

**BIOGRAPHICAL SKETCH**

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NAME: Raina D. Pang

eRA COMMONS USER NAME (credential, e.g., agency login): rdpang

POSITION TITLE: Assistant Professor of Research

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Portland State University	n/a	n/a	Psychology
University of Oregon	B.S.	06/2007	Psychology
University of Southern California	Ph.D	08/2012	Neuroscience
University of Southern California	Postdoc	06/2015	Preventive Medicine

**A. Personal Statement**

Broadly speaking my research interest lies in understanding sex/gender differences and women specific factors in tobacco addiction. As part of these efforts, I have developed expertise in lab-based experimental behavioral pharmacology methodology and menstrual cycle based staging of experimental sessions. I have completed a postdoctoral fellowship using laboratory based behavioral pharmacology experimental designs to investigate the interactive role of menstrual cycle and smoking abstinence on response inhibition and smoking behavior (TRDRP: 22-FT-0062). Currently, I am PI on a five year study aimed at understanding within and between subject effects of ovarian hormones on mood and smoking behavior using ecological momentary assessment (NIDA: K01 DA040043). Additionally, I have worked on numerous publications focused on sex/gender differences in tobacco addiction, women specific factors in tobacco addiction, and the role of mood symptoms in tobacco addiction. In summary, I have shown productivity in research related to women specific factors and the role of mood symptoms in tobacco addiction.

To compliment my experience, I have invited several outstanding researchers to be on this team. Co-I, Dr. Adam Leventhal, has considerable expertise in tobacco addiction and psychiatric comorbidity with substance use research. Dr. Leventhal has been PI on externally funded projects totaling over \$8 million in overall costs and will be essential for ensuring that this study is successfully executed and ideally positioned to make a powerful impact on the field. Co-I, Dr. Matthew Kirkpatrick has successfully completed several laboratory behavioral pharmacology addiction studies and will bring valuable experience related to the role of socioemotional processing disruptions and substance use. Overall, this investigative team is uniquely qualified to carry out the proposed project.

1. **Pang, R. D.**, & Leventhal, A. M. (2013). Sex differences in negative affect and lapse behavior during acute tobacco abstinence: a laboratory study. *Exp Clin Psychopharmacol*, 21(4), 269-276. doi: 10.1037/a0033429.
2. **Pang, R. D.**, Zvolensky, M. J., Schmidt, N. B., & Leventhal, A. M. (2014). Gender Differences in Negative Reinforcement Smoking Expectancies. *Nicotine Tob Res*. doi: 10.1093/ntr/ntu226
3. **Pang, R. D.**, Khoddam, R., Guillot, C. R., & Leventhal, A. M. (2014). Depression and anxiety symptoms moderate the relation between negative reinforcement smoking outcome expectancies and nicotine dependence. *J Stud Alcohol Drugs*, 75(5), 775-780.

4. **Pang, R. D.**, Farrahi, L., Glazier, S., Sussman, S., & Leventhal, A. M. (2014). Depressive symptoms, negative urgency and substance use initiation in adolescents. *Drug Alcohol Depend*, 144, 225-230. doi: 10.1016/j.drugalcdep.2014.09.771.

## **B. Positions and Honors**

### **Positions and Employment**

2005-2007	Undergraduate Research Assistant, Electrical Geodesics Inc.
2006-2007	Undergraduate Research Assistant, Lab of Clifford Kentros, University of Oregon
2007	Undergraduate Research Assistant, Cognitive Dynamics Lab, University of Oregon
2008-2012	Graduate Research Assistant, Laboratory of Vertebrate Functional Brain Mapping, University of Southern California
2010-2012	Teaching Assistant, Biological Sciences, University of Southern California
2012-2015	Postdoctoral Research Assistant, Department of Preventive Medicine, University of Southern California
2014-2015	Adjunct Instructor, Department of Psychology, Occidental College
2015	Adjunct Instructor, Department of Psychology, Citrus College
2015-Present	Assistant Professor of Research, Department of Preventive Medicine, University of Southern California

### **Society Memberships:**

2010-2011	Society for Neuroscience
2013-2015	American Women in Science (AWIS)
2013-Present	Society for Research on Nicotine and Tobacco (SRNT)

### **Honors:**

2003-2004	Western Undergraduate Exchange Scholarship
2003-2007	Choctaw Nation of Oklahoma Higher Education Scholarship
2003-2007	Pang Society Scholarship
2006	Nominated for University of Oregon Award
2007	B.S. in Psychology summa cum laude, University of Oregon
2007-2008	USC Neuroscience Graduate Program Provost Fellowship Award
2008	National Science Foundation Graduate Research Fellowship Program (GRFP) honorable mention

## **C. Contribution to Science**

### **1. Depression and anxiety symptoms on substance use.**

Mood related symptoms have been linked to substance use initiation and addiction. While much of this work has focused on syndrome-based approaches, there is evidence that subclinical level of symptoms may also contribute to substance use. To this end, I showed that depression levels in adolescents associated with increased likelihood of lifetime use of cigarettes, other tobacco, marijuana, inhalants, and prescription stimulants. In dependent smokers, I have also shown that increased depressive and anxiety symptoms increased associations between negative reinforcement smoking expectancies and nicotine dependence. Taken together these research findings suggest that even subclinical levels of depressive symptoms may contribute to tobacco initiation and maintenance.

- a) **Pang, R. D.**, Farrahi, L., Glazier, S., Sussman, S., & Leventhal, A. M. (2014). Depressive symptoms, negative urgency and substance use initiation in adolescents. *Drug Alcohol Depend*, 144, 225-230. doi: 10.1016/j.drugalcdep.2014.09.771
- b) **Pang, R. D.**, Khoddam, R., Guillot, C. R., & Leventhal, A. M. (2014). Depression and anxiety symptoms moderate the relation between negative reinforcement smoking outcome expectancies and nicotine dependence. *J Stud Alcohol Drugs*, 75(5), 775-780.

### **2. Negative Mood and Smoking in Women**

Women compared to men are more likely to experience mood related disorders. In the smoking literature, there is evidence to suggest that negative mood may be a more important factor contributing to smoking in

women compared to men. However, few laboratory based studies have directly tested whether women experience greater increases in negative affect specifically following withdrawal and whether or not this relates to smoking behavior. In this regard, I have found that women compared to men experience greater increases in negative affect following overnight tobacco abstinence. Furthermore, I have found that increased abstinence induced anger mediated gender differences in abstinence-induced changes to delay smoking for money. These findings suggest that women may be more sensitive to increased negative affect during tobacco withdrawal and may be resume smoking sooner as a way to relieve negative affect related withdrawal symptoms. Overtime, these patterns of smoking behavior could change cognitive processes related to expectations for smoking. In a cross sectional study, I showed that women compared to men report greater expectations that smoking relieves negative affect (i.e., negative reinforcement smoking expectancies) even after controlling for depression and other positive expectations for smoking related outcomes. Taken together, these findings support theory that negative mood is an important factor underlying tobacco addiction in women.

- a) **Pang, R. D.**, & Leventhal, A. M. (2013). Sex differences in negative affect and lapse behavior during acute tobacco abstinence: a laboratory study. *Exp Clin Psychopharmacol*, 21(4), 269-276. doi: 10.1037/a0033429
- b) **Pang, R. D.**, Zvolensky, M. J., Schmidt, N. B., & Leventhal, A. M. (2014). Gender Differences in Negative Reinforcement Smoking Expectancies. *Nicotine Tob Res*. doi: 10.1093/ntr/ntu226
- c) "Sex Differences in Smoking". Given April 2015 at the Institute of Genetic Medicine Science Club at the University of Southern California, Los Angeles, CA.
- d) "Affect Regulation and Smoking in Women". Given August 2015 at 10<sup>th</sup> Drug Abuse Research Symposium at Charles R. Drew University of Medicine and Science, Los Angeles, CA.

### 3. Menstrual cycle, premenstrual symptoms, and tobacco addiction

Recently, there has been a focus on the role of the menstrual cycle in tobacco addiction. However, much of this work has not accounted for hormonal levels in selection of phases. For my postdoctoral work, I received funding from the Tobacco Related Disease Research Program (TRDRP # 22-FT-0062) to begin developing my research program focused on understanding the role of the menstrual cycle in tobacco addiction. One factor related to the menstrual cycle that could contribute to effects is the role of premenstrual symptoms. To this end, I have completed a cross sectional study showing that women with greater premenstrual symptoms, particularly affect related premenstrual symptoms, show greater smoking related expectancies in regards to increased withdrawal from abstinence and pleasure from smoking.

- a) **Pang, RD**, Bello, MS, Stone, MD, Kirkpatrick, M, Huh, J, Monterosso, J, Haselton, MG, Fales, MR, & Leventhal AM (2015). Premenstrual symptoms and smoking related expectancies. Oral presentation at the Tobacco Control, Research, and Education: Joining Forces to Address New Challenges meeting, Sacramento, CA.
- b) **Pang, RD**, Bello, MS, Stone, MD, Kirkpatrick, M, Huh, J, Monterosso, J, Haselton, MG, Fales, MR, & Leventhal AM (under review). Premenstrual symptoms and smoking related expectancies. *Addictive Behaviors*.

### 4. Neuroimaging of genotype and sex effects on emotional circuitry in a rodent model.

My dissertation work focused on sex and genotype effects on corticolimbic circuitry (i.e., circuitry involved in emotional responses) in serotonin transporter knockout mice. Overall my work showed that irrespective of sex, genotype altered functional activity in fear circuits and altered behavioral fear responses. Sex, irrespective of genotype, showed a broad effect on emotional, motor, and sensory circuits. These results suggest that both sex and genotype alter emotional neurocircuitry.

- a) "Effects of loss of serotonin transporter in functional activation during an acute stressor". Given at the 2011 Neuroscience Student Spring Symposium at the University of Southern California, Los Angeles, CA.
- b) **Pang, RD**, Wang, Z, Klosinski, LP, Guo, Y, Herman, DH, Celikel, T, . . . Holschneider, DP (2011). Mapping functional brain activation using [14C]-iodoantipyrine in male serotonin transporter knockout mice. *PLoS One*, 6(8), e23869. doi: 10.1371/journal.pone.0023869 [doi] PONE-D-11-07836 [pii]

## **Complete List of Published Work in Google Scholar**

<https://scholar.google.com/citations?user=zbNhO1wAAAAJ&hl=en>

### **D. Research Support**

#### **Ongoing Research Support**

K01 DA040043 (NIDA; PI: Pang)

07/01/15 – 06/30/20

Ovarian hormone effects on smoking

This career development award supports field research investigating the effects of estrogen and progesterone on smoking behavior using novel methods such as ecological momentary assessment combined with biological hormonal assessment. The goal of this study is to examine the effects of ovarian hormone variation effects on smoking within participants and between participants.

Role: PI

#### **Completed Research Support**

22-FT-0062 (TRDRP; PI: Pang)

07/01/13 - 06/30/15

Menstrual Cycle and Nicotine Effects on Response Inhibition in Smoking

The goal of this career development award was to integrate neuroendocrine function and behavioral pharmacology on cognitive control processes in tobacco addiction. The project will lay the groundwork for future application of this interdisciplinary paradigm integrating neuroendocrinology, behavioral pharmacology, and cognitive control to study nicotine and other addictions.

Role: PI