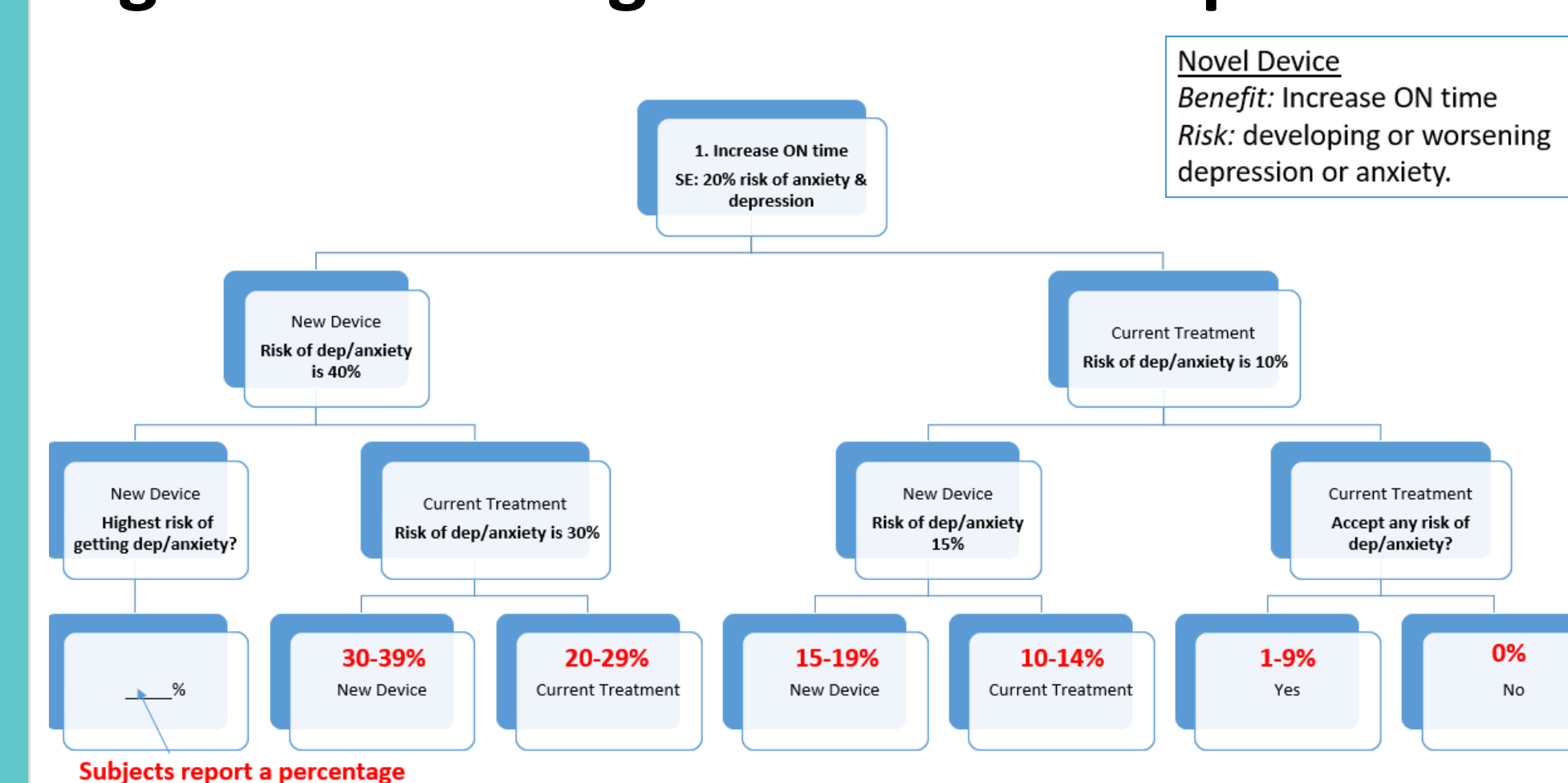
Table 1. Participant Demographics and Clinical Characteristics by Gender

Demographics	Women (N=1232)	Men (N=1427)
Age, mean (SD)*	65 (8.7)	66.5 (9.1)
Marital Status*		
Married	907 (73.6%)	1275 (89.4%)
Widowed	93 (7.6%)	23 (1.6%)
Divorced or single	226 (18.3%)	125 (8.8%)
Highest level of education*		
Less than 4-year college degree	431 (35%)	367 (25.7%)
4 year college degree or higher	800 (65%)	1060 (74.3%)
Employment Status*		
Employed full-time	289 (23.5%)	387 (27.1%)
Retired	691 (56.2%)	833 (58.4%)
Unemployed	249 (20.3%)	207 (14.5%)
Ethnicity		
Hispanic or Latino	22 (1.8%)	34 (2.4%)
Disease Duration, median (IQR)	4 (2-8)	4 (2-7)
Depression/Anxiety present*, N(%)	561 (45.5%)	536 (37.6%)
Mean severity out of 10, (SD)	4.5 (2.1)	4.3 (2.1)
OFF Time/Day in hours, mean (SD)	5.3 (3.7)	5.1 (3.8)

* p<0.05

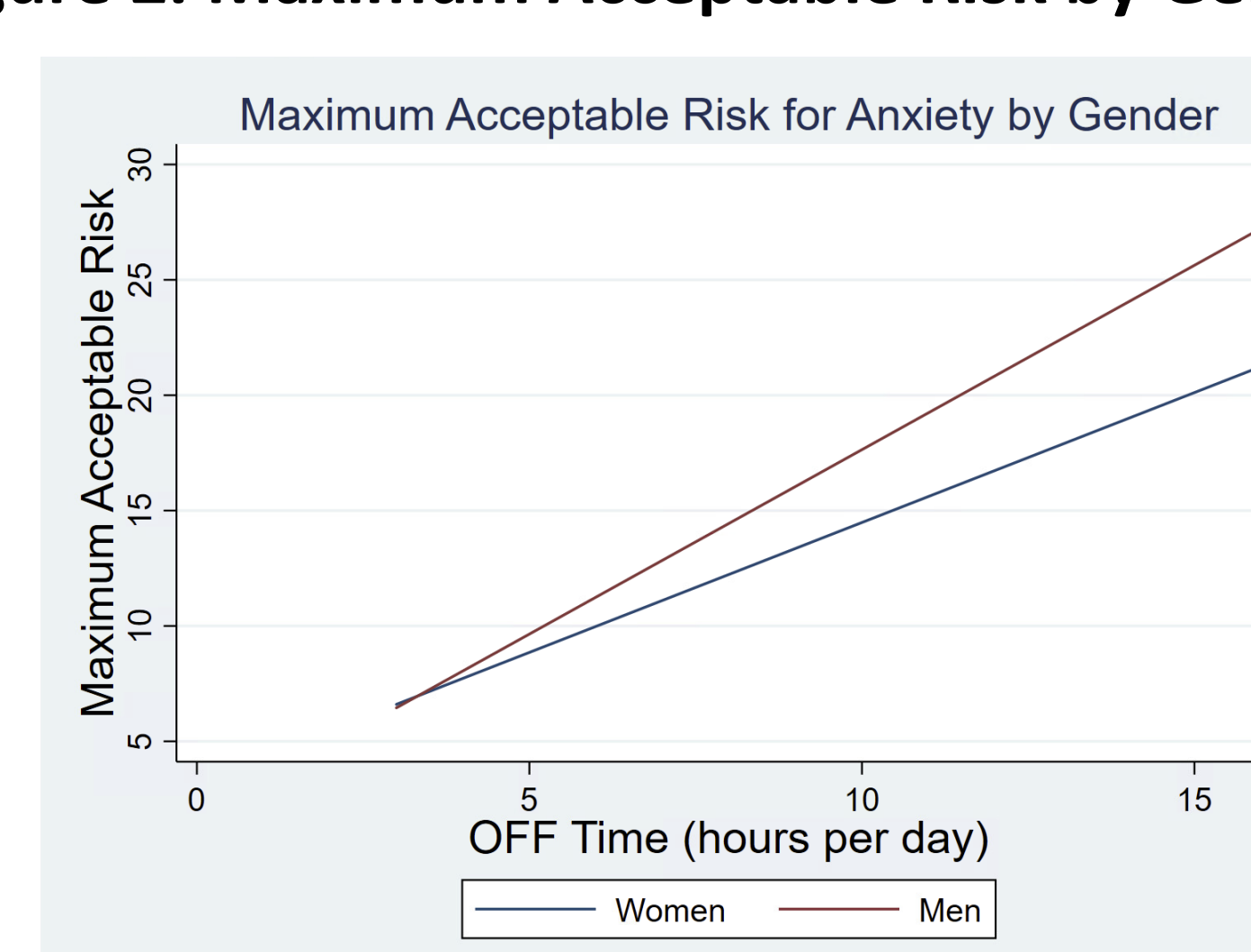
Data were analyzed using interval regression models accounting for interval censoring with gaussian likelihood, augmenting with logistic regression models for observations exactly equal to zero. Women and men had similar maximum acceptable risk thresholds except when the risk included worsening anxiety or depression ($\beta=-2.6$, $p=0.04$). Caregiving status was not associated with risk tolerance.

Figure 1. Eliciting Maximum Acceptable Risk



Participants were presented with a novel neurostimulation device that increased ON time (when medications are working well) by decreasing OFF time (when medications are not working well) by 50%. The device has a 20% risk of causing anxiety or depression. The participant would either choose the new device or to stay on their current therapy. If they chose the new device, they would be presented with a higher risk of anxiety or depression. If they chose to stay on their therapy, they would be presented with a lower risk. This was repeated 3 times until a maximum acceptable risk was attained.

Figure 2. Maximum Acceptable Risk by Gender



This graph shows that OFF time (when Parkinson's medications are not working well) is correlated with maximum acceptable risk, meaning that the more OFF time a patient experiences, the higher their risk threshold is. There was some separation between men and women in which for any given amount of OFF time, men had a higher maximum acceptable risk compared to women.

RESULTS

Table 2. Proportion of participants not willing to take any risk for a novel neurostimulation device.

Benefit	Risk	Maximum Acceptable Risk – No Risk	
		Women	Men
Increase ON Time	Anxiety/Depression	179 (54.4%)	149 (46.3%)
	Brain Bleed	153 (53.9%)	126 (39.9%)
	Death	179 (59.7%)	152 (47.2%)
Decrease Motor Severity	Anxiety/Depression	154 (56.8%)	202 (48.4%)
	Brain Bleed	197 (68.4%)	220 (56%)
	Death	195 (66.6%)	220 (54.7%)
Decrease Pain Severity	Anxiety/Depression	170 (50.6%)	139 (51.5%)
	Brain Bleed	200 (62.3%)	189 (61.4%)
	Death	217 (64.8%)	160 (58%)
Decrease Cognitive Impairment Severity	Anxiety/Depression	161 (55.3%)	145 (43.9%)
	Brain Bleed	163 (59.7%)	159 (49.4)
	Death	162 (57.9%)	159 (48.5%)
Decrease Medications and Side Effects	Anxiety/Depression	248 (79.7%)	316 (74.9%)
	Brain Bleed	267 (84.8%)	312 (78%)
	Death	266 (81.1%)	316 (77.1%)

- Participants with more OFF time and a history of DBS had a higher maximum acceptable risk.
- Most participants were not willing to take any for the novel neurostimulation device.

CONCLUSION

- Women and men with PD demonstrated similar risk tolerance when considering a novel neurostimulation device, suggesting that risk tolerance is not a large contributor to the gender disparity in DBS utilization.