OMB Number: 4040-0001
Expiration Date: 10/31/2019

APPLICATION FOR FEDERAL ASSISTANCE
SF 424 (R&R)

3. DATE RECEIVED BY STATE	**State Application Identifier**

1. TYPE OF SUBMISSION*

❍ Pre-application ● Application ❍ Changed/Corrected Application

4.a. Federal Identifier

b. Agency Routing Number

c. Previous Grants.gov Tracking Number

2. DATE SUBMITTED

Application Identifier
#25799 Cosme

5. APPLICANT INFORMATION

Organizational DUNS*: 0792896260000

Legal Name*: UNIVERSITY OF OREGON
Department: Sponsored Projects Services
Division: Research and Innovation
Street1*: 5219 UNIVERSITY OF OREGON
Street2:
City*: EUGENE
County: Lane
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 974035219

Person to be contacted on matters involving this application
Prefix: Mr. First Name*: Joshua Middle Name: Last Name*: Kerber Suffix:
Position/Title: Sponsored Projects Administrator
Street1*: 5219 University of Oregon
Street2:
City*: Eugene
County: Lane
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 974035219
Phone Number*: 5413465131 Fax Number: 5413465138 Email: sponsoredprojects@uoregon.edu

6. EMPLOYER IDENTIFICATION NUMBER *(EIN) or (TIN)** 46-4727800

7. TYPE OF APPLICANT* H: Public/State Controlled Institution of Higher Education

Other (Specify):
Small Business Organization Type ❍ Women Owned ❍ Socially and Economically Disadvantaged

8. TYPE OF APPLICATION*

● New ❍ Resubmission
❍ Renewal ❍ Continuation ❍ Revision

If Revision, mark appropriate box(es).
❍ A. Increase Award ❍ B. Decrease Award ❍ C. Increase Duration
❍ D. Decrease Duration ❍ E. Other *(specify)* :

Is this application being submitted to other agencies?* ❍Yes ●No What other Agencies?

9. NAME OF FEDERAL AGENCY*
National Institutes of Health

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER
TITLE:

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT*
Cancer prevention through dietary change: Training in translational neuroimaging

12. PROPOSED PROJECT
Start Date* Ending Date*
07/01/2018 06/30/2021

13. CONGRESSIONAL DISTRICTS OF APPLICANT
OR-004

SF 424 (R&R) APPLICATION FOR FEDERAL ASSISTANCE

14. PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR CONTACT INFORMATION

Prefix: Ms. First Name*: Danielle Middle Name: Last Name*: Cosme Suffix:
Position/Title: Graduate Student
Organization Name*: UNIVERSITY OF OREGON
Department: Psychology
Division: College of Arts & Sciences
Street1*: 1227 University of Oregon
Street2:
City*: Eugene
County: Lane
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 974031227
Phone Number*: 5413464921 Fax Number: Email*: dcosme@uoregon.edu

15. ESTIMATED PROJECT FUNDING

a. Total Federal Funds Requested*	$168,927.00
b. Total Non-Federal Funds*	$0.00
c. Total Federal & Non-Federal Funds*	$168,927.00
d. Estimated Program Income*	$0.00

16.IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?*

a. YES ○ THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:
DATE:

b. NO ● PROGRAM IS NOT COVERED BY E.O. 12372; OR

○ PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. By signing this application, I certify (1) to the statements contained in the list of certifications* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances * and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)

● I agree*

** The list of certifications and assurances, or an Internet site where you may obtain this list, is contained in the announcement or agency specific instructions.*

18. SFLLL or OTHER EXPLANATORY DOCUMENTATION File Name:

19. AUTHORIZED REPRESENTATIVE

Prefix: Dr. First Name*: David Middle Name: Last Name*: Conover Suffix: Ph.D
Position/Title*: VP for Research and Innovation
Organization Name*: University of Oregon
Department: Sponsored Projects Services
Division: Research and Innovation
Street1*: 5219 University of Oregon
Street2:
City*: Eugene
County: Lane
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 974035219
Phone Number*: 5413465131 Fax Number: 5413465138 Email*: sponsoredprojects@uoregon.edu

Signature of Authorized Representative*
Joshua Kerber

Date Signed*
12/07/2017

20. PRE-APPLICATION File Name:

21. COVER LETTER ATTACHMENT File Name:CoverLetter.pdf

424 R&R and PHS-398 Specific
Table Of Contents

OMB Number: 4040-0010
Expiration Date: 10/31/2019

Project/Performance Site Location(s)

Project/Performance Site Primary Location

❍ I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name:	UNIVERSITY OF OREGON
Duns Number:	0792896260000
Street1*:	1227 UNIVERSITY OF OREGON
Street2:	
City*:	EUGENE
County:	Lane
State*:	OR: Oregon
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	974031227
Project/Performance Site Congressional District*:	OR-004

Additional Location(s) File Name:

Funding Opportunity Number: PA-16-309. Received Date: 2017-12-07T14:04:28.000-05:00

OMB Number: 4040-0001
Expiration Date: 10/31/2019

RESEARCH & RELATED Other Project Information

1. Are Human Subjects Involved?* ● **Yes** ○ **No**

1.a. If YES to Human Subjects

Is the Project Exempt from Federal regulations? ○ Yes ● No

If YES, check appropriate exemption number: _ 1 _ 2 _ 3 _ 4 _ 5 _ 6

If NO, is the IRB review Pending? ● **Yes** ○ **No**

IRB Approval Date: 10-26-2017

Human Subject Assurance Number FWA0000591

2. Are Vertebrate Animals Used?* ○ **Yes** ● **No**

2.a. If YES to Vertebrate Animals

Is the IACUC review Pending? ○ Yes ○ No

IACUC Approval Date:

Animal Welfare Assurance Number

3. Is proprietary/privileged information included in the application?* ○ **Yes** ● **No**

4.a. Does this project have an actual or potential impact - positive or negative - on the environment?* ○ **Yes** ● **No**

4.b. If yes, please explain:

4.c. If this project has an actual or potential impact on the environment, has an exemption been authorized or an environmental assessment (EA) or environmental impact statement (EIS) been performed? ○ Yes ○ No

4.d. If yes, please explain:

5. Is the research performance site designated, or eligible to be designated, as a historic place?* ○ **Yes** ● **No**

5.a. If yes, please explain:

6. Does this project involve activities outside the United States or partnership with international collaborators?* ○ **Yes** ● **No**

6.a. If yes, identify countries:

6.b. Optional Explanation:

	Filename
7. Project Summary/Abstract*	ProjectSummaryAbstract.pdf
8. Project Narrative*	ProjectNarrative.pdf
9. Bibliography & References Cited	BibliographyReferencesCited.pdf
10.Facilities & Other Resources	FacilitiesOtherResources.pdf
11.Equipment	Equipment.pdf

Funding Opportunity Number: PA-16-309. Received Date: 2017-12-07T14:04:28.000-05:00

PROJECT SUMMARY / ABSTRACT

Unhealthy eating increases the risk of developing several kinds of cancer. This occurs directly through consumption of carcinogenic food, and indirectly through overweight and obesity. Because nearly 70% of American adults are overweight or obese, it is critical that we develop effective interventions to alter eating behavior. One key factor that influences eating behavior and weight gain is cue-induced food craving. Craving stimulates appetitive motivation to eat, but can be regulated via cognitive strategies such as reappraisal, or the reconstrual of a stimulus to change its affective meaning. Reappraisal increases the salience of consumption-related costs and reduces food craving for, and the reward value of, unhealthy food. Craving reappraisal is therefore a promising target for interventions designed to reduce unhealthy eating and risk for diet-related cancers. However, individual differences in treatment efficacy remain a persistent problem with interventions. To understand why an intervention works for some individuals and not for others requires clearly defined neurobiological mechanisms of change, as well as sensitive and specific tools to evaluate individual differences in psychological targets. To fill this gap, the goal of this project is to leverage machine learning and multivariate neuroimaging methods to develop and validate a sensitive and specific neural signature of craving reappraisal that can be used as a neurobiological index of craving reappraisal ability. To achieve this goal, this project will pursue the following Aims: 1) develop a neural signature of craving reappraisal in an independent sample of existing data, and 2) validate the neural signature in the context of an ongoing randomized control trial of cognitive reappraisal training to reduce unhealthy eating in overweight and obese adults. Specifically, I will test the reliability and construct validity of the neural signature by assessing the extent to which the cognitive reappraisal training produces changes in the neural signature of craving reappraisal (Aim 2A). I will also test the predictive and incremental validity of the neural signature by assessing the extent to which individual differences the neural signature change predict intervention outcomes, such as the value of unhealthy food and eating behavior (Aim 2B). Upon completion of this project, I will have developed and validated a neurobiological index of craving reappraisal ability that is sensitive and specific, and can be readily used by other researchers to evaluate intervention efficacy and individual differences in responsivity to treatment. I will also receive in-depth training in translational neuroscience interventions and multivariate neuroimaging and machine learning. This work will facilitate the refinement of reappraisal-based interventions to reduce unhealthy eating that will ultimately reduce the prevalence of overweight and obesity and risk for diet-related cancers. Further, by documenting my analysis process and sharing my analysis code, the results of this work can readily be adopted by others to study a variety of psychological processes relevant to eating behavior and cancer risk.

PROJECT NARRATIVE

Cognitive reappraisal can be used to reduce food craving and unhealthy eating (a key risk factor for several kinds of cancer), but interventions to train reappraisal ability are not equally effective for all individuals. This project aims to leverage multivariate neuroimaging and machine learning techniques to develop an objective, neurobiological index of craving reappraisal ability that can be used to assess individual differences in treatment responsivity. The knowledge and research training gained from this project will prepare the trainee to build and refine interventions to reduce unhealthy eating that will ultimately reduce the prevalence of overweight and obesity, and risk for diet-related cancers.

BIBLIOGRAPHY & REFERENCES CITED

Berkman, E. T., & Falk, E. B. (2013). Beyond Brain Mapping: Using Neural Measures to Predict Real-World Outcomes. *Current Directions in Psychological Science*, *22*(1), 45–50.

Berridge, K. C. (2009). 'Liking' and 'wanting' food rewards: Brain substrates and roles in eating disorders. *Physiology & Behavior*, *97*(5), 537–550.

Boswell, R. G., & Kober, H. (2016). Food cue reactivity and craving predict eating and weight gain: a meta-analytic review: Food cue reactivity and craving meta-analysis. *Obesity Reviews*, *17*(2), 159–177.

Calle, E. E., Rodriguez, C., Walker-Thurmond, K., & Thun, M. J. (2003). Overweight, Obesity, and Mortality from Cancer in a Prospectively Studied Cohort of U.S. Adults. *New England Journal of Medicine*, *348*(17), 1625–1638.

Chang, L. J., Gianaros, P. J., Manuck, S. B., Krishnan, A., & Wager, T. D. (2015). A Sensitive and Specific Neural Signature for Picture-Induced Negative Affect. *PLOS Biol*, *13*(6), e1002180.

Cosme, D., Mobasser, A., Zeithamova, D., Berkman, E. T., & Pfeifer, J. H. (Submitted). Choosing to regulate: Does autonomous choice enhance craving regulation? *Social Cognitive and Affective Neuroscience*.

Doré, B. P., Weber, J., & Ochsner, K. N. (2017). Neural Predictors of Decisions to Cognitively Control Emotion. *The Journal of Neuroscience*, *37*(10), 2580–2588.

Dougan, M. M., Hankinson, S. E., Vivo, I. D., Tworoger, S. S., Glynn, R. J., & Michels, K. B. (2015). Prospective study of body size throughout the life-course and the incidence of endometrial cancer among premenopausal and postmenopausal women. *International Journal of Cancer*, *137*(3), 625–637.

Drewnowski, A. (1995). Energy intake and sensory properties of food. *The American Journal of Clinical Nutrition*, *62*(5 Suppl), 1081S–1085S.

Ewers, M., Sperling, R. A., Klunk, W. E., Weiner, M. W., & Hampel, H. (2011). Neuroimaging markers for the prediction and early diagnosis of Alzheimer's disease dementia. *Trends in Neurosciences*, *34*(8), 430–442.

Flegal, K. M., Carroll, M. D., Kit, B. K., & Ogden, C. L. (2012). Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA*, *307*(5), 491–497.

Giuliani, N. R., Calcott, R. D., & Berkman, E. T. (2013). Piece of cake. Cognitive reappraisal of food craving. *Appetite*, *64*, 56–61.

Giuliani, N. R., Mann, T., Tomiyama, A. J., & Berkman, E. T. (2014). Neural Systems Underlying the Reappraisal of Personally Craved Foods. *Journal of Cognitive Neuroscience*, *26*(7), 1390–1402.

Giuliani, N. R., & Pfeifer, J. H. (2015). Age-related changes in reappraisal of appetitive cravings during adolescence. *NeuroImage*, *108*, 173–181.

Gnagnarella, P., Gandini, S., La Vecchia, C., & Maisonneuve, P. (2008). Glycemic index, glycemic load, and cancer risk: a meta-analysis. *The American Journal of Clinical Nutrition*, *87*(6), 1793–1801.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, *2*(3), 271–299.

Hoyo, C., Cook, M. B., Kamangar, F., Freedman, N. D., Whiteman, D. C., Bernstein, L., … Gammon, M. D. (2012). Body mass index in relation to oesophageal and oesophagogastric junction adenocarcinomas: a pooled analysis from the International BEACON Consortium. *International Journal of Epidemiology*, *41*(6), 1706–1718.

Hutcherson, C. A., Plassmann, H., Gross, J. J., & Rangel, A. (2012). Cognitive Regulation during Decision Making Shifts Behavioral Control between Ventromedial and Dorsolateral Prefrontal Value Systems. *The Journal of Neuroscience*, *32*(39), 13543–13554.

Jansen, A. (1998). A learning model of binge eating: cue reactivity and cue exposure. *Behaviour Research and Therapy*, *36*(3), 257–272.

Kant, A. K. (2000). Consumption of energy-dense, nutrient-poor foods by adult Americans: nutritional and health implications. The third National Health and Nutrition Examination Survey, 1988-1994. *The American Journal of Clinical Nutrition*, *72*(4), 929–936.

Kober, H., Kross, E. F., Mischel, W., Hart, C. L., & Ochsner, K. N. (2010). Regulation of craving by cognitive strategies in cigarette smokers. *Drug and Alcohol Dependence*, *106*(1), 52–55.

Kushi, L. H., Doyle, C., McCullough, M., Rock, C. L., Demark-Wahnefried, W., Bandera, E. V., … The American Cancer Society 2010 Nutrition and Physical Activity Guidelines Advisory Committee. (2012). American Cancer Society guidelines on nutrition and physical activity for cancer prevention. *CA: A Cancer Journal for Clinicians*, *62*(1), 30–67.

Liu, S., Globa, A. K., Mills, F., Naef, L., Qiao, M., Bamji, S. X., & Borgland, S. L. (2016). Consumption of palatable food primes food approach behavior by rapidly increasing synaptic density in the VTA. *Proceedings of the National Academy of Sciences*, *113*(9), 2520–2525.

Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, *24*, 167–202.

Norat, T., Lukanova, A., Ferrari, P., & Riboli, E. (2002). Meat consumption and colorectal cancer risk: dose-response meta-analysis of epidemiological studies. *International Journal of Cancer*, *98*(2), 241–256.

Norman, K. A., Polyn, S. M., Detre, G. J., & Haxby, J. V. (2006). Beyond mind-reading: multi-voxel pattern analysis of fMRI data. *Trends in Cognitive Sciences*, *10*(9), 424–430.

Pelchat, M. L., Johnson, A., Chan, R., Valdez, J., & Ragland, J. D. (2004). Images of desire: food-craving activation during fMRI. *NeuroImage*, *23*(4), 1486–1493.

Poldrack, R. A., Halchenko, Y. O., & Hanson, S. J. (2009). Decoding the Large-Scale Structure of Brain Function by Classifying Mental States Across Individuals. *Psychological Science*, *20*(11), 1364–1372.

R Core Team. (2016). R (Version 3.3.0). Retrieved from http://www.R-project.org

Richter, F. R., Chanales, A. J. H., & Kuhl, B. A. (2016). Predicting the integration of overlapping memories by decoding mnemonic processing states during learning. *NeuroImage*, *124*, 323–335.

Rissman, J., Gazzaley, A., & D'Esposito, M. (2004). Measuring functional connectivity during distinct stages of a cognitive task. *NeuroImage*, *23*(2), 752–763.

Rogers, P. J., & Hill, A. J. (1989). Breakdown of dietary restraint following mere exposure to food stimuli: interrelationships between restraint, hunger, salivation, and food intake. *Addictive Behaviors*, *14*(4), 387–397.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*(2), 1–36.

Siep, N., Roefs, A., Roebroeck, A., Havermans, R., Bonte, M., & Jansen, A. (2012). Fighting food temptations: The modulating effects of short-term cognitive reappraisal, suppression and up-regulation on mesocorticolimbic activity related to appetitive motivation. *NeuroImage*, *60*(1), 213–220.

Stice, E., Yokum, S., Burger, K., Rohde, P., Shaw, H., & Gau, J. M. (2015). A Pilot Randomized Trial of a Cognitive Reappraisal Obesity Prevention Program. *Physiology & Behavior*, *0*, 124–132.

Tang, D. W., Fellows, L. K., Small, D. M., & Dagher, A. (2012). Food and drug cues activate similar brain regions: A meta-analysis of functional MRI studies. *Physiology & Behavior*, *106*(3), 317–324.

Wager, T. D., Atlas, L. Y., Lindquist, M. A., Roy, M., Woo, C.-W., & Kross, E. (2013). An fMRI-Based Neurologic Signature of Physical Pain. *New England Journal of Medicine*, *368*(15), 1388–1397.

Wager, T. D., & Nichols, T. E. (2003). Optimization of experimental design in fMRI: a general framework using a genetic algorithm. *NeuroImage*, *18*(2), 293–309.

Wang, F., & Xu, Y. (2014). Body mass index and risk of renal cell cancer: a dose-response meta-analysis of published cohort studies. *International Journal of Cancer*, *135*(7), 1673–1686.

Woo, C.-W., Chang, L. J., Lindquist, M. A., & Wager, T. D. (2017). Building better biomarkers: brain models in translational neuroimaging. *Nature Neuroscience*, *20*(3), 365–377.

Yokum, S., & Stice, E. (2013). Cognitive regulation of food craving: effects of three cognitive reappraisal strategies on neural response to palatable foods. *International Journal of Obesity*, *37*(12), 1565–1570.

Zeithamova, D., & Preston, A. R. (2017). Temporal Proximity Promotes Integration of Overlapping Events. *Journal of Cognitive Neuroscience*, *29*(8), 1311–1323.

FACILITIES AND OTHER RESOURCES

University of Oregon

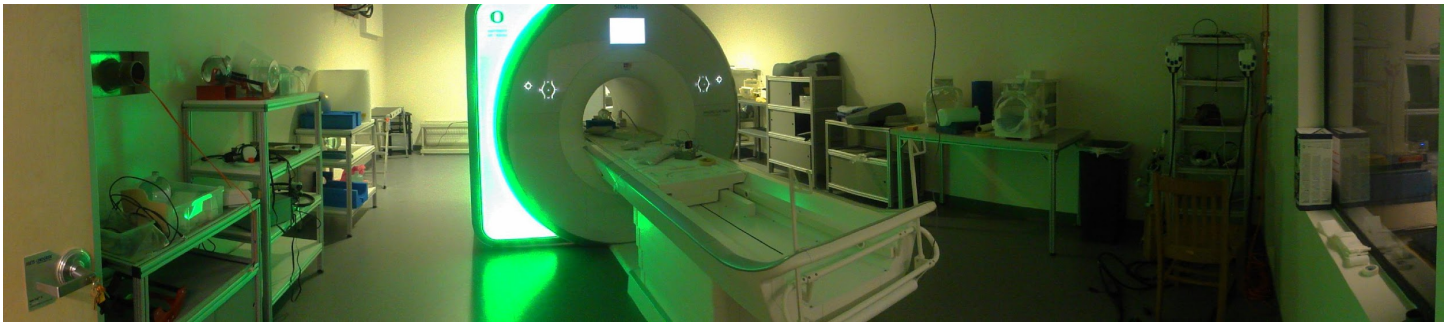
The University of Oregon (UO) is classified as a Carnegie Doctoral/Research University–Extensive and has a history of substantial research, federal grant funding, and scientific inquiry. The College of Arts and Sciences (CAS), which includes the Department of, comprises 40 departments and programs, with 463 tenure-track faculty. The research activity of CAS faculty is the basis for the UO's status as a Carnegie Research I institution and its membership in the Association of American Universities. In the past 5 years, three faculty have been elected to the National Academy of Sciences, three named Sloan Research Fellows, five elected to the American Academy of Arts and Sciences, five named Guggenheim Fellows, seven elected as American Mathematical Society Fellows, and nine elected to the American Association for the Advancement of Science, with an additional faculty member elected as president of the AAAS.

UO provides comprehensive instructional, research, and public service programs that advance scientific and humanistic knowledge. Research programs serve the educational, cultural, and economic needs of the region and the nation. Administrative units provide direct oversight and support for graduate programs, grant proposal submission, research compliance, contracts and grant administration, and research initiatives. UO has collaborative research-based relationships with every school district in the state and in many other states in the United States. The facilities at UO will contribute substantially to the success of the proposed research.

Lewis Center for Neuroimaging (LCNI)

The LCNI is a core-research facility under the auspices of the office of the vice president of research and innovation. It is designed to enhance access to state-of-the-art MRI-related research by the UO faculty and surrounding research community. The center, with its own private entrance (see photo at right), is housed in the Lewis Integrative Science Building (LISB) and contains a Siemens Skyra 3-Tesla MRI machine dedicated to research (see photo below). A generous endowment by the Lewis family provides unparalleled infrastructure support for staff and equipment dedicated to center activity. The center is located just steps away from Dr. Berkman's Social and Affective Neuroscience (SAN) Lab, which is located on the 2nd floor of LISB, directly above the LCNI. Dr. Zeithamova's office and lab space are also on the 2nd floor of LISB near Dr. Berkman's.

Laboratory. The centerpiece of the LCNI is the Siemens Skyra 3T MRI machine. This magnet is approximately 2 years old and was recently upgraded with multiband sequences. We have multiple coils, including a 32-channel head coil with optimized sequences based on the latest Human Connectome Project's published work. We support both Mac and PC presentation with both goggle and projector systems with 5-fingered response boxes for both hands. With a large magnet room and control room that are optimal for research training, our lab is ideal for the type of cross-disciplinary work proposed in this application. The LCNI has a large electronics laboratory for coil design and hardware construction and directly adjacent to the console room, a separate room contains an MR-simulator used to acclimate participants to the MR-environment, with moveable participant table, full visual/audio presentation and response measurement capabilities, and accurate auditory simulation of EPI sequences.



Clinical. The LCNI has space for private physical exams, pre-testing, and interviews that is situated across the hall from the magnet room and is equipped with interview table, chairs, and computer for pretesting.

Computing. The LCNI maintains a variety of computing equipment, including a grid-server for large neuroimaging analysis jobs and a dedicated image analysis room. The analysis room contains two workstations for smaller analyses and data manipulation and two other terminals for interaction with the grid-server. Data are stored on a separate file server.

Office. The LCNI has a dedicated and regularly staffed reception area with a separate entrance to facilitate participant access and comfort. This provides an exceptionally professional feel typically not seen in research settings, which can be especially helpful when scanning sensitive populations, including children and clinical populations who may be accompanied by family members or caregivers. Additional office space for center staff and related trainees is available down the hall from the magnet and other center space. This proximity enables center staff to provide maximal interaction with investigators and to be accessible for troubleshooting or problem solving.

Computer Support
The UO operates a centralized data and authentication system (Red Hat Enterprise). All faculty and staff have accounts and have direct access on campus or via VPN from off campus. Internet access is provided at no cost. Data access and transfer capacity are excellent. Computer support is available from the university's Computing Center and from in-house staff in the Department of Psychology. The Computing Center also employs statistical and computer consultants to assist faculty and staff with other computer needs.

Dr. Berkman has ample research space in his lab as part of the Department of Psychology at UO. The Social and Affective Neuroscience (SAN) Laboratory, located in the recently built Lewis Integrative Sciences Building (LISB) directly above the LCNI, is equipped with 10 Apple workstations (see the Equipment section of this proposal) that have all necessary software for training stimulus presentation (MATLAB with Psychophysics Toolbox) and analytic software for fMRI analysis, including SPM12 and FSL. These computers have additional software for all other analyses described in the "Analytic Strategy" subsection of the Approach, including HLM, EQS, MPLUS, SAS, R, and SPSS. Dr. Zeithamova has comparable computational resources available to her, and both Berkman and Zeithamova have access to the University of Oregon's High Performance Computing Cluster, Talapas.

Talapas High Performance Computing Cluster
The Talapas supercomputer is a high performance computing cluster that will be used to process fMRI data. Talapas enables rapid processing of the massive quantity of fMRI data that will be collected in the proposed research, including preprocessing and multivariate pattern analyses. Talapas is maintained by the Research Advanced Computing Services, which has four full-time staff dedicated to administration and maintenance of Talapas and provide support for application software, training, and consulting services for the UO computational research community. Talapas has 96 general purpose computational nodes providing 2,688 physical cores, 24 compute nodes with quad Graphics Processor Units (GPUs), eight large memory nodes with up to 4TB of RAM for high memory applications, full EDR Infiniband interconnect for fast message passing in high-performance applications, and 1.5 petabytes of fast data storage.

Scientific Environment
The UO provides strong support for synergistic and multidisciplinary collaborations across departments, research centers, and institutes, and the LCNI. The Department of Psychology and the Center for Translational Neuroscience (CTN), of which Dr. Berkman is Associate Director, includes faculty affiliates whose research focuses on preventive interventions in people across the lifespan, and supports weekly meetings for research scientists and NIH-funded pre- and postdoctoral training fellows focused on developing and disseminating evidence-based mental health services. The University of Oregon's LISB also houses several University of Oregon strategic interdisciplinary research clusters focused on research across the spectrum of cellular processes to improving communities. The University of Oregon's strategic research initiatives provide another collaborative forum for the investigators of this project to present and discuss their research. Access to an extensive research library at the University of Oregon campus are also available.

The Department of Psychology supports a vibrant intellectual community that provides the research team with extensive opportunities to present their own research, receive feedback about ongoing projects, and learn of new and related research in the Pacific Northwest and beyond. There are departmental colloquium and bi-weekly brown bags attended by faculty and students for each of the social/personality, cognitive/neuroscience, clinical, and developmental areas. Lecture series are further supplemented by talks offered at off-campus research institutes that are affiliated with the Department of Psychology and relevant to the current proposal: Oregon Social Learning Center, Child and Family Center, Oregon Center for Applied Sciences, and Oregon Research Institute.

EQUIPMENT

Lewis Center for Neuroimaging (LCNI) Equipment

Functional magnetic resonance imaging (fMRI) scans will be conducted at the Robert and Beverly Lewis Center for Neuroimaging (LCNI) located in the Lewis Integrative Sciences Building (LISB) at the University of Oregon (Fred Sabb, director), which also houses Dr. Berkman and Dr. Zeithamova's lab and office spaces. Major resources in the neuroimaging center include the following:

- Three full-time staff, including an MRI radiology technologist, MR physicist, and administrative staff. The technologist has extensive experience scanning in clinical and research settings.
- Research-dedicated 3T MRI system (Siemens Skyra), MRI-compatible electrostatic headphones (Koss), digital projector, and MRI-compatible button boxes
- Multiple head coils, including a phased array coil
- MRI/RF coil development lab with Agilent network analyzer, RF signal generator, digital oscilloscope, computer interface of test gear to a lab PC, and resistance/inductance/capacitance meters
- Image analysis computer hardware
- Several fMRI data analysis programs, including locally developed programs (e.g., MRIConvert for converting DICOM files into SPM/Analyze format), MATLAB, and standard packages (AFNI, FSL, BrainVoyager, SPM, MarsBaR, Neuroelf)
- MRI simulator unit (with internal dimensions identical to those of the Siemens Skyra scanner) with moveable participant table, full visual/audio presentation and response measurement capabilities, and accurate auditory simulation of EPI sequences

Dr. Berkman's Social Affective Neuroscience Laboratory Equipment

- 10 Apple iMacs (3.2 GHz Intel Core i5 processors, 8 GB RAM, 4 TB hard drives)
- 2 MacPros (2 x 2.4 GHz QuadCore Intel Xeon processors, 16 GB RAM, 2 TB hard drives)
- 2 MacBook Pros (2.66 GHz Intel Core i7 processors, 8 GB RAM, 1 TB hard drives)
- 16 TB RAID 0 independent storage/backup server
- Laser printer
- Document scanner
- Clinical-quality scale, ruler, and tape measure to accurately assess height, weight, BMI, and waist-to-hip ratio

Talapas High Performance Computing Cluster

The Talapas supercomputer is a high performance computing cluster that will be used to process fMRI data. Talapas enables rapid processing of the massive quantity of fMRI data that will be collected in the proposed research, including preprocessing and multivariate pattern analyses. Talapas is maintained by the Research Advanced Computing Services, which has four full-time staff dedicated to administration and maintenance of Talapas and provide support for application software, training, and consulting services for the UO computational research community. Talapas has the following specifications:

- 96 standard nodes, each with: 28 cores, 128 GB RAM, 200 GB SSD local storage
- 24 GPU nodes, each with: 28 cores, 256 GB RAM, 200 GB SSD local storage
- 8 large memory nodes, each with: 56 cores, 1, 2, or 4 TB RAM, dual 480 GB SSD local storage
- 1.5 PB fast storage
- SLURM cluster management and job submission
- Relevant software installed: Singularity, Python, MATLAB, SPM, AFNI, FSL, Freesurfer, R

OMB Number: 4040-0001
Expiration Date: 10/31/2019

RESEARCH & RELATED Senior/Key Person Profile (Expanded)

PROFILE - Project Director/Principal Investigator

Prefix: Ms. First Name*: Danielle Middle Name Last Name*: Cosme Suffix:

Position/Title*: Graduate Student
Organization Name*: UNIVERSITY OF OREGON
Department: Psychology
Division: College of Arts & Sciences
Street1*: 1227 University of Oregon
Street2:
City*: Eugene
County: Lane
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
Zip / Postal Code*: 974031227

Phone Number*: 5413464921 Fax Number:

E-Mail*: dcosme@uoregon.edu

Credential, e.g., agency login: DCOSME16

Project Role*: PD/PI Other Project Role Category:

Degree Type: PhD Degree Year: In Progress

Attach Biographical Sketch*: File Name: Biosketch_Cosme.pdf

Attach Current & Pending Support: File Name:

Tracking Number: GRANT12530803 Funding Opportunity Number: PA-16-309 . Received Date: 2017-12-07T14:04:28.000-05:00

PROFILE - Senior/Key Person

Prefix: First Name*: Elliot Middle Name Todd Last Name*: Berkman Suffix:

Position/Title*: Assistant Professor
Organization Name*: University of Oregon
Department: Psychology
Division:
Street1*: 1227 University of Oregon
Street2:
City*: Eugene
County:
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
Zip / Postal Code*: 974030000

Phone Number*: 541-346-4909 Fax Number: 541-346-4911

E-Mail*: berkman@uoregon.edu

Credential, e.g., agency login: BERKMANET1

Project Role*: Other (Specify) Other Project Role Category: Sponsor

Degree Type: PHD,MA,BA,BS Degree Year:

Attach Biographical Sketch*: File Name: Biosketch_Berkman.pdf

Attach Current & Pending Support: File Name:

PROFILE - Senior/Key Person

Prefix: First Name*: Dagmar Middle Name Last Name*: Zeithamova Suffix:

Position/Title*: Assistant Professor
Organization Name*: University of Oregon
Department: Psychology
Division:
Street1*: 1227 University of Oregon
Street2:
City*: Eugene
County:
State*: OR: Oregon
Province:
Country*: USA: UNITED STATES
Zip / Postal Code*: 974030000

Phone Number*: (541) 346-6731 Fax Number:

E-Mail*: dasa@uoregon.edu

Credential, e.g., agency login: zeithamova

Project Role*: Other (Specify) Other Project Role Category: Co-Sponsor

Degree Type: PHD,MA Degree Year:

Attach Biographical Sketch*: File Name: Biosketch_Zeithamova.pdf

Attach Current & Pending Support: File Name:

Tracking Number: GRANT12530803 Funding Opportunity Number: PA-16-309 . Received Date: 2017-12-07T14:04:28.000-05:00

OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES**.

NAME: Danielle (Dani) Cosme

eRA COMMONS USER NAME (credential, e.g., agency login): DCOSME16

POSITION TITLE: Doctoral Candidate

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)*	Start Date MM/YYYY	Completion Date MM/YYYY	FIELD OF STUDY
Chapman University	BS	08/2005	05/2009	Psychobiology, minor in chemistry
Stockholm University	MS	08/2012	01/2015	Psychology
University of Oregon	MS	09/2015	12/2016	Psychology
	PHD	09/2015	06/2021 (expected)	Psychology

A. Personal Statement

My long-term career goal is to become a leading independent translational neuroscientist, designing and evaluating interventions to improve self-regulation and reduce engagement in health-risking, cancer-relevant behaviors, such as unhealthy eating, using cutting-edge neuroimaging and statistical methods. My research will focus on both prevention and intervention in adolescent and adult populations. To achieve this goal, I have worked with my mentors to craft a training plan that builds on my present knowledge and skillset to develop expertise in translational neuroscience, and advanced neuroimaging and longitudinal modeling techniques.

Through my academic training and research experience, I have developed a strong foundation in psychology and neuroscience. As an undergraduate at Chapman University, I excelled with rigorous scientific coursework, majoring in psychobiology and minoring in chemistry. To gain a broad overview of research in neuroscience and psychology, I worked as a research assistant in Dr. William Wright's marine neurobiology lab studying evolutionary mechanisms of learning and memory in sea hares, as well as Dr. Connie Shears' cognitive psychology lab studying the effect of emotional language on inference processing. As a master's student at Stockholm University, I narrowed my research interests to human behavior and worked with Dr. Stefan Wiens studying individual differences in emotional reactivity using a variety of psychophysiological measures. I operated with a high degree of independence, and gained skills in experimental design, data collection and analysis, and manuscript preparation and presentation. This work culminated in a first author paper[1], as well as several presentations. As a lab manager for Drs. Elliot Berkman and Jennifer Pfeifer, I gained substantial experience with functional neuroimaging (fMRI), including experimental design, task programming and optimization, fMRI data collection, and subject- and group-level univariate GLM analysis, as well as critical "soft skills", such as project management, troubleshooting, and on-the-fly problem solving. I also gained experience with longitudinal fMRI analysis, with which I have continued to develop expertise as a PhD student in Dr. Pfeifer's lab, presenting an innovative developmental analysis method as an invited speaker at a recent methodological workshop[2].

As a PhD student, my primary focus has been on appetitive self-regulation and its relationship to health-risking behaviors, including substance use and unhealthy eating. Ultimately, I seek to improve our ability to predict real-world behavior using neural and behavioral data in order to identify cancer-relevant risk and protective factors. Towards this goal, I have focused on improving the ecological validity of a task assessing appetitive self-regulation ability by incorporating choice into the paradigm. This first-author paper is currently in revision[3]. I conducted a year-long longitudinal pilot study using this task to characterize its ability to predict changes in substance use and other health-risking behaviors across freshman year. I analyzed this data and, together with Dr. Pfeifer, wrote a successful R21 application, funded by the National Institute on Drug Abuse[4].

Next, I plan to improve our ability to predict real-world behavior by improving the sensitivity and specificity of neural predictors. The project outlined in this proposal will pursue this goal by developing and validating a neurobiological index (i.e., neural signature) of craving reappraisal, which can be used in a variety of ways, including assessment of spontaneous engagement in reappraisal, individual differences in craving reappraisal ability, and craving reappraisal intervention efficacy. I will develop this neural signature under the mentorship of Dr. Dagmar Zeithamova, an expert in multivariate neuroimaging and machine learning techniques, and validate it under the mentorship of Dr. Berkman, an expert in translational neuroscience and advanced longitudinal modeling. Together, this is the ideal team to facilitate the acquisition of the skills necessary to achieve my career goal of becoming a leading translational neuroscientist.

1. **Cosme, D.**, & Wiens, S. (2015). Self-Reported Trait Mindfulness and Affective Reactivity: A Motivational Approach Using Multiple Psychophysiological Measures. PLOS One, 10(3), e0119466.
2. **Cosme, D**., Flournoy, J. C., Telzer, E., Pfeifer, J. H. (2017) Traditional modeling approaches. Presented at the Modeling Developmental Change workshop, September 15, Portland, Oregon.
3. **Cosme. D.**, Mobasser, A., Zeithamova, D., Berkman E. T., Pfeifer, J. H. Choosing to regulate: Does autonomous choice enhance craving regulation? (Manuscript in revision at *Social Cognitive and Affective Neuroscience*).
4. PI Pfeifer J. H. (2017) Choosing to Regulate: An fMRI Investigation of Autonomous Versus Controlled Self-Regulation and Substance Use in Late Adolescence. National Institute on Drug Abuse (R21DA043015).

B. Positions and Honors

Positions and Employment

2007-2009	Undergraduate research assistant, Wright Lab, Chapman University, Orange, CA
2008-2009	Undergraduate research assistant, Shears Lab, Chapman University, Orange, CA
2012-2014	Masters student, Wiens Lab, Stockholm University, Stockholm, Sweden
2014-2015	Lab manager, Pfeifer and Berkman Labs, University of Oregon, Eugene, OR
2015-2021	Graduate research fellow, Pfeifer and Berkman Labs, University of Oregon, Eugene, OR
2016-	Facilitator, Data Science Club, University of Oregon, Eugene, OR
2017	Fellow, Neurohackweek, University of Washington, Seattle, WA

Other Experience and Professional Memberships

2015-	Member, Flux Society
2015-	Member, Social and Affective Neuroscience Society
2016	Organizer, Brainhack Global Hackathon
2016-2017	Departmental Steward, Graduate Teaching Fellows Federation
2017-	Member, American Psychological Association
2017-	Vice President of Organizing, Graduate Teaching Fellows Federation

Honors

2005	Norris Foundation Scholar for the Biological Sciences, Chapman University
2005-2009	Presidential Scholar, Chapman University
2009	Graduated Magna Cum Laude with Honors in Psychology, Chapman University
2009	Undergraduate Travel Grant, Chapman University
2014	Student Travel Award, International Symposium for Contemplative Sciences
2015	Jacobs Foundation Young Scholars Award, Society for Research in Child Development
2016	Clarence and Lucille Dunbar Scholarship, University of Oregon
2017	Miller Family Graduate Award in Technology and Science, University of Oregon
2017	General University Scholarship, University of Oregon
2017	Graduate School “Special Opps” Travel and Research Award, University of Oregon

C. Contributions to Science

1. **Individual differences in emotional reactivity.** Together with my master’s thesis advisor, Dr. Stefan Wiens, I developed a rigorous psychophysiological experiment to test whether emotional reactivity varies as a function of trait mindfulness. Prior research suggested that mindfulness meditation reduces emotional reactivity by facilitating disengagement from emotional stimuli. However, the evidence was mixed as to whether individuals with higher trait mindfulness actually have decreased reactivity to emotional stimuli. We

assessed emotional reactivity using a multi-method approach, collecting electrocortical brain activity (EEG), skin conductance, startle response, and self-reported responses to highly arousing positive and negative emotional pictures. Across all measures, we did not find any evidence for moderation by trait mindfulness. These findings are significant because they suggest that either self-reported trait mindfulness is not related to spontaneous emotional reactivity or that the available questionnaires may not be valid measures of mindfulness. We published this work[a] and I presented these findings as an invited speaker at Stockholm University[b], as well as at several poster sessions[c].

a) **Cosme, D.**, & Wiens, S. (2015). Self-Reported Trait Mindfulness and Affective Reactivity: A Motivational Approach Using Multiple Psychophysiological Measures. PLOS One, 10(3), e0119466.
b) **Cosme, D.** (2014) Mindfulness and Self-Regulation: How is mindfulness related to emotional reactivity, attention regulation, and emotion regulation? Presentation given at the Stockholm University's Public Lecture Series in Psychology, April 9, Stockholm, Sweden.
c) **Cosme, D.** & Wiens, S. (2014) Self-reported trait mindfulness and emotional responding: A multi-method approach. Poster presented at the International Symposium for Contemplative Studies, October 30-November 2, Boston, MA.

2. **Neurodevelopmental trajectories of self and social processing across adolescence.** Human adolescence is a formative period characterized by major shifts in self and social development. However, the specific neurodevelopmental trajectories of self and social evaluations are not well characterized. While a lab manager in Dr. Jennifer Pfeifer's lab, I began analyzing behavioral and fMRI data from a well-powered 6-year longitudinal neuroimaging study to assess how self and social processing develops during early to late adolescence. Toward this end, we used whole-brain linear mixed effects modeling to estimate the shape of the developmental curves at each voxel (volumetric pixel) in the brain. Because we conduct a huge number of statistical tests (approximately 70,000), it is critical to correct for multiple comparisons. However, despite showing robust task effects, this method was not sensitive enough to detect developmental changes after stringent correction for multiple comparisons. In response, I helped develop an innovative analysis technique to continue to probe whole-brain developmental effects. We used a standardized parcellation atlas to divide the brain into 350 regions of interest (ROI), extracted the mean signal within each ROI for each subject, time point, and condition, and used this data as input to linear mixed effects models. This approach is significant because it substantially reduces the number of multiple comparisons and stabilities estimates by averaging across ROIs. To facilitate the adoption of this method by others, I presented this approach and shared analysis code at the Modeling Developmental Change workshop[a,b]. Our results showed expected increases activation for self and social processing in their respective neural networks. However, we also showed that self-evaluations in the academic domain become highly salient, affirming the importance of academic identity during adolescence. I have presented this work as an invited speaker[c], as well as at a poster sessions[d], and we are currently preparing the manuscript for publication and expect to submit in early 2018.

a) **Cosme, D**., Flournoy, J. C., Telzer, E., Pfeifer, J. H. (2017) Traditional modeling approaches. Presented at the Modeling Developmental Change workshop, September 15, Portland, Oregon.
b) Flournoy, J. C., **Cosme, D.**, & Pfeifer, J. H. (2017) Orientation to fMRI. Presented at the Modeling Developmental Change workshop, September 15, Portland, Oregon.
c) **Cosme, D.** & Pfeifer, J. H. (2015) A longitudinal fMRI study of self-evaluation across adolescence. Presentation given at the SRCD meeting, September 16-17, Leiden, The Netherlands.
d) **Cosme, D.**, Flournoy, J. C., Livingston, J. L., Mazziotta, J., Dapretto, M., Pfeifer, J. H. (2017) Neurodevelopmental trajectories of self and social evaluation across adolescence. Poster presented at the Flux Congress, September 16-18, Portland, Oregon.
e) Telzer, E. H., McCormick, E. M., Peters, S., **Cosme, D.**, Pfeifer J. H., Duijvenvoord, A. C. K., Methodological Considerations for Developmental Longitudinal fMRI Research (Manuscript in revision at *Developmental Cognitive Neuroscience*).

3. **The effect of choice on appetitive self-regulation.** Although the ability to engage in regulation to avoid goal-incongruent temptations is critical for healthy development, individuals who are otherwise capable often *choose not* to regulate. In most self-regulation tasks participants are explicitly told when to regulate, and thus these tasks are only able to assess participants' abilities to regulate when prompted to do so. However, this approach lacks fidelity to the regulatory process outside the lab. To improve ecological validity and assess whether and how self-regulation may differ when individuals choose to regulate, I

designed a novel neuroimaging paradigm to test the hypothesis that choosing to regulate improves appetitive self-regulation for personally-craved foods. Despite strong theoretical predictions that choice should facilitate regulation, we observed the opposite effect; choice actually disrupted regulation. Collaborating with Dr. Dagmar Zeithamova, I used a multivariate neuroimaging technique, multivoxel pattern analysis (MVPA), to show that the disruption may be due to inefficient resource allocation on choice trials. This work is significant because it shows that standard task paradigms instructing individuals when to regulate may not generalize to behavior outside the lab, when they must first choose to regulate. The manuscript for this work is currently in revision at *Social Cognitive and Affective Neuroscience*[a], and I have presented this work as an invited speaker[b], as well as at various poster sessions[c].

a) **Cosme. D.**, Mobasser, A., Zeithamova, D., Berkman E. T., Pfeifer, J. H. Choosing to regulate: Does autonomous choice enhance craving regulation? (Manuscript in revision at *Social Cognitive and Affective Neuroscience*).
b) **Cosme, D.** (2015) Choosing to regulate: Autonomy alters neural responses during craving regulation. Seminar presented at Stockholm University's Gösta Ekman Laboratory, December 15, Stockholm, Sweden.
c) **Cosme, D.**, Mobasser, A., Zeithamova, D., Berkman, E. T., Pfeifer, J. H. (2017) Muddying the waters: Does autonomous choice reduce craving regulation efficacy? Poster presented at the Social and Affective Neuroscience Society annual meeting, March 16-18, Los Angeles, CA.
d) Giuliani, N. R., Merchant, J. S., **Cosme, D.**, Berkman, E. T. Neural predictors of dietary change. (Manuscript submitted to the *Annals of the New York Academy of Sciences*).

4. **Autonomy, appetitive self-regulation, and health-risking behaviors during the transition to college.** Designing effective interventions to reduce collegiate substance use and other health-risking behaviors requires the identification of risk factors that are amenable to change, such as appetitive self-regulation. Further, because there is a sudden increase in autonomy and decrease in regulatory scaffolding during the transition to college, it is important to understand how autonomous motivation interacts with regulatory ability. Together with my PhD advisor, Dr. Jennifer Pfeifer, I designed and carried out a year-long longitudinal pilot study assessing the ability of self-initiated, autonomous appetitive self-regulation to predict changes in substance use across freshman year. Our results indicated that autonomous appetitive self-regulation better predicted outcomes than either standard measures of appetitive self-regulation or other known predictors, such as gender, SES, or ethnicity. We used this pilot data to write a grant application to conduct this study in a well-powered sample, and it was recently funded by the National Institute on Drug Abuse[a]. These results have also been presented at the Society for Research in Child Development's biennial meeting[b].

a) PI Pfeifer J. H. (2017) Choosing to Regulate: An fMRI Investigation of Autonomous Versus Controlled Self-Regulation and Substance Use in Late Adolescence. National Institute on Drug Abuse (R21DA043015).
b) Mobasser, A., **Cosme, D.**, Berkman, E. T., Pfeifer, J. H. (2017) Don't tell me what to do: Autonomy-related neural activity during self-regulation is related to health-risking behaviors of college freshmen. Poster presented at the Society for Research in Child Development meeting, April 6-8, Austin, TX.

D. Additional Information: Research Support and/or Scholastic Performance

YEAR	COURSE TITLE	GRADE	COURSE TITLE	GRADE
	BELLEVUE COMMUNITY COLLEGE (TAKEN DURING HIGH SCHOOL; AU = Audit)			
2003	Introduction to the theater	A	Written expression	B+
	Wellness	A-	Life fitness training I	AU
2004	American sign language I	A	American sign language II	A
	American literature beginning to civil war	A	Introduction to chemistry	A
	Precalculus I	B	U.S. history: global age	B+
2005	American sign language III	A	Introduction to philosophy	F
	CHAPMAN UNIVERSITY (P = Equivalent to C or higher, AU = Audit, FW = Failure to withdraw, R = Repeated)			
2005	Writing about literature	A	Single variable calculus I	A

	Socrates trial: Reasoning and critical analysis	B	Introduction to American politics	B+
2006	General biology I	A	General chemistry and lab I	A
	Intro to film aesthetics	A	Volleyball – intermediate	A
	Single variable calculus II	A	General physics for life science I	FW R
	Introduction to ethics	A	College biology	A
	Introduction to psychology	A	Human nutrition	A
	Ecology and evolution	A-		
2007	Eastern concepts of health and healing	A	Student faculty research	P
	Neuroanatomy and neurophysiology	A-	Organic chemistry and lab I	A
	General chemistry and lab II	A-	General physics for life science I	A
	Ultimate Frisbee	A	Introduction to statistics	A-
	Psychology of learning	A	Sensation and perception	A
	Physiological psychology	A		
2008	Photography	A	Cellular and molecular biology	B+
	Chemistry of the natural world	A	Biochemistry I, biomolecules and lab	A
	Physics	C	Leadership and experiential learning	P
	Study abroad science	A	Research methods behav. sciences	A
	Foundation course photography	AU	Individual research	A
	Student faculty research	P		
2009	Independent study: Cog. Psych. research	A	Elementary German I	AU
	Genetics	A-	Individual research	A
	Research in biology	A	Advanced American sign language I	B
	Advanced topics in environmental chemistry	A-		

STOCKHOLM UNIVERSITY (A = Excellent, B = Very good, TG = Transferred credit)

2012	Psychology: history and science	A	Applied questionnaire methods	A
	Research methods I	B		
2013	Biological psychology	A	Biochemistry of the brain	B
	Statistics I	A	Memory	A
	Neuroscience	A	Applied study design	B
	Emotion psychology & affective neuro.	A	Higher cognitive functions	B
2014	Master's thesis in psychology	A	Statistical methods with R	TG

UNIVERSITY OF OREGON (P = Equivalent to B- or higher)

2015	Research developmental social neuro.	P	Seminar developmental research group	P
	Seminar adolescence	A+	Seminar first year research	P
	Seminar social personality group	P	Data analysis I	A+
	Seminar programming in R	P		
2016	Research developmental social neuro.	P	Advanced cognitive neuroscience	A+
	Seminar first year ethics	P	Advanced applications in MRI	P
	Social personality core	A	Data analysis III	A
	Data analysis II	A	Research developmental social neuro.	P
	Research developmental social neuro.	P	Reading first year project	A+
	Seminar first year research	P	Seminar programming in R	P
2017	Research developmental social neuro.	P	Reading machine learning	A
	Seminar brain decoding	A	Seminar statistical analyses in R	P
	Seminar grant writing	A	Developmental core	A
	Research developmental social neuro.	P	Research developmental social neuro.	P

OMB No. 0925-0001/0002 (Rev. 08/12 Approved Through 8/31/2015)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. DO NOT EXCEED FIVE PAGES.

NAME: Berkman, Elliot Todd

eRA COMMONS USER NAME (credential, e.g., agency login): BERKMANET1

POSITION TITLE: Associate Professor of Psychology

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
Stanford University	B.S.	06/2002	Mathematics
Stanford University	B.A.	06/2002	Psychology
Stanford University	M.A.	04/2004	Psychology
University of California, Los Angeles	M.A.	12/2005	Psychology
University of California, Los Angeles	NIH / NIDA T90 Training Grant	12/2008	UCLA Neuroimaging Training Program
University of California, Los Angeles	Ph.D.	06/2010	Social Psychology

A. Personal Statement

This proposal is to provide training to Dani Cosme in translational neuroscience, multivariate neuroimaging and machine learning, and open and reproducible neuroscience. Dani is an outstanding candidate for a predoctoral NRSA because she is an exceptionally strong researcher on an excellent trajectory, and the NRSA would provide the final additions that she needs in her graduate training to become an independent, federally-funded scholar in the emerging area of translational neuroscience. Only with NRSA funding would Dani be able to immerse herself in the design and implementation of an R01-scale translational neuroscience intervention for cancer prevention *and* master the advanced multivariate data analytic techniques that we plan to use to examine the mediators and moderators of that intervention. Dani has been involved in projects in my lab, but with NRSA support, she could focus her time and energy on acquiring the skills laid out in the Training Plan.

I am the PI of the parent study that will provide support for Dani's NRSA training, R01 CA211224. As her Primary Sponsor and PI of the parent grant, I will be responsible for overseeing all aspects of the training, especially training in translational neuroscience as it relates to the parent grant. I will also be responsible for coordinating with Co-Sponsor Zeithamova, who is a close collaborator and co-I on the parent grant, and Dr. Chavez, with whom our lab group collaborates, to make sure Dani gets the proposed training in areas with which am less familiar: multivariate neuroimaging and machine learning, and open and reproducible science.

The research in my lab research focuses on the neurocognitive underpinnings of cancer-relevant health goals in adults, such as dietary change and smoking cessation. This research emphasizes the roles of valuation, motivation, and executive function, and integrates neurocognitive measures into prevention and intervention trials as indices of underlying targeted processes. I am PI on three NIH-funded grants that test theory-driven hypotheses about the mechanisms underlying health and wellbeing interventions using neuroimaging. I received training on a NIDA-funded F31 that investigated the longitudinal association between neural activations during inhibitory control and smoking cessation outcomes. I received training in advanced neuroimaging methods from a NIDA T90 comprehensive neuroimaging training grant at UCLA. All of my current neuroimaging projects focus on elucidating mediators and/or moderators of experimental and intervention effects by synthesizing cognitive neuroscience knowledge with psychological theory related to cognitive control, social processing, and reward or motivational states.

1. Berkman, E. T., Hutcherson, C. A., Livingston, J. L., Kahn, L. E., & Inzlicht, M. (2017). Self-control as value-based choice. Current Directions in Psychological Science, 26(5), 422-428.
2. Berkman, E. T. (2017). Value-based choice: An integrative, neuroscience-informed model of health goals. Psychology and Health, in press.
3. Berkman, E. T., Graham, A. M., & Fisher, P. A. (2012). Training self-control: A domain-general translational neuroscience approach. Child Development Perspectives, 6(4), 374–384.
4. Berkman, E. T., Dickenson, J., Falk, E. B., & Lieberman, M. D. (2011). Using SMS text messaging to assess moderators of smoking reduction: Validating a new tool for ecological measurement of health behaviors. Health Psychology, 30(2), 186-194.

B. Positions and Honors

Positions and Employment

2007 Fellow, Summer Institute for Cognitive Neuroscience, University of California, Santa Barbara
2008 Fellow, Neuroimaging Training Program, University of California, Los Angeles
2010-2016 Assistant Professor, Department of Psychology, University of Oregon, Eugene, OR
2016- Associate Professor, Department of Psychology, University of Oregon, Eugene, OR
2016- Associate Director, Center for Translational Neuroscience, University of Oregon
2017- Co-Director, Center for Translational Neuroscience, University of Oregon

Other Experience and Professional Memberships

2004- Member, American Psychological Association
2005- Member, Association for Psychological Science
2006- Member, Society for Personality and Social Psychology
2007- Member, Cognitive Neuroscience Society
2008- Member, Social and Affective Neuroscience Society
2011-2014 Treasurer, Social and Affective Neuroscience Society
2012- Member, American Psychosomatic Society
2012- Member, Society for Research on Nicotine and Tobacco
2012-2013 Conference Co-Chair, Social and Affective Neuroscience Society
2014- Member, Society for Affective Science
2016- Editorial Board Member, *Social and Personality Psychology Science*
2017- Associate Editor, *Journal of Personality and Social Psychology*, Section I
2017- Associate Editor, *Social Cognitive and Affective Neuroscience*
2017- Regular member, Social Personality and Interpersonal Processes (SPIP) study section, NIH

Honors

2004 UC Regents Distinguished Achievement Fellowship, University of California, Los Angeles
2006 Graduate Research Mentorship Fellowship, University of California, Los Angeles
2007 Distinguished Student Teaching Award, University of California, Los Angeles
2008 Graduate Students Present Award, Cognitive Neuroscience Society
2008 J. Arthur Woodward Peer Mentoring Award, University of California, Los Angeles
2008 National Research Service Award, National Institute on Drug Abuse
2009 Travel Award, Society for Personality and Social Psychology
2010 Social Psychology Area Dissertation Award, University of California, Los Angeles
2010 Joseph A. Gengerelli Distinguished Dissertation Award, University of California, Los Angeles
2017 Social-Personality Health Network Early Career Award
2017 College of Arts and Sciences Dean's Fellow, University of Oregon

C. Contribution to Science

1. **Neural measures as predictors of real-world, cancer-relevant outcomes**. We have identified instances (e.g., in health behaviors and persuasion) where neural measures explain unique variance in subsequent outcomes, above and beyond task-based and self-report measures. This "brain-as-predictor" approach can suggest candidate hypotheses about the role of a particular mental process in a particular outcome. Often, these hypotheses are not obvious without insight from imaging.

a. Berkman, E. T., & Falk, E. B. (2013). Beyond brain mapping: Using neural measures to predict real-world outcomes. Current Directions in Psychological Science, 22(1), 45-50.
b. Berkman, E. T., Falk, E. B., & Lieberman, M. D. (2011). In the trenches of real-world self-control: Neural correlates of breaking the link between craving and smoking. Psychological Science, 22(4), 498-506.
c. Falk, E. B., Berkman, E. T., Mann, T., Harrison, B., & Lieberman, M. D. (2010). Predicting persuasion-induced behavior change from the brain. Journal of Neuroscience, 30(25), 8421-8424.
d. Falk, E. B., Berkman, E. T., Whalen, D., & Lieberman, M. D. (2011). Neural activity during health messaging predicts reductions in smoking above and beyond self-report. Health Psychology, 30(2), 177-185.

2. **Training-related improvement in executive functions such as inhibitory control**. There is much debate about this question in the literature, and our contribution to that debate is to show how a mechanistic understanding of how executive functions work at the level of neural function can provide insights into the questions of how those functions can be improved with training and why training so frequently fail to produce generalizable effects.
    a. Beauchamp, K. G., Kahn, L. E., & Berkman, E. T. (2016). Does inhibitory control training transfer? Behavioral and neural effects on an untrained emotion regulation task. Social Cognitive and Affective Neuroscience, 11, 1374-1382.
    b. Berkman, E. T. (2015). Self-regulation training. In Vohs, K. D., Baumeister, R. F. (eds.), Handbook of Self-Regulation (3rd edition, pp. 440-457). New York: Guilford Press.
    c. Berkman, E. T., Kahn, L. E., & Merchant, J. S. (2014). Training-induced changes in inhibitory control network activity. The Journal of Neuroscience, 34(1), 149-157.
    d. Berkman, E. T., Graham, A. M., & Fisher, P. A. (2012). Training self-control: A domain-general translational neuroscience approach. Child Development Perspectives, 6(4), 374-384.

3. **Ecological validity of executive function and emotion regulation tasks**. This work uses both neuroimaging and longitudinal experience sampling methodology, often together, to investigate whether and how well the tasks that are frequently used in the cognitive, social, and affective neuroscience literatures link up with real-world outcomes such as cigarette smoking cessation and unhealthy food intake.
    a. Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2012). From neural responses to population behavior: Neural focus group predicts population-level media effects. Psychological Science, 23(5), 439-445.
    b. Berkman, E. T., Dickenson, J., Falk, E. B., & Lieberman, M. D. (2011). Using SMS text messaging to assess moderators of smoking reduction: Validating a new tool for ecological measurement of health behaviors. Health Psychology, 30(2), 186-194.
    c. Falk, E. B., Berkman, E. T., Whalen, D., & Lieberman, M. D. (2011). Neural activity during health messaging predicts reductions in smoking above and beyond self-report. Health Psychology, 30(2), 177-185.
    d. Berkman, E. T., & Lieberman, M. D. (2010). Approaching the bad and avoiding the good: Lateral prefrontal cortical asymmetry distinguishes between action and valence. Journal of Cognitive Neuroscience, 22(9), 1970-1979.

4. **Self-regulation of food craving as a model for appetitive craving regulation in general**. My lab has developed a laboratory task that yields behavioral and neural measures of self-regulation of food craving. The regulation of food craving is significant on its own given that food craving precipitates eating and relates to overweigh/obesity. Additionally, this paradigm provides a window into the neurocognitive processes involved in appetitive craving regulation more broadly, and has been deployed with children.
    a. Giuliani, N. R., Tomiyama, A. J., Mann, T., & Berkman, E. T. (2015). Prediction of daily food intake as a function of measurement modality and restriction status. Psychosomatic Medicine, 77(5), 583–590.
    b. Giuliani, N. R., & Berkman, E. T. (2015). Craving is an affective state and its regulation can be understood in terms of the extended process model of emotion regulation. Psychological Inquiry, 26(1), 48–53.
    c. Giuliani, N. R., Mann, T., Tomiyama, A. J., & Berkman, E. T. (2014). Neural systems underlying the reappraisal of personally craved foods. Journal of Cognitive Neuroscience, 26(7), 1390–1402.

d. Giuliani, N. R., Calcott, R. D., & Berkman, E. T. (2013). Piece of cake: Cognitive reappraisal of food craving. Appetite, 64, 56–61.

Complete List of Published Work in MyBibliography and Google Scholar:
http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/40864077/
http://scholar.google.com/citations?user=jCxd8-UAAAAJ&hl=en

D. Research Support

Ongoing Research Support

R01 CA211224-01A1 Berkman (PI) 08/01/17-07/31/22
Devaluing energy-dense foods for cancer control: Translational neuroscience
This study evaluates the mechanisms of action of two effective programs to increase intake of cancer-preventing foods and decrease intake of cancer-promoting foods. Though the programs differ in their proximal effects (one targets behavioral and the other targets cognitive processes), we hypothesize that both ultimately exert their effects by altering the ventromedial prefrontal cortical valuation system.

Pilot Project Award Berkman (PI) 09/01/16-10/31/17
Bezos Family Foundation
Motivational boost to enhance parenting buy-in
This pilot study tests the efficacy of an identity-based motivation intervention to enhance commitment to, engagement with, and perseverance in new parenting behaviors among a group of high-adversity parents enrolled in a parenting course.

R01MH107418-02 Pfeifer, PI; Berkman Co-I 08/01/15-04/30/20
Puberty, neural systems for social processes, and early adolescent mental health: A longitudinal neuroimaging study
This study provides a comprehensive picture of the pubertal, neurodevelopmental, and social psychological changes occurring during early adolescence, and their relationship to the emergence of mental health problems, so that modifiable, developmentally specific risk factors can be identified as targets for early intervention and prevention efforts.

P50DA035763-04 Fisher, PI; Berkman, Co-I 07/15/13-04/30/18
Risk-taking and social contexts in CWS-involved youth: Underlying processes
The proposed Center provides a national resource in drug abuse prevention research, with the ultimate goal of reducing drug use and related outcomes for child welfare involved youth.

Completed Research Support

R21 CA175241-01A1 Berkman (PI) 09/24/14-08/31/17
Reducing craving for cancer-promoting foods via cognitive self-regulation
The goal of this study is to compare the efficacy of an autonomy-boosting intervention to an information-only treatment as usual control for engaging cognitive control neural systems and improving self-regulation of craving for cancer-promoting foods such as energy dense carbohydrates and red meat.
Role: PI

R01 AG048840-01 Berkman (PI) 09/30/14-04/30/17
Tailored inhibitory control training to reverse EA-linked deficits in mid-life
This study tests the feasibility and efficacy of a personalized inhibitory control training protocol to increase proactive activity in inhibitory control-related neural systems and thereby reduce health-risking behaviors among a sample of mid-life adults who experienced high levels of early adverse experiences.
Role: PI

Frontiers of Innovation Award Berkman (PI) 04/01/14-12/31/15

Center on the Developing Child at Harvard University
Brain-based intervention to remediate the effects of early adversity on inhibitory control
This pilot study tests the efficacy of a customized inhibitory control training intervention in early adolescents with extensive early adversity who are at high risk for drug use and other health-risking behaviors.

Developmental Project Funds Berkman (PI) 09/01/12-08/31/14
University of Michigan Center for Excellence in Cancer Communications Research
National Institutes of Health / National Cancer Institute
Self-, peer-, and distant other-authored messages for cigarette smoking cessation
This pilot compared the effect of distance-from-self authorship on cigarette smoking cessation outcomes and identify specific neural and linguistic properties of messages that are predictive of these outcomes.

R43 HL110487-01 Mulvihill (PI) 08/01/12–4/30/14
Computer-based program to promote exercise among sedentary employees
Build upon and update an already proven to be efficacious, web-based exercise-promoting intervention that targets sedentary employees, and innovatively integrate that program within an employee's daily workflow using Google Apps.

OMB No. 0925-0001 and 0925-0002 (Rev. 10/15 Approved Through 10/31/2018)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Dagmar Zeithamova Demircan

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

POSITION TITLE: Assistant professor of Psychology

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
Charles University of Prague, Czech republic	M.A.	02/2003	Psychology
The University of Texas at Austin	Ph.D.	08/2008	Neuroscience
The University of Texas at Austin	Postdoctoral	08/2014	Cognitive Neuroscience

A. Personal Statement

The overarching goal of my research is to understand the brain mechanisms that support memory for specific events and memory generalization. For this work, I use univariate and multivariate fMRI brain decoding methods to assess how information is represented in the brain and how those representations support novel decisions based on prior experience. In addition, I am developing new techniques that allow us to extract signatures of specific processes, as implemented in the brain, and then apply them to new tasks and participants in order to index engagement in those processes irrespective of an overt behavioral response. I am excited to co-sponsor the training application of Dani Cosme, serving as her mentor in the area of multivariate brain decoding techniques that she will apply in the domain of cognitive reappraisal. These techniques can be leveraged to estimate subjective value of healthy and cancer-promoting foods, to index the degree of engagement in cognitive reappraisal, and how these processes interact and predict treatment outcomes. Data-driven clustering and machine learning tools can be also used to detect groups of participants based on their baseline or response-to-treatment patterns, enabling the development and testing of individualized treatment protocols that improve efficacy. I am happy to provide hands-on training and conceptual guidance in these techniques and their application to Dani Cosme's research questions. My prior experience with process dissociations (in the area of multiple memory systems), value representation (in the area of reward effects on memory), trial-by-trial brain decoding analyses and application of neural signatures across tasks position me as an ideal mentor/co-sponsor on this project.

Zeithamova, D., de Araujo Sanchez, M.A., Adke, A. (2017). Trial timing and pattern-information analyses of fMRI data. *NeuroImage 153, 221-231*

Zeithamova, D., Preston, A. R. (2017). Temporal proximity promotes integration of overlapping events. *Journal of Cognitive Neuroscience, 29(8), 1311-1323.*

Zeithamova, D., Dominick, A.L., Preston, A.R. (2012). Hippocampal and ventral medial prefrontal activation during retrieval-mediated learning supports novel inference. *Neuron, 75*(1), 168-79.

Zeithamova, D., Maddox, W.T. & Schnyer, D.M. (2008). Dissociable prototype learning systems: Evidence from brain imaging and behavior. *Journal of Neuroscience, 28*(49), 13194-13201.

B. Positions and Honors

Positions and Employment

2008-2014 Postdoctoral Fellow, Center for Learning and Memory, University of Texas at Austin
2014- Assistant Professor, Department of Psychology, University of Oregon

Other Experience and Professional Memberships

2004- Member, Cognitive Neuroscience Society
2007- Member, Society for Neuroscience

Honors

2011 – 2014 Postdoctoral National Research Service Award, NIMH
2011 Postdoctoral Trainee Chapter Travel Award, Society for Neuroscience
2007 – 2008 University Continuing Fellowship, UT Austin
2007 Graduate Students Present award, Cognitive Neuroscience Society
2003 – 2004 Neuroscience Graduate Fellowship, Institute for Neuroscience, UT Austin

C. Contribution to Science

1. Memory integration. The bulk of my research focuses on generalization of prior experience, especially the cognitive and neural mechanisms that support our ability to combine information across multiple related episodic events. I have demonstrated that prior experience is automatically reactivated while we encode new information, leading to a formation of integrated memory representations that link information across events to support novel inferences that transcend direct experience. I have shown that episodic memory generalization is supported by interactions between the hippocampus and ventromedial prefrontal cortex (VMPFC) where hippocampus encodes individual episodes while VMPFC forms generalized schemas of experiences by linking information across episodes. Contrary to an intuitive view of inference and generalization as logical reasoning processes, my findings underscore that memory itself is a constructive process that represents both experienced and derived information to guide novel behaviors. In this research, I have been one of the first researchers to adopt pattern-information analyses of functional MRI data and apply them in a novel way to assess online memory reactivation and integration.
I have been the lead researcher on most of these studies, from design, data analysis, and manuscript writing.

Zeithamova, D., Preston, A. R. (2017). Temporal proximity promotes integration of overlapping events. *Journal of Cognitive Neuroscience.*

Zeithamova, D., Manthuruthil, C., Preston, A.R. (2016). Repetition suppression in the medial temporal lobe and midbrain is altered by event overlap. *Hippocampus, 26(11)*, 1464-1477

Zeithamova, D., Dominick, A.L., Preston, A.R. (2012). Hippocampal and ventral medial prefrontal activation during retrieval-mediated learning supports novel inference. *Neuron, 75*(1), 168-79.

Zeithamova, D. & Preston, A.R. (2010). Flexible memories: differential roles for medial temporal lobe and prefrontal cortex in cross-episode binding. *Journal of Neuroscience, 30*(44), 14676-84.

2. Identifying multiple learning and memory systems using categorization tasks. A lasting debate in the literature revolves around whether concept learning (such as learning a concept of a dog from multiple examples of a dog and then being able to generalize to novel dog examples) relies on declarative memory or on non-declarative forms of learning. I have used categorization tasks with novel artificial stimuli as laboratory models of concept learning and demonstrated that multiple memory systems may support learning in these tasks depending on the task instructions and the structure of the categories. These studies have helped to resolve the single vs. multiple systems debate by providing insights into how humans strategically employ

different learning systems in response to task demands. I was the lead contributor to these studies, mostly completed during graduate school.

Maddox, W.T., Filoteo, J.V. & **Zeithamova, D**. (2010). Computational models inform clinical science and assessment: An application to category learning in striatal-damaged patients. *Journal of Mathematical Psychology, 54*(1), 109-122.

Zeithamova, D., Maddox, W.T. & Schnyer, D.M. (2008). Dissociable prototype learning systems: Evidence from brain imaging and behavior. *Journal of Neuroscience, 28*(49), 13194-13201.

Zeithamova, D. & Maddox, W.T. (2007). The role of visuo-spatial and verbal working memory in perceptual category learning. *Memory & Cognition, 35*(6), 1380-1398.

Zeithamova, D. & Maddox, W.T. (2006). Dual task interference in perceptual category learning. *Memory & Cognition, 34*(2), 387-398.

3. Reward representation and reward sensitivity. Large individual differences exist in sensitivity to external motivation. I have used monetary incentive encoding task where participants are offered varying monetary reward for successfully remembering different events. Individual differences in modulation of memory by reward in this task closely tracks personality traits of reward sensitivity and behavioral inhibition as measured by standardized questionnaires. I have shown that individual differences in sensitivity to such external motivation by the degree to which reward-related regions, such as dopaminergic midbrain, represent the motivational context of events. I am a co-author on two published studies, contributing to study design, mentoring the lead graduate student on data analysis and interpretation, and contributing to manuscript writing.

Wolosin, S.M., **Zeithamova, D.,** Preston, A.R. (2013). Distributed hippocampal patterns that discriminate reward context are associated with enhanced associative binding. *Journal of Experimental Psychology: General, 142*(4), 1264-76

Wolosin, S.M., **Zeithamova, D**., Preston, A.R. (2012). Reward modulation of hippocampal subfield activation during successful associative encoding and retrieval. *Journal of Cognitive Neuroscience, 24*(7), 1532-47.

Within the reward representation and reward sensitivity domain, I am also a lead or senior researcher on two additional studies that have been presented at scientific conferences and are currently being prepared for submission. Below are the references to the relevant presented conference abstracts:

Frank, L., Preston, A.R., **Zeithamova, D.** (2017). Resting-state medial temporal lobe connectivity with reward centers predicts how motivation impacts learning. *Cognitive Neuroscience Society Meeting, March 25-28, 2017*

Zeithamova D., Gelman, B.D., Preston, A.R. (2015). Human hippocampus forms abstract, pattern separated representations of motivational context during encoding. *Society for Neuroscience Annual Meeting, October 16-21, 2015, Chicago, IL*

4. Cognitive effects of sleep deprivation. With a group of collaborators, I have contributed to a project on physical and cognitive effects of 36 hours of sleep deprivation on military personnel. Besides design of two behavioral tasks on memory and generalization, my main contribution was design and fMRI data analysis of a decision-making task that tapped into different types of decisions. We found that decisions of intermediate difficulty were least affected by sleep deprivation, accompanied by the least decline in attentional networks activation after sleep deprivation. Complex decisions that required combination of information from multiple sources were strongly affected by fatigue. However, trivial decisions that were normally executed without error became also highly error prone after deprivation and elicited more attentional network activation than before sleep deprivation. Our results demonstrated complex effects of sleep deprivation on cognitive performance.

Maddox, W.T., Glass, B.D., **Zeithamova, D**., Savarie, Z.R., Bowen, C., Matthews, M.D. & Schnyer, D.M. (2011). The effects of sleep deprivation on dissociable prototype learning systems. *Sleep, 34*(3), 253-60. PMC3041701

Schnyer, D.M., **Zeithamova, D**. & Williams, T. (2009). Decision making under conditions of sleep deprivation: Cognitive and neural consequences. *Military Psychology 21(Suppl. 1),* S36-S45.

Maddox, W.T., **Zeithamova, D**. & Schnyer, D.M. (2009). Dissociable processes in classification: Implications from sleep deprivation. *Military Psychology 21(Suppl. 1),* S55-S61.

A complete bibliography can be accessed via a NCBI MyBibliography link:
https://www.ncbi.nlm.nih.gov/sites/myncbi/1nw23W-HMeP5i/bibliography/49205280/public/?sort=date&direction=ascending

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D. Research Support

List both selected ongoing and completed research projects for the past three years (Federal or non-Federally-supported). *Begin with the projects that are most relevant to the research proposed in the application.* Briefly indicate the overall goals of the projects and responsibilities of the key person identified on the Biographical Sketch. Do not include number of person months or direct costs.

University of Oregon Start-up Research Support PI Zeithamova 9/2014-9/2020
University of Oregon
Neural mechanisms supporting memory specificity and generalization
This research uses behavioral methods and fMRI to map the cognitive and neural mechanisms supporting memory for individual events, the ability to generalize across events, and their contributions to decision-making across tasks.

NIH R01 CA211224 PI Berkman 8/2017-7/2022
National Cancer Institute
Devaluing energy-dense foods for cancer control: Translational neuroscience
This research uses behavioral and neuroimaging metrics to compare two intervention programs that target the valuation system to facilitate lasting changes in attitudes and eating behaviors involving cancer-risk foods. Results will establish the pathways through which the programs work and suggest specific treatments for individuals based on a personalized profile.
Role: Co-investigator (use of machine learning tools in construction of predictive models)

National Research Service Award F32 MH094085 PI Zeithamova 9/2011-9/2014
National Institute of Mental Health
Medial temporal lobe contributions to the flexible use of memory
This research used fMRI to understand how past memories can be reactivated during new related events to be integrated into a combined memory representation.

PHS Fellowship Supplemental Form

OMB Number: 0925-0001
Expiration Date: 10/31/2018

Introduction

1. Introduction
(RESUBMISSION)

Fellowship Applicant Section

2. Applicant's Background and Goals for Fellowship Training*	ApplicantsBackgroundGoals.pdf

Research Training Plan Section

3. Specific Aims*	SpecificAims.pdf
4. Research Strategy*	ResearchStrategy.pdf
5. Respective Contributions*	RespectiveContributions.pdf
6. Selection of Sponsor and Institution*	SelectionSponsorInstitution.pdf
7. Progress Report Publication List (RENEWAL)	
8. Training in the Responsible Conduct of Research*	ResponsibleConductResearch.pdf

Sponsor(s), Collaborator(s) and Consultant(s) Section

9. Sponsor and Co-Sponsor Statements	SponsorCoSponsorStatements.pdf
10. Letters of Support from Collaborators, Contributors and Consultants	LetterSupport_Chavez.pdf

Institutional Environment and Commitment to Training Section

11. Description of Institutional Environment and Commitment to Training	DescriptionInstitutionalEnvironmentCommitmentTraining.pdf

Other Research Training Plan Section

Human Subjects

Please note. The following item is taken from the Research & Related Other Project Information form. The response provided on that page, regarding the involvement of human subjects, is repeated here for your reference as you provide related responses for this Fellowship application. If you wish to change the answer to the item shown below, please do so on the Research & Related Other Project Information form; you will not be able to edit the response here.

Are Human Subjects Involved? ☑ Yes ☐ No

12. Human Subjects Involvement Indefinite?	☐ Yes	☑ No
13. Clinical Trial?	☐ Yes	☑ No

14. Agency-Defined Phase III Clinical Trial?

15. Protection of Human Subjects	ProtectionHumanSubjects.pdf
16. Data Safety Monitoring Plan	
17. Inclusion of Women and Minorities	InclusionWomenMinorities.pdf
18. Inclusion of Children	InclusionChildren.pdf

Vertebrate Animals

The following item is taken from the Research & Related Other Project Information form and repeated here for your reference. Any change to this item must be made on the Research & Related Other Project Information form.

Are Vertebrate Animals Used? ☐ Yes ☑ No

19. Vertebrate Animals Use Indefinite?

Funding Opportunity Number: PA-16-309. Received Date: 2017-12-07T14:04:28.000-05:00

PHS Fellowship Supplemental Form

20. Are vertebrate animals euthanized?

If "Yes" to euthanasia
Is method consistent with American Veterinary Medical Association (AVMA) guidelines?

If "No" to AVMA guidelines, describe method and provide scientific justification

21. Vertebrate Animals

Other Research Training Plan Information

22. Select Agent Research

23. Resource Sharing Plan

24. Authentication of Key Biological and/or Chemical Resources

Tracking Number: GRANT12530803

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Additional Information Section

25. Human Embryonic Stem Cells

Does the proposed project involve human embryonic stem cells?* ☐ Yes ☑ No

If the proposed project involves human embryonic stem cells, list below the registration number of the specific cell line(s), using the registry information provided within the agency instructions. Or, if a specific stem cell line cannot be referenced at this time, please check the box indicating that one from the registry will be used:

Specific stem cell line cannot be referenced at this time. One from the registry will be used.

Cell Line(s):

26. Alternate Phone Number: [redacted]

27. Degree Sought During Proposed Award:

Degree:	If "other", please indicate degree type:	Expected Completion Date (month/year):
PHD: Doctor of Philosophy		06/2021

28. Field of Training for Current Proposal*: 612 Developmental & Child Psychology

29. Current Or Prior Kirschstein-NRSA Support?* ☐ Yes ☑ No

If yes, please identify current and prior Kirschstein-NRSA support below:

Level*	Type*	Start Date (if known)	End Date (if known)	Grant Number (if known)

30. Applications for Concurrent Support?* ☐ Yes ☑ No

If yes, please describe in an attached file:

31. Citizenship*

U.S. Citizen — U.S. Citizen or Non-Citizen National? ☑ Yes ☐ No

Non-U.S. Citizen
- ☐ With a Permanent U.S. Resident Visa
- ☐ With a Temporary U.S. Visa

If you are a non-U.S. citizen with a temporary visa who has applied for permanent resident status and expect to hold a permanent resident visa by the earliest possible start date of the award, please also check here. ☐

32. ☐ Change of Sponsoring Institution — Name of Former Institution:*

PHS Fellowship Supplemental Form

Budget Section

All Fellowship Applicants:

1. Tuition and Fees*:

☐ None Requested ☑ Funds Requested

Year 1	$28,265.00
Year 2	$28,265.00
Year 3	$28,265.00
Year 4	$0.00
Year 5	$0.00
Year 6 (when applicable)	$0.00
Total Funds Requested:	$84,795.00

Senior Fellowship Applicants Only:

	Amount	Academic Period	Number of Months
2. Present Institutional Base Salary:			

3. Stipends/Salary During First Year of Proposed Fellowship:

	Amount	Number of Months
a. Federal Stipend Requested:		

	Amount	Number of Months
b. Supplementation from other sources:		

Type (sabbatical leave, salary, etc.)

Source

Appendix

Tracking Number: GRANT12530803 Funding Opportunity Number: PA-16-309. Received Date: 2017-12-07T14:04:28.000-05:00

APPLICANT'S BACKGROUND AND GOALS FOR FELLOWSHIP TRAINING

A. Doctoral Dissertation and Research Experience

Below I highlight key skills, methods, and research interests that will support the accomplishment of my training goals using **bold, underlined** typeface.

Neuroplasticity and interactions between cognition and emotion

I began my undergraduate studies as a biology major at Chapman University, with the aspiration of becoming a neuroscientist. My fascination with **neuroplasticity** lead me to begin working in Dr. William Wright's marine neurobiology lab studying the evolutionary mechanisms of learning and memory. During my time as an undergraduate research assistant, I worked on two projects and was given the opportunity to take on a great deal of responsibility and work with a high degree of independence. Inspired by the pioneering work by Eric Kandel, the first project I worked on investigated the neural basis of sensitization in sea hares (*Aplysia Californica)*. I learned how to ethically conduct animal surgery and carried out classical conditioning experiments to study sensitization. Whereas classic sensitization experiments typically employ electrical shocks to sensitize *Aplysia*, this method lacks ecological validity. Because sensitization evolved in the natural world, we chose to study sensitization using touch and observed similarly enhanced withdrawal responses following tactile stimulation. Extending this line of work, the second project I worked on used sub-lethal attacks by natural predators to induce sensitization in *Aplysia*. To refine our experimental design, I helped conduct a pilot study using predatory sea slugs, which informed later work in lab using lobsters that was ultimately published by my colleagues in *Learning and Memory*. Although the theoretical implications of this work were striking, I realized that my passion lay in understanding neuroplasticity in humans rather than animals, and consequently switched my major to psychobiology to receive training in both biology and psychology.

My initial interest in the **interactions between cognition and emotion** was sparked by my undergraduate work in Dr. Connie Shears' cognitive psychology lab where I studied the effect of emotional language on inference processing. I participated in nearly every aspect of the research process, working as part of a small team to develop stimuli, design experiments, recruit and run subjects, and analyze behavioral data. This work resulted in two poster presentations and I won a Chapman undergraduate travel grant to present one of these posters at the Theoretical and Experimental Neuropsychology conference. While I lacked the means to investigate the neural correlates underlying these processes, it was a valuable introduction to psychological research and confirmed my longstanding sense that research was my calling.

Individual differences in emotional reactivity

To gain more experience with psychological research and prepare for doctoral studies, I began a master's degree in psychology at Stockholm University in Sweden. Here, I continued to refine my interests in emotion, cognition, and neuroplasticity. Through my coursework, I realized that it is not just emotion that affects cognition, but cognition also affects emotion; cognitive processes such as attention and appraisals (interpretations) modulate emotional responses. Because emotional responses are powerful drivers of behavior that can lead to maladaptive coping mechanisms, such as unhealthy eating and substance use, there is great potential to improve health and well-being by teaching individuals to control their emotional responses using cognitive strategies. Following this line of reasoning, I became interested in whether meditation could be used as a vehicle to **train emotion regulation and improve well-being**. Although I did not have the ability to train subjects in meditation, I approached this question from an individual differences perspective. Together with my master's thesis advisor, Dr. Stefan Wiens, I developed a rigorous **psychophysiological experiment** to test whether emotional reactivity varies as a function of trait mindfulness. Prior research suggested that mindfulness meditation reduces emotional reactivity by facilitating disengagement from emotional stimuli. However, the evidence was mixed as to whether individuals with higher trait mindfulness actually ehibit decreased reactivity to emotional stimuli. To comprehensively characterize emotional reactivity we used a multi-method approach, collecting measures of electrocortical brain activity (EEG), skin conductance, startle response, and self-reported responses to highly arousing positive and negative emotional pictures. I independently ran nearly 60 participants in the experiment and worked closely with Dr. Wiens to preprocess and analyze the data. Across all measures, we did not find evidence for moderation by trait mindfulness. These findings are significant because they suggest that either self-reported trait mindfulness is not related to spontaneous emotional reactivity or that the available questionnaires may not be valid measures of mindfulness. This work resulted in a first-author publication in *PLOS One* and I presented these findings as an invited speaker for the Stockholm University Public Lecture Series. I also presented this work at two poster

sessions and won a student travel award to present at the International Symposium for Contemplative Sciences. Not only did this work give me the opportunity to experience every step of the research process with a large degree of autonomy, but it also reaffirmed my passion for research and solidified my interest in understanding **individual differences** in emotion regulation ability and how this ability might be improved through training.

Neurodevelopmental trajectories of self and social processing across adolescence

Upon completing my master's thesis, I returned to the United States to immerse myself in the thriving social and affective neuroscience community and to gain experience with neuroimaging. I sought and obtained a lab manager position at the University of Oregon working with Drs. Elliot Berkman and Jennifer Pfeifer. Splitting my time between their two labs afforded me the opportunity to work on a variety of projects, including large-scale prospective studies investigating topics like self-regulation and risk-taking in adolescent and adults populations who experienced early adversity. This experience was critical for my scientific development, both because it introduced me to the field of translational neuroscience and because it allowed me to develop priceless research skills. I gained experience with **experimental design**, functional neuroimaging (fMRI) **acquisition and optimization**, **programming** in a variety of computer languages (e.g., MATLAB, R, shell scripting), community participant **recruitment and retention**, as well as essential research "soft skills" such as project management, troubleshooting, and on-the-fly problem solving.

Although I had not previously been interested in developmental psychology, through working with Dr. Pfeifer, an expert in developmental social neuroscience, I became convinced that adolescence is a unique window of opportunity for interventions to improve health and well-being. Not only is there increased neuroplasticity during this period, but the massive changes in cognitive, emotional, and social processing provide an extraordinary opportunity to help shape healthy habits and prevent engagement in health-risking behaviors. Working with Dr. Pfeifer, I had the unique opportunity to learn **fMRI preprocessing and analysis** using data from a 6-year **longitudinal study** on self and social development. Although human adolescence is characterized by major shifts in self and social processing, the specific neurodevelopmental trajectories of self and social evaluations are not well characterized. Toward this end, we used whole-brain linear mixed effects modeling to estimate the shape of the developmental curves at each voxel (volumetric pixel) in the brain. Because we conduct a huge number of statistical tests (approximately 70,000), it is critical to correct for multiple comparisons. However, despite showing robust task effects, this method was not sensitive enough to detect developmental changes after stringent correction for multiple comparisons. In response, I helped develop an innovative analysis technique to continue to probe developmental effects across the whole brain while reducing the number of comparisons and taking advantage of the functional organization of the brain. We used a standardized parcellation atlas to divide the brain into 350 regions of interest (ROIs), extracted the mean signal within each ROI for each subject, time point, and condition, and used this data as inputs to a linear mixed effects model. This approach is significant because it substantially reduces the number of multiple comparisons and stabilizes effect estimates by averaging the signal across voxels in each ROIs. To introduce this novel method to others, I was invited to present at the Modeling Developmental Change workshop sponsored by the National Science Foundation. Our results showed expected increases in activation for self and social processing in their respective neural networks. However, we also showed that self-evaluations in the academic domain become highly salient, affirming the importance of academic identity during adolescence. I won a Jacobs Foundation Young Scholars Award to present this work at the Flux congress in the Netherlands, and have also presented our findings at several poster sessions. We are currently preparing this manuscript for publication and expect to submit in early 2018. Overall, this was a formative experience, providing me with the skillset to pursue a doctoral degree in translational neuroscience, as well as revealing to me the incredible importance of taking a **developmental approach**. I also developed excellent working relationships with Drs. Berkman and Pfeifer and chose to continue working with them as a doctoral student.

The effect of choice on appetitive self-regulation

As a doctoral student, I continued to build on my interest in emotional self-regulation and became interested in examining the processes underlying the ability to regulate **emotional responses to appetitive stimuli**. Although the ability to engage in regulation to avoid goal-incongruent temptations is critical for healthy development, individuals who are otherwise capable often *choose not* to regulate. In most self-regulation tasks participants are explicitly told when to regulate, and thus these tasks are only able to assess participants' abilities to regulate when prompted to do so. However, this approach lacks fidelity to the regulatory process outside the lab, where participants must decide for themselves whether and when to engage in regulation. To

improve **ecological validity** and assess whether and how self-regulation may differ when individuals *choose* to regulate, Dr. Pfeifer and I designed a novel neuroimaging paradigm to test the hypothesis that choosing to regulate improves appetitive self-regulation for personally-craved foods. Participants used **cognitive reappraisal** to reframe their foods cravings and were either instructed when to regulate or chose when to regulate. Based on previous research showing that autonomy and self-determination promote intrinsic motivation and enhance self-regulation, we expected that choice should facilitate craving regulation. However, we observed the opposite effect; choice actually disrupted regulation. To probe this unexpected result, I collaborated with Dr. Dagmar Zeithamova, to use a multivariate neuroimaging technique, **multivoxel pattern analysis (MVPA)**. We found evidence that the disruption may be due to inefficient allocation of cognitive resources on choice trials, presumably because the choice itself demanded those resources. This work is important because it shows that standard task paradigms instructing individuals when to regulate may not generalize to behavior outside the lab, where they must first decide to regulate. This work resulted in a first-author manuscript that is currently in revision at *Social Cognitive and Affective Neuroscience*. I have also presented this work as an invited speaker at Stockholm University, as well as at two posters sessions for the Social and Affective Neuroscience Society meeting. This experience allowed me to further develop my expertise with univariate neuroimaging analysis, as well as gain familiarity with within-subject MVPA analysis.

Autonomy, appetitive self-regulation, and health-risking behaviors during the transition to college

Designing effective interventions to reduce collegiate substance use and other health-risking behaviors requires identification of risk factors that are amenable to change, such as appetitive self-regulation. Further, because there is a sudden increase in autonomy and decrease in regulatory scaffolding during the transition to college, it is important to understand how autonomous motivation interacts with regulatory ability. Extending the work cited above, I sought to investigate how individual differences in the ability to regulate appetitive motivations relate to substance use in college students. I designed and carried out a year-long **longitudinal pilot study** to assess the ability of autonomous appetitive self-regulation to predict changes in substance use across freshman year. We used fMRI to scan 33 incoming college freshman the summer prior to entering college. We assessed appetitive self-regulation ability and choice tendency using the task described above while participants were in the MRI scanner, and also measured self-reported substance use and engagement in other health-risking behaviors. Participants completed follow-up assessments at the end of each quarter during freshman year to assess **substance use** and engagement in other **health-risking behaviors**. Our results indicated that autonomous self-regulation better predicted outcomes than either standard measures of appetitive self-regulation or other known predictors, such as gender, SES, or ethnicity. Dr. Pfeifer and I used this pilot data to write an R21 grant application to conduct this study in a large, well-powered sample, and it was recently funded by the National Institute on Drug Abuse. Working on this project was an invaluable experience, as I learned how to design and conduct a longitudinal study, and gained critical experience with **grant writing**.

Doctoral Dissertation

The primary focus of my research is on the relationship between **appetitive self-regulation** and health-risking, cancer-promoting behaviors, including substance use and unhealthy eating. Ultimately, I seek to improve our ability to predict real-world behavior using neural and behavioral data in order to identify risk and protective factors relevant to health-risking behaviors and **cancer control**. Towards this goal, I have focused on improving the ecological validity of a task assessing appetitive self-regulation ability by incorporating choice into the paradigm, and using it to predict substance use during freshman year. The findings from this work will constitute the first two chapters of my dissertation. The final chapter will focus on improving our ability to predict real-world behavior by enhancing the sensitivity and specificity of neural indicators of appetitive self-regulation. As outlined in the current project proposal, I will pursue this goal by developing and validating a neural signature of craving reappraisal. Once created, this **neural signature** can be used in a variety of novel ways to advance the field, including assessment of spontaneous engagement in reappraisal, individual differences in craving reappraisal ability, and craving reappraisal intervention success. Ultimately, this work will reduce the prevalence of diet-related cancers by helping improve intervention development and efficacy. I have successfully advanced to candidacy and plan to defend my dissertation spring 2021.

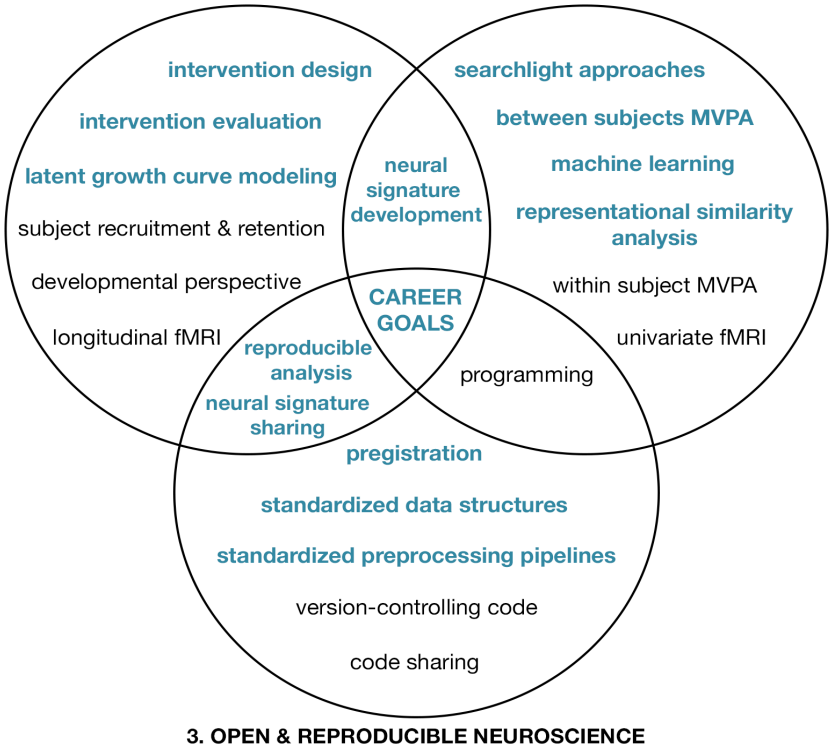
B. Training Goals and Objectives

My long-term career goal is to become a leading independent researcher in the field of translational neuroscience. My primary research focus will be on understanding how appetitive self-regulation develops

during adolescence, can be improved through training, and protects against engagement in health-risking, cancer-relevant behaviors. I will approach this work from both a prevention and intervention standpoint, and hope to design and evaluate interventions to improve self-regulation using cutting edge behavioral, neuroimaging, and statistical methods. I plan to conduct rigorous, reproducible research that will help shape practice and policy. Ultimately, I believe this work will reduce the prevalence of cancer by helping individuals develop healthy habits and avoid engaging in behaviors, such as unhealthy eating and substance use, that increase risk for a variety of cancers.

Achieving these goals requires knowledge and skills in a variety of distinct yet overlapping domains (see Figure 1). To develop these skills, I plan to build on my present skill set (un-bolded, black text in Figure 1) and acquire training in those domains I have not yet mastered (bolded, blue text in Figure 1). Specifically, my training goals are to develop expertise in 1) **translational neuroscience**, 2) **multivariate neuroimaging and machine learning** techniques, and 3) **open and reproducible neuroscience**.

Figure 1. Skill set within each training domain required to achieve career goals



I will develop the neural signature of craving reappraisal under the mentorship of Dr. Zeithamova, an expert in multivariate neuroimaging and machine learning applications, and validate it under the mentorship of Dr. Berkman, an expert in translational neuroscience and advanced statistical modeling. I have excellent working relationships with both Dr. Zeithamova and Dr. Berkman and we have successfully collaborated in the past (e.g., on the paper in revision at *Social Cognitive and Affective Neuroscience*). Also, because Dr. Zeithamova is a co-investigator on Dr. Berkman's NCI R01, the parent grant for this project, this synergy makes these mentors the ideal team to facilitate the acquisition of the skills necessary to achieve my career goal of becoming a leading translational neuroscientist (see Figure 1). Furthermore, being awarded this fellowship will free me from my duties as a graduate research fellow on Dr. Berkman's R01 and allow me to focus exclusively on my training aims. Rather than running participant sessions and operating the MRI scanner, I will be able to be involved in this project at a higher, more supervisory level and receive critical training that will propel me towards a successful career in academia. *I would not be able to accomplish all of my training aims, each of which is necessary to achieve my career goals, without the support provided by an NRSA.*

1. **Translational neuroscience.** The goal of translational neuroscience is to leverage findings from basic research in neuroscience and psychology to develop and improve treatments to promote health and well-being. I plan to learn this approach to help develop interventions to improve self-regulation and reduce engagement in health-risking, cancer-relevant behaviors. To do this, my goal is to learn how to design and evaluate a randomized control trial using a novel craving reappraisal intervention to change cancer-relevant eating behavior, and identify moderators and mediators that affect intervention efficacy (Research Aim 2). Dr. Berkman, who is an expert in translational neuroscience, behavioral approaches to cancer prevention, and statistics, and co-director of University of Oregon's Center for Translational Neuroscience, will guide and mentor me while I pursue these aims. Through Dr. Berkman's R01, the parent grant for this project, I will receive training in intervention development for cancer control and longitudinal randomized control trial study design. This training will be supported by weekly project meetings, weekly individual meetings with Dr. Berkman, and monthly meetings with the leadership team. To gain competency with intervention evaluation, I will learn advanced statistical methods, including multilevel modeling and structural equation modeling. I plan to assess intervention outcomes using latent growth curve models, and this objective will be supported through coursework taught by, as

well as individual meetings with, Dr. Berkman. A comprehensive list of specific activities related to this and the other training goals is presented below.

2. **Multivariate neuroimaging and machine learning.** Building on my strong foundation in univariate neuroimaging methods, my goal is to learn multivariate neuroimaging methods from Dr. Zeithamova, a cognitive neuroscientist with expertise in machine learning applications to neuroscience. I have already begun to learn simple, within-subject neural decoding approaches using multivoxel pattern analysis (MVPA) under the guidance of Dr. Zeithamova and our analysis is currently in revision at *Social Cognitive and Affective Neuroscience*. I will extend this training by learning to program in Python and conducting between-subjects MVPA analyses to create the neural signature of craving reappraisal (Research Aim 1) using a powerful and flexible Python-based software package, PyMVPA. I will also learn about the strengths and weakness of different machine learning classifiers and metrics for assessment of accuracy (e.g., area under the curve, balanced accuracy), the limitations of machine learning approaches, as well as learn how to conduct other widely used multivariate techniques, such as representational similarity analysis and searchlight approaches. Via bi-weekly individual meetings with Dr. Zeithamova, I will receive guidance and feedback, as well as discuss contemporary and seminal methodological papers (see below).
3. **Open and reproducible neuroscience.** My goal is to conduct research that can be translated into interventions and policy. As such, it is essential that my work is rigorous and reproducible. Towards this goal, I aim to extend the training I received at Neurohackweek, a week-long summer school for neuroimaging and data science that emphasizes open science, to learn and adopt reproducible scientific practices. Chief among the practices that facilitate reproducibility is preregistration of study design and planned analyses. Preregistration reduces various sources of bias, including researcher flexibility in data analysis procedures ("researcher degrees of freedom") and specification of variables based on statistical significance ("p-hacking"), and also helps researchers clarify their analysis plan before collecting or analyzing the data. I will also learn how to comment and version-control my code using tools such as Jupyter Notebooks and git, to ensure reproducibility, and employ standardized neuroimaging protocols developed by the Center for Reproducible Neuroscience. This includes learning to use the emerging standard structure for neuroimaging data (i.e., Brain Imaging Data Structure) and pipelines for preprocessing and quality control (e.g., fmriprep, mriqc). Further, to facilitate collaboration between scientists and the advancement of knowledge, I will learn and employ open scientific practices such as sharing analysis code, neuroimaging data, and the neural signature of craving reappraisal via online repositories such as GitHub.com and NeuroVault.org. To help mentor and guide me through this process, I will meet regularly with Dr. Rob Chavez, an expert in reproducible neuroscience (https://github.com/robchavez). To further my training, I will also complete coursework and attend methodological meetings in the psychology department that emphasize open and reproducible science.

In addition to these training goals, I will also engage in other critical professional development activities, including publishing manuscripts and presenting findings at professional meetings, and taking coursework to strengthen my grantsmanship and prepare a portfolio to enter the academic job market. Further, to gain crucial experience with grant management, I will participate in monthly meetings with the R01 leadership team.

C. Activities Planned Under This Award

The following didactic and hands-on activities have been carefully selected so that my training goals will be accomplished following these experiences. These activities will also promote my long-term career goal of becoming a leading independent researcher in the field of translational neuroscience studying cancer-relevant behavior change.

1. **Translational neuroscience**
    a. **Intervention design:** Assist with design of RCT craving reappraisal intervention for NCI R01
    b. **Intervention monitoring:** Supervise staff to maintain fidelity with intervention protocol
    c. **Intervention evaluation:** Assess treatment effects and individual differences in treatment responsivity using advanced statistical techniques (Research Aim 2)
    d. Weekly individual meetings with Dr. Berkman
    e. Weekly project meetings with the NCI R01 team
    f. Monthly leadership team meetings with NCI R01 PI, co-Is, consultants, and full-time project staff
    g. Monthly collaborative mentorship meetings with Drs. Berkman and Zeithamova

h. Bi-weekly Center for Translational Neuroscience brownbag to present and receive feedback
i. PSY 607 Translational Neuroscience (Winter 2020)
j. PSY 610 Multilevel Modeling (Fall 2018)
k. PSY 610 Structural Equation Modeling (Currently enrolled, Fall 2017)

2. **Multivariate neuroimaging and machine learning**
   a. **Programming:** Learn to program in Python via lab scripts, online tutorials, and materials from PSY 407 Computing for the Behavioral Scientist (https://github.com/jashubbard/psycomputing)
   b. **MVPA:** Use machine learning to conduct multivoxel pattern analysis (MVPA) in order to develop the neural signature using Python-based PyMVPA software package (Research Aim 1)
   c. Bi-weekly individual meetings with Dr. Zeithamova
   d. Monthly collaborative mentorship meetings with Drs. Berkman and Zeithamova
   e. PSY 607 Brain Decoding (Completed Winter 2017)
   f. PSY 601 Machine Learning (Completed Spring 2017)
   g. Multivoxel Pattern Analysis course at Georgetown University (Completed November 2017)
3. **Open and reproducible neuroscience**
   a. **Reproducible tools:**
      i. Preregister analyses on the Open Science Foundation website
      ii. Utilize software and procedures that facilitate reproducible neuroscience
   b. **Open science:** Share analysis code, neuroimaging data, and neural signature via open, online repositories
   c. Meetings with Dr. Chavez before and after specified activities
   d. Bi-weekly methodological brownbag to present progress and receive feedback
   e. PSY 607 Open and Replicable Science (Winter 2019)
   f. Neurohackweek at the University of Washington (Completed Summer 2017)
4. **General professional development**
   a. Prepare and publish planned first author manuscripts
      i. Paper 1: Development and validation of neural signature of craving reappraisal
      ii. Paper 2: Individual differences in reappraisal intervention success using neural signature
   b. Present research at professional meetings
   c. Monthly leadership team meetings with NCI R01 PI, co-Is, consultants, and full-time project staff
   d. PSY 607 Professional Development Seminar to write research and teaching statements, prepare and present an academic job talk (Fall 2020)
   e. PSY 607 Grant Writing to submit postdoctoral NRSA application (Winter 2021)

Timeline for proposed research training and activities, and percentage of time per year. Red = fall quarter, yellow = winter quarter, blue = spring quarter, green = summer quarter.

Domain	Activity	Year 1	%	Year 2	%	Year 3	%
Research Training	Aim 1 preprocessing Aim 1 analysis Aim 2 MRI data collection Aim 2 follow-ups Aim 2 preprocessing Aim 2 analysis		65		55		10
Manuscript Preparation	Paper from Aim 1 Paper from Aim 2		10		25		55
Mentorship & Supervision	Individual meetings Project & leadership meetings Collaborative mentorship meetings Lab meetings		15		10		10
Professional Development	Presentation at professional meetings Brownbags, colloquia PSY 607 Professional Development PSY 607 Grant Writing		5		5		10
Coursework & Requirements	PSY 610 Multilevel Modeling PSY 607 Open and Replicable Science PSY 607 Translational Neuroscience Dissertation		5		5		15

SPECIFIC AIMS

Unhealthy eating increases the risk of developing several kinds of cancer. This occurs directly through consumption of carcinogenic food, and indirectly through overweight and obesity. Because nearly 70% of American adults are overweight or obese, it is critical that we develop effective interventions to alter eating behavior. One key factor that influences eating behavior and weight gain is cue-induced food craving. Craving stimulates appetitive motivation to eat, but can be regulated via cognitive strategies such as reappraisal, or the reconstrual of a stimulus to change its affective meaning. Reappraisal increases the salience of consumption-related costs and reduces food craving for, and the reward value of, unhealthy food. Craving reappraisal is therefore a promising target for interventions designed to reduce unhealthy eating and risk for diet-related cancers, and the NCI-funded parent grant for this project is currently pursuing this objective. However, individual differences in treatment efficacy remain a persistent problem with interventions. To understand why an intervention works for some individuals and not for others requires clearly defined neurobiological mechanisms of change, as well as sensitive and specific tools to evaluate individual differences in psychological targets that are open-source and easily disseminated.

To fill this gap, the overall objective of this project is to leverage machine learning and multivariate neuroimaging methods to develop a sensitive and specific neurobiological index (i.e., neural signature) of craving reappraisal and validate it in the context of a cognitive reappraisal intervention to reduce unhealthy eating in overweight and obese adults. Based on previous findings, my central hypotheses are that 1) compared to a control intervention, cognitive reappraisal training will result in increased expression of a neural signature of craving reappraisal that will be built using data from an independent sample, and 2) individuals exhibiting increased expression of the neural signature following reappraisal training will have greater changes in intervention outcomes (i.e., unhealthy food valuation and eating behavior). Upon completion of this project, I will have developed and validated a neurobiological index of craving reappraisal that can be readily used by other researchers to evaluate intervention efficacy and individual differences in responsivity to treatment.

To achieve this objective, I will perform new analyses on existing data as well as collect and analyze new data as part of a longitudinal study (NCI R01 CA211224) assessing the efficacy of a four-week cognitive reappraisal intervention to reduce the value and consumption of unhealthy, cancer-promoting foods in overweight and obese adults. Neural measures of craving reappraisal ability and behavioral measures of food valuation and eating behavior will be assessed pre- and post-intervention, and outcome measures will also be assessed at 3-, 6- and 12-month follow-ups to evaluate the persistence of intervention effects.

Aim 1. Develop a neural signature of craving reappraisal. Using existing functional neuroimaging data from a craving reappraisal paradigm previously employed in our lab (N = 144), I will divide the data into two samples–a development and validation sample–and create a neural signature of craving reappraisal by training a machine learning classifier to distinguish reappraisal-related neural activity within the development sample (N = 96) and assessing generalizability of the resulting signature in an independent, hold-out sample (N = 48).
Training goals: *Learn multivariate neuroimaging and machine learning techniques to build a neural signature of a target psychological process, while utilizing open and reproducible methods.*

Aim 2A. Establish the reliability and construct validity of the craving reappraisal signature by assessing its temporal stability and evaluating the degree to which a novel cognitive reappraisal training intervention produces changes in this neurobiological index. I hypothesize that 1) the neural signature will be a reliable measure of instructed craving reappraisal within the active control group across pre- and post-intervention measurements, and 2) compared to the active control, cognitive reappraisal training will result in greater pre-to-post change of the craving reappraisal signature developed in Aim 1.
Training goals: *Learn to design and evaluate a randomized control trial using functional neuroimaging.*

Aim 2B. Establish the predictive validity of the craving reappraisal signature by determining the extent to which individual differences in neurobiological index change predict intervention outcomes. I hypothesize that individuals showing larger changes in pattern expression of the craving reappraisal signature will show greater changes in food valuation and eating behavior. Further, I will assess the incremental validity of the craving reappraisal signature and hypothesize that multivariate pattern expression will predict outcomes better than neural indices created using current gold standard subtractive methods.
Training goals: *Learn advanced longitudinal modeling techniques to assess intervention outcomes and individual differences in treatment efficacy.*

RESEARCH STRATEGY

A. Significance

Unhealthy eating increases the risk of developing several kinds of cancer. Diet is related to cancer risk both directly and indirectly. First, consumption of energy dense foods increases body mass and risk for obesity (Drewnowski, 1995; Kant, 2000). This in turn increases risk for several cancers, including endometrial, kidney, esophageal, colon, and liver cancer (Calle et al., 2003; Dougan et al., 2015; Hoyo et al., 2012; Wang & Xu, 2014). Second, consumption of specific foods, such as red meat or foods with high glycemic load, increases the risk for cancers even in the absence of overweight or obesity (Gnagnarella et al., 2008; Norat et al., 2002). Indeed, the American Cancer Society now includes healthy eating and weight maintenance in their cancer prevention guidelines (Kushi et al., 2012). Given that two in three American adults are overweight or obese, costing nearly $150 billion in health-related expenses (Flegal et al., 2012), *it is imperative that we develop effective interventions to promote healthy eating and reduce the risk of diet-related cancers*.

Cue-induced food cravings influence eating behavior and weight gain. A key process driving eating behavior is reactivity to food cues. Food is a primary reward and through learning, cues associated with palatable foods (e.g., the sight or smell of food) become reward predictive cues (Liu et al., 2016; Pelchat et al., 2004). These cues are highly salient and are associated with automatic reward value (Berridge, 2009). In response to these cues, there are physiological changes, including increased heart rate, salivation, and neural activity in the subcortical reward regions (Pelchat et al., 2004; Rogers & Hill, 1989; Tang et al., 2012), as well as cognitive changes, including food cravings, or the strong, conscious desire to eat the food (Jansen, 1998). Both food cue exposure and cue-induced craving are associated with increased eating and weight gain (for a meta-analysis, see Boswell & Kober, 2016). Because cue-induced food craving stimulates eating behavior, *craving reduction is a promising intervention target to decrease unhealthy eating and therefore cancer risk.*

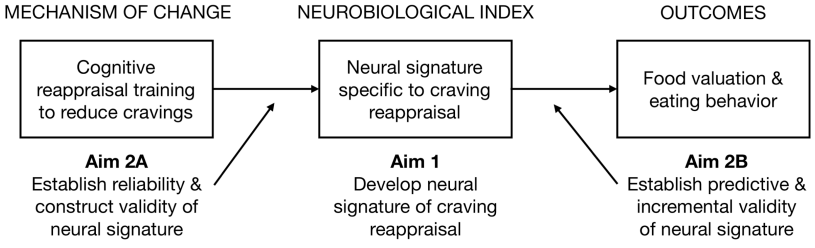
Cognitive reappraisal reduces craving and modulates the reward value of food. One effective strategy for reducing cue-induced food cravings is cognitive reappraisal, or the reframing of a stimulus to change its affective meaning (Gross, 1998). Reappraisal can be used to make the costs of food consumption more salient, such as by thinking about the long-term health costs, reducing the value of the food cue. Indeed, a number of studies have shown that reappraisal decreases self-reported cravings for and reward value of unhealthy, cancer-promoting foods (Giuliani et al., 2013; Giuliani et al., 2014; Hutcherson et al., 2012; Kober et al., 2010; Siep et al., 2012; Yokum & Stice, 2013). Further, individuals can be trained to use reappraisal to reduce food craving. One four-week pilot study showed that reappraisal training resulted in reduced caloric intake from fat and sugar, and decreased body fat compared to an active control (Stice et al., 2015). Thus, there is a clear theoretical mechanism of change linking cognitive reappraisal and reductions in cue-induced food craving, and the parent grant for this project is investigating this relationship through a randomized control trial of a novel craving reappraisal intervention. Critically, individual differences in treatment efficacy remain a persistent problem with interventions. *Because self-reported measures of craving reappraisal ability are limited by their subjectivity, an objective neurobiological index would facilitate assessment of individual differences.*

Multivariate neuroimaging methods may provide increased sensitivity and explain additional variance. Self-reported measures of reappraisal ability can be complemented by objective, neural indices. Standard univariate neuroimaging methods subtract the neural activity during one condition from another. In the context of craving reappraisal, univariate results show that compared to food viewing, reappraisal engages a number of regions in the frontoparietal control network, including dorsolateral (dlPFC), ventrolateral (vlPFC), and dorsomedial (dmPFC) prefrontal cortex (Giuliani et al., 2014; Kober et al., 2010; Siep et al., 2012; Yokum & Stice, 2013). However, these regions are involved in a variety of different cognitive processes, including planning, working memory, inhibition, and shifting attention (Miller & Cohen, 2001), and therefore are unlikely to be specific indicators of reappraisal. In addition, as subtractive contrasts are comprised of thousands of individual voxels (volumetric pixels), a common approach to reduce the data is to select one or several regions of interest (ROIs) and average the neural signal across the voxels within the ROI. However, this approach is limited in that it only uses a small fraction of the available data and the mean signal within an ROI is unlikely to generalize (e.g., across scan protocols or scanners). In contrast, assessing *patterns of activation* across the whole brain may be both more sensitive and generalizable. To develop neural indices that are sensitive and specific to craving reappraisal, researchers can capitalize on recent developments in machine learning to analyze patterns of activity across the whole brain (Norman et al., 2006). In a translational context, these multivariate models have frequently been used to predict clinical outcomes (e.g., disease status; Ewers et al., 2011), but can also be used to predict engagement in a specific psychological process. These predictive models, or *neural signatures*, have been employed to successfully classify a variety of psychological processes

across individuals (Chang et al., 2015; Richter et al., 2016; Wager et al., 2013). In addition to indexing a specific psychological process, because they use all available neural data, they may have greater sensitivity (Norman et al., 2006) and explain more variance in behavior than univariate ROIs (Chang et al., 2015; Doré et al., 2017). Further, because they are predictive models, once developed, these neural signatures can be shared among researchers and used to predict outcomes in new samples collected at different sites using different imaging protocols (Zeithamova & Preston, 2017). *Leveraging multivariate neuroimaging methods and machine learning techniques to create and validate neural signatures has significant promise to improve our ability to detect changes in neurobiological indices and predict individual differences in intervention outcomes.*

Rationale for the proposed project and significance of the research contribution. It is increasingly apparent that cognitive reappraisal attenuates cue-induced food cravings and reappraisal training reduces consumption of unhealthy, cancer-promoting foods. This project builds on that theoretical foundation to develop (Aim 1) and validate (Aim 2) a sensitive and specific, multivariate neural signature of craving reappraisal (see Figure 1). The development of this research product, which will be made publicly available to researchers, is significant for several reasons. First, it advances the field of affective neuroscience by refining knowledge of the specific neurobiological mechanisms underlying craving reappraisal, and producing a sharable index of this psychological process that can be used on new and existing data. This index can be employed to assess the degree to which individuals engage in reappraisal at a given moment, as well as their average ability to engage in reappraisal across trials. Further, because this signature does not rely on subtractive methods, it also facilitates the measurement of spontaneous engagement of reappraisal during more ecologically valid, uninstructed contexts (e.g., food image viewing), which is a key line of research that I plan to pursue in the future. Second, it advances the field of translational neuroscience by importing to it an innovative methodology that can be used to create neural signatures for translationally-relevant psychological processes. It creates a tool that can be used to evaluate target engagement in reappraisal interventions and individual differences in treatment responsivity. My proposed research will facilitate the refinement of reappraisal-based interventions to reduce unhealthy eating and ultimately reduce the prevalence of overweight and obesity, and risk for diet-related cancers. Further, by documenting and sharing my analytic code, this process can readily be adopted by others to study a variety of relevant psychological processes, such as cue-induced craving, relevant to eating behavior and cancer risk.

Figure 1. Conceptual model



For this project, I will extend my experience with univariate neuroimaging to add multivariate and machine learning methods, intervention design and implementation, advanced longitudinal modeling, and reproducible neuroscience practices to my analytic toolkit. I highlight these training goals below using **bold, underlined** text.

B. Approach

Aim 1. Develop a neural signature of craving reappraisal.

Rationale. Across a number of studies, cognitive reappraisal has been shown to effectively reduce food cravings and the value of unhealthy, cancer-promoting foods, and activate regions in the frontoparietal control network (Giuliani et al., 2014; Kober et al., 2010; Siep et al., 2012; Yokum & Stice, 2013). Although the neural network supporting cognitive reappraisal has been well-characterized, due to reduced sensitivity and generalizability in univariate approaches (see Significance section), it remains difficult to assess individual differences or detect changes within individuals in reappraisal-related activity. To bridge this critical gap and increase our sensitivity to detect individual differences, the objective of this aim is to extend current approaches by using machine learning to develop a multivariate neural signature of craving reappraisal.

Data. To create the neural signature, I will utilize existing neuroimaging data from our lab, comprising a total of 144 subjects (110 females). All participants completed the same craving reappraisal task developed in our lab (Giuliani et al., 2013, 2014; Giuliani & Pfeifer, 2015) while undergoing functional neuroimaging.

Craving reappraisal task. This task will be used in both Aims 1 and 2. Participants are trained to decrease their desire to consume personally-craved foods using cognitive reappraisal (e.g., thinking about the negative health costs). Participants either passively view unhealthy craved foods (“look” condition) or reappraise their craving (“regulate” condition). To maximize craving, participants select their most craved food from the following menu of unhealthy, cancer-promoting foods: chocolate, cookies, donuts, French fries, ice cream, pasta, pizza. Craving is operationalized as the desire and tendency to eat even in the absence of

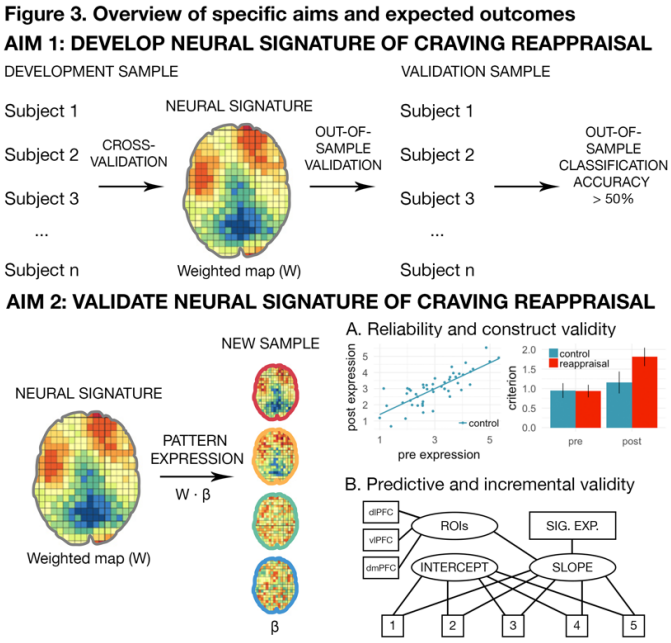
Figure 2. Trial from craving reappraisal task used in Aims 1 & 2

hunger. Stimuli were independently rated for desirability and ratings did not differ from one another. Each condition contains 20 trials. On each trial (see Figure 2), participants are presented with an instruction (2s; look or regulate), view a food image while following the instruction (5s), and rate their craving for the food on a 5-point Likert scale (4s; 1 = not at all, 5 = very much). Each 11s trial of this event-related design is followed by a jittered fixation cross (M = 1s) and trial order is optimized using a genetic algorithm (Wager & Nichols, 2003).

fMRI data analysis. Images will be preprocessed and analyzed using the University of Oregon (UO) High Performance Computing cluster. To facilitate reproducibility, images will be stored in the **emerging standard Brain Imaging Data Structure** (http://bids.neuroimaging.io) and preprocessed using a **standard pipeline** from the Center for Reproducible Neuroscience (fmriprep; http://github.com/poldracklab/fmriprep). Further in line with my reproducibility and open science goal, preprocessing and analysis **scripts will be publicly shared** via an online code repository. Preprocessing will include: segmentation of the high resolution T1-weighted anatomical scan, distortion correction to reduce susceptibility artifacts, realignment of functional images, co-registration of functional images to the anatomical image, and normalization of all images to a template in standard MNI space. Functional images will then be smoothed in Statistical Parametric Mapping 12 (SPM12; http://fil.ion.ucl.ac.uk/spm/software/spm12/) using a 4-mm smoothing kernel. For statistical analyses, each trial will be modeled as a separate regressor using a general linear model in SPM12 and concatenated to create a beta-series (Rissman et al., 2004). Each beta-series will be z-scored and multivoxel pattern analysis (MVPA), which uses **machine learning** to classify distributed patterns of neural activity, will be conducted within grey matter on each subject's beta-series using the python-based PyMVPA toolbox (http://pymvpa.org). The grey matter mask will be defined using the grey matter tissue segmentation generated by fmriprep.

Analytic strategy. To develop the craving reappraisal signature, I will use **MVPA and train a machine learning classifier** to distinguish between the "look" and "regulate" conditions from the craving reappraisal task. Prior work in our lab using MVPA on a similar craving reappraisal paradigm shows that these brain states are highly distinguishable within subject (~70% classification accuracy; Cosme et al., Submitted). Although MVPA is often conducted within subject, the goal of the proposed work is to create a neural signature that generalizes across individuals, so I will classify conditions between subjects. Based on the robust univariate differences between brain regions involved during craving reappraisal and viewing, and reports of between subjects classification outperforming within subject classification (Chang et al., 2015; Poldrack et al., 2009; Wager et al., 2013), I expect to be able to classify these two conditions with high accuracy between subjects. However, as this has not yet been directly tested with craving reappraisal, I will also conduct the analysis within subjects to determine whether within or between subject classification best distinguishes these brain states.

Figure 3. Overview of specific aims and expected outcomes



To create the neural signature, I will first divide the data into development (N = 96) and validation (N = 48) samples and conduct MVPA between subjects (Figure 3; adapted from Woo et al., 2017). I will use the development sample to create the neural signature and assess classification accuracy. I will then test its generalizability in the "hold out" validation sample. This validation step is critical to avoid overfitting the neural signature to the development sample. Within the development sample, the data will be separated into training and test sets using a leave-one-subject-out cross-validation procedure (i.e., training = 95 subjects, test = 1 subject). On each iteration, the machine learning classifier (a support vector machine algorithm) will learn to distinguish look from regulate trials using the training set and make a "guess" for each test subject. The process will be repeated 96 times, with each subject serving as a test and the average accuracy across subjects will be calculated. I will test whether the accuracy is significantly higher than chance using a one-

sample t-test and expect that accuracy will be well above chance (50%). However, if this is not the case, I will follow the contingency plan outlined below in the Potential problems and alternative strategies section. Once adequate accuracy has been achieved in the development sample, I will then test out-of-sample generalizability by applying the final classifier trained on all participants in the development sample to the validation sample and calculating accuracy. I expect that accuracy in the validation sample will be similar to the accuracy in the development sample. This process will yield a neural signature consisting of a map of voxel weights (i.e., a trained classifier) that can be applied to data from other studies and by other researchers.

Aim 2. Validate the neural signature of craving reappraisal.

Parent grant overview. The proposed research is a secondary analysis of data collected through the parent grant (R01 CA211224) funded by NCI. The primary goal of the parent grant is to assess the efficacy of a novel cognitive reappraisal intervention to alter food valuation and reduce unhealthy eating in overweight and obese adults at risk for diet-related cancers. Participants complete a baseline MRI session, a 4-week cognitive **reappraisal training intervention** (or active control), a post-intervention MRI session, and follow-up assessments at 3, 6, and 12 months. We begin data collection in January 2018 and expect to run 2-4 subjects per week. The current proposal builds on the parent grant by analyzing neural data from the MRI sessions, as well as behavioral data from all 5 sessions to characterize the reliability and construct validity (Aim 2A), and predictive and incremental validity (Aim 2B) of the craving reappraisal signature developed in Aim 1.

Participants. Participants will be overweight and obese adults (BMI 25-35), ages 18-60, native English speakers, and will be screened for MRI eligibility. In accordance with the Standard Operating Procedures at the UO Lewis Center for Neuroimaging (LCNI), MRI exclusion criteria include metal implants (e.g., braces, pins), embedded metal fragments, biomedical devices (e.g., pacemakers, cochlear implants), claustrophobia, and pregnancy. In order to reduce confounds, participants will also be excluded if they are currently diagnosed with a neurological, psychiatric, or eating disorder, or are taking psychotropic medications. Due to the physical constraints of the MRI machine, only participants weighing less than 550 lbs. will be included. For Aim 2, I will use data from the first 100 participants who complete the protocol.

Biological variables. The age range was selected by the parent grant to aid recruitment and improve generalizability, but as age may moderate effects, it will be included as a covariate if necessary. Biological sex is not expected to moderate the relationships assessed in this project, but it will be included as a covariate if necessary. Further, as body mass may moderate the effects, it will also be included as a covariate.

Procedure. Participants will complete 5 assessments with these measures at the following intervals:

Baseline MRI	4-Week Intervention	Post-Intervention MRI	Follow-Ups at 3, 6, & 12 Months
Food valuation	Cognitive reappraisal training	Food valuation	Food valuation
Eating assessment	or active control training	Eating assessment	Eating assessment
Craving reappraisal (MRI)		Craving reappraisal (MRI)	

fMRI Data Acquisition & Analysis. MR scans are performed at LCNI on a Siemens Skyra 3T magnet: a research-dedicated, whole-body MR system optimized for fMRI. We use a shimming protocol that maximizes field homogeneity. Scan sessions begin with a 17s, T2-weighted scout that allows slice prescriptions for all subsequent scans. We acquire a high-resolution anatomical T1-weighted MP-RAGE scan (TR/TE=2500/3.41ms, 256x256 matrix, 1mm thick, 176 sagittal slices, FOV=256), functional images with a T2*- weighted echo-planar sequence (72 axial slices, TR/TE=2000/25.0ms, 90-deg flip, 100x100 matrix, 2mm thick, FOV=200), and in-plane gradient echo field map magnitude and phase images to correct for magnetic field inhomogeneities (72 axial slices, TR/TE=6970/60.0ms, 90-deg flip, 100x100 matrix, 2mm thick, FOV=200). Participants will complete the craving reappraisal task described above while in the MRI scanner. For Aims 2A and 2B, the same fMRI preprocessing procedure outlined in Aim 1 will be followed.

Interventions. The cognitive reappraisal intervention includes in-person training and at home practice over the course of 4 weeks. There are 8 30-minute in-person sessions, which use a combination of interpersonal and computer-based methods to train participants to generate cognitive reappraisals and practice applying them. Participants receive feedback during these sessions, and engage in speeded practice to help habitualize this behavior. At home practice consists of 7 15-minute exercises focused on using reappraisals in the natural environment. The active control is a general (i.e., not food specific) attention and inhibitory control training intervention of equal duration and intensity.

Food valuation task. To measure individual subjective value of various foods, we adapted a validated willingness-to-pay task (Hutcherson et al., 2012). The task is an economic auction in which participants view images of 30 healthy and 30 unhealthy, cancer-promoting snack foods and determine how much they are willing to pay for each item. Participants are be endowed with $1.50 to buy snacks during the task and are told that one trial will be randomly selected and enacted. Bids greater than or equal to a randomly selected bid

result in the participant getting the snack food, whereas lower bids result in participants receiving the money, but not the snack food. As such, the optimal strategy is to bid the true amount one is willing to pay for each item. On each trial (Figure 4), participants view a snack food (2.5s) and bid how much they were willing to pay for the food, from $0-$1.5 (2.5s). Food image order is randomized for each subject. The average bid value for unhealthy foods will be the criterion variable.

Figure 4. Trial from valuation task used in Aim 2

Eating assessment. At all assessments, eating behavior will be measured using NCI's Automated Self-Administration 24-hour Recall (ASA24). At each assessment, a composite score of diet quality (the "Healthy Eating Index") will be calculated for each participant and used as a criterion variable.

Aim 2A. Establish the reliability and construct validity of the craving reappraisal signature.

Rationale. In order to use the neural signature of craving reappraisal developed in Aim 1 as an index of craving reappraisal ability, it must first be validated. I will validate the neural signature using new data from the parent grant described above. The objective of this aim is to establish the reliability and construct validity of the neural signature of craving reappraisal by assessing changes in signature expression from baseline to post-intervention. Because the reappraisal intervention targets the underlying neurobiological system, there should be changes in this system over the course of the intervention within this group to a greater degree than active control group. As such, my working hypotheses are that 1) participants in the control group will show substantial reliability in their expression of the neural signature from pre-to-post intervention, and 2) compared to participants in the control group, those in the cognitive reappraisal group will show increased expression of the neural signature from pre-to-post intervention. We are aware that Aims 2A and 2B rely on the neural signature developed in Aim 1. Based on previous research showing superior accuracy for between subjects classification (Chang et al., 2015; Poldrack et al., 2009; Wager et al., 2013) and preliminary data from our lab (Cosme et al., Submitted), we have high confidence that we will be able to build a between subjects neural signature of craving reappraisal. However, if classification accuracy for the neural signature is not substantially greater than chance, I will conduct within subject classification and use within subject data for the analyses.

Analytic strategy. To test these hypotheses, subjects will complete the same craving reappraisal task described in Aim 1 at the baseline and post-intervention sessions. For each subject, at each session (baseline and post-intervention), I will generate a map for the average activation on regulate trials and multiply it by the neural signature developed in Aim 1 (i.e., calculate the dot-product for each subject and session). This process yields a single number that will serve as the index of expression of the neural signature of craving reappraisal. To **assess reliability**, I will calculate the correlation between signature expression pre- and post-intervention within the control group, which is not expected to change substantially. I expect to see a moderate to large positive correlation within this group, indicating adequate reliability. To assess **construct validity**, I will compare the mean change in signature expression between the cognitive reappraisal and control groups. I expect to find a statistically significant interaction ($p < .05$) between session and group, such that the cognitive reappraisal intervention will result in larger increases in signature expression than the control intervention.

Aim 2B. Establish the predictive and incremental validity of the craving reappraisal signature.

Rationale. The objective of this aim is to evaluate the predictive validity of the craving reappraisal signature developed in Aim 1 by assessing whether individual differences in signature expression predict changes in two intervention outcomes–food valuation (proximal outcome) and eating behavior (distal outcome) over the course of 12 months. My working hypothesis is that 1) change in signature expression will account for significant variance in the slope of outcome variables across sessions and 2) individuals with the greatest increases in signature expression from baseline to post-intervention will show the greatest change in intervention outcomes. In this event, I will conduct a mediation analysis to determine whether the effect of the intervention on outcomes is explained by changes in the craving reappraisal signature. Further, to establish incremental validity beyond the gold standard univariate "brain-as-predictor" approach (Berkman & Falk, 2013), I will compare the ability of the multivariate neural signature and mean activation within univariate ROIs (e.g., dlPFC, vlPFC, dmPFC) to predict change in intervention outcomes. I hypothesize that the change in the multivariate signature expression will add explanatory value to the models beyond the univariate ROIs.

Analytic strategy. To test these hypotheses, within the cognitive reappraisal intervention group, I will use the multivariate signature expression for each subject and session generated in Aim 2A and create a change score by subtracting the baseline expression from the post-intervention expression. Food valuation will be assessed using the behavioral task described above and the average value of the unhealthy, cancer-promoting foods will be used as the criterion variable. Eating behavior will be assessed using the ASA24 and

the composite “Healthy Eating Index” will be used as the criterion variable. Both measures will be assessed at each session. To determine the predictive validity of the neural signature, I will use **latent growth curve modeling**. This structural equation modeling technique is used to assess growth in criterion variables over time and will be implemented with the lavaan package (Rosseel, 2012) in R (R Core Team, 2016). Two models will be created, one for each criterion variable separately. Each model will consist of a latent intercept and slope, with paths to the criterion variable at each timepoint (sessions 1-5; see Figure 3). To determine whether the neural signature explains additional variance in the slope (i.e., change in food valuation and eating behavior over time), change in neural signature expression will be regressed on the slope. I expect that this model will explain additional variance in outcome slopes and improve model fit, as assessed by the AIC and chi-square difference test ($p < .05$). I also expect that the path coefficient between change in neural signature expression and slope to be a significant positive value, indicating that greater change in expression is related to increased change in intervention outcomes. Further, I will assess whether these effects are unique to the cognitive reappraisal group and if so, will conduct a follow-up mediation analysis to determine whether the effect of the intervention (i.e., group) on each outcome is mediated by change in neural signature expression.

To establish incremental validity beyond the gold standard univariate “brain-as-predictor” approach, I will first **define reproducible univariate regions of interest** (ROIs) using NeuroSynth (http://neurosynth.org). This tool creates automated meta-analytic maps of neural activity based on keywords. I will use the map for the keyword “reappraisal” to create three ROIs (dlPFC, vlPFC, dmPFC) and extract mean parameter estimates from the reappraisal trials for each subject at each session. Change scores for each ROI will be calculated using the method specified above. For each outcome, I will compare two latent growth curve models within the reappraisal intervention group (Figure 3). The first model will be the same as the first model described above, but with the addition of the three ROI change scores. These scores will be indicators for a latent factor of univariate craving reappraisal, which will be regressed on the slopes of the intervention outcomes. The second model will also include change in multivariate neural signature expression regressed on the slopes. Using the same model fit indices specified above, I expect that this second model will better fit the data, indicating that change in multivariate signature expression explains unique variance above and beyond univariate ROIs.

Potential problems and alternative strategies. First, although I do not anticipate problems creating the neural signature in Aim 1 using MVPA, if accuracy is not significantly greater than chance, during the development phase, I will use other machine learning techniques (e.g., support vector regression or LASSO-PCR) that have been successfully used to develop neural signatures (Chang et al., 2015; Wager et al., 2013). Second, if between subjects classification accuracy in the validation sample is not significantly greater than chance, I will conduct MVPA within subjects and use within subject accuracy as the index of craving reappraisal in Aims 2A and 2B. Third, because subject recruitment for Aim 2 is driven by the parent grant, it is possible that I may not be able to acquire complete data (i.e., all 3-, 6- and 12-month follow-ups) for the targeted 100 subjects. This is unlikely given the fact that our team is on track to complete baseline and post-intervention sessions for at least 50 participants by July 2018 (the earliest start date for this training grant). However, in the event that we are not able to complete planned data collection for 100 subjects by the beginning of Year 3, I will use all available data for these subjects in Aim 2B. Fourth, although we have several protocols in place to ensure subject retention (e.g., multiple session confirmations, regular contacts during follow-up periods), we may experience some attrition. However, because structural equation modeling readily handles missing data, we will reduce potential bias by including all available data in statistical models.

Commitment to rigor, reproducibility, and transparency. In line with NIH guidelines, this project is designed to produce robust and reproducible results. To ensure that results are unbiased and generalizable, I utilize techniques such as structural equation modeling and out of sample validation in order to include all available data and test the generalizability of effects. To ensure reproducibility and transparency, I will **preregister** these analyses, employ **standardized data structures and preprocessing pipelines**, and share analysis scripts online. Further, the neural signature of craving reappraisal that will be developed and validated in this project will be shared publicly with researchers, and the **data and analysis scripts will be open-source** so that others can continue to develop this approach on other, cancer-relevant psychological processes.

Timeline and benchmarks for success. To complete the proposed project over the course of three years, I have designated deadlines for the completion data collection, preprocessing and analysis, and manuscript preparation. Preprocessing and analysis for Aim 1 will be completed during year one and the manuscript will be completed during year 2. MRI data collection for Aim 2 will be completed during year 1 and behavioral follow-ups will be completed during year 2. Aim 2 preprocessing will be completed during year 2, analysis will be completed during year 3, and the manuscript will be completed during year 3.

RESPECTIVE CONTRIBUTIONS

Development of Research Training Plan

This research training plan was developed in close collaboration with my mentor Dr. Elliot Berkman and co-mentor Dr. Dagmar Zeithamova. The idea for this project first began developing during my second year advising committee meeting in winter 2017. Drs. Berkman and Zeithamova are members of my advising committee and we discussed my career goal of using cutting-edge neuroimaging and statistical methods to design and evaluate interventions to improve self-regulation and reduce health-risking, cancer-relevant behaviors such as unhealthy eating and substance use. To achieve this goal, we determined that I require further training that I would not otherwise receive under the mentorship of my doctoral advisor Dr. Jennifer Pfeifer. Together, my mentors suggested I draft an NRSA-style research training plan for my Major Preliminary Examination, which I proposed in spring 2017. In the summer, Dr. Berkman's R01 application to conduct a randomized control trial on a novel cognitive reappraisal training intervention to reduce unhealthy eating and cancer risk was funded. We agreed that this would be the perfect opportunity for me to receive training in translational neuroscience, as well as learn and apply multivariate neuroimaging tools to the data to address new research questions that are outside the scope of the parent R01's proposal. This project would build on my developing expertise in appetitive self-regulation, and allow me to study craving reappraisal in adults. Further, because it is a longitudinal neuroimaging study, it would allow me to gain experience with intervention design, delivery, and assessment, as well as machine learning, multivariate neuroimaging methods, and advanced statistical techniques.

I composed an extensive reading list and while reviewing the literature, brainstormed ideas for the research training plan. Through weekly meetings with Dr. Berkman and frequent meetings with Dr. Zeithamova throughout the summer, I iteratively refined my proposal. In August, I wrote an initial draft of the proposal and received written feedback from Drs. Berkman and Zeithamova. I also presented the proposal as the oral defense of my Major Preliminary Examination and received verbal feedback from them as well. In September, I drafted a list of specific activities to support my training goals, and met with my mentors to discuss and refine the list. Together with my mentors, we determined that Dr. Rob Chavez, an Assistant Professor at the University of Oregon with extensive experience engaging in practices that support open and reproducible neuroscience, would be an excellent consultant for my training goal in this area. I approached Dr. Chavez about joining my mentorship team and he enthusiastically agreed, working with me to enhance the activities specified in my training plan. Over the course of fall quarter, I drafted the final version of my training plan and after receiving final comments from my mentors, I arrived at the final proposal detailed in this application.

Roles in Accomplishing the Proposed Work

I am the primary author on the proposed research training plan and will take the lead role in the research described in the plan. For Aim 1, with guidance from Dr. Zeithamova, I will be responsible for carrying out and writing up the specified analyses. For Aim 2, I will join the leadership team of Dr. Berkman's R01 to design the cognitive reappraisal intervention and will supervise the intervention staff to maintain fidelity between the design and implementation. The project coordinator and other graduate students funded by the grant will be responsible for subject recruitment and data collection. I will be responsible for preprocessing the neural and behavioral data. With guidance from Dr. Berkman, I will conduct the statistical analyses outlined in Aim 2. Throughout this process, I will receive additional supervision from Dr. Chavez when engaging in the activities specified in my open and reproducible neuroscience training aim. The accomplishment of my research and training aims will further be supported by monthly collaborative meetings with Drs. Berkman and Zeithamova.

SELECTION OF SPONSOR AND INSTITUTION

Selection of Sponsors

These sponsors were selected to provide the optimal mentorship team to achieve the training goals proposed in this project. Dr. Berkman is an Associate Professor in psychology and Co-Director of the Center for Translational Neuroscience, with expertise in translational neuroscience for cancer control, functional neuroimaging, behavioral approaches to cancer prevention, and advanced statistics. Dr. Berkman combines these techniques to design and refine interventions to improve health and well-being. For example, he has helped pioneer the "brain-as-predictor" approach, leveraging neural data to predict real-world health outcomes and identify novel candidate psychological targets (Berkman & Falk, 2013). Dr. Berkman's expertise in these domains will ensure that I receive excellent training in translational neuroscience broadly, and intervention design and evaluation using advanced statistical techniques specifically. Furthermore, over the past three and a half years, Dr. Berkman and I have developed a productive working relationship, co-authoring two journal articles currently under review. Dr. Berkman has served on each of my advising committees and is an excellent mentor. His mentorship style strikes the perfect balance between autonomy and guidance, critical feedback and support, facilitating my development as an independent scientist.

Dr. Zeithamova is an Assistant Professor in psychology with expertise in cognitive neuroscience, advanced functional neuroimaging methods, and machine learning applications. Dr. Zeithamova utilizes machine learning techniques, such as multivoxel pattern analysis (MVPA), leveraging the rich information contained in distributed patterns of neural activity to "decode" psychological states. She has conducted these analyses within subject, allowing unique patterns for each subject to predict psychological states, as well as between subjects, wherein a stable pattern developed across participants is used to predict psychological states. This proposal will use the latter approach to develop a "neural signature" of craving reappraisal. In addition, Dr. Zeithamova has extensive knowledge in task design and optimization for MVPA, which will inform the task design used in the parent grant, on which Dr. Zeithamova is a co-I. She has served on my advising committee for the past year and has been an outstanding mentor. Under her guidance, I am rapidly learning simple MVPA analyses and our work together has culminated in a co-authored manuscript currently under review. Dr. Zeithamova's expertise in these domains, combined with the successful working relationship we have developed, will provide excellent conditions to achieve my training goals.

Selection of Institution

The University of Oregon is the ideal setting for this proposal because of the innovative, interdisciplinary opportunities offered here, bridging the fields of health, psychology, and neuroscience. One distinctive feature of UO that makes it an ideal fit for the proposed training is the Center for Translational Neuroscience (CTN). The CTN, which is co-directed by my sponsor, Dr. Berkman, along with Drs. Philip Fisher and Jennifer Pfeifer, is a research center within the Department of Psychology that fosters an intellectual community around translational neuroscience on campus and also provides concrete support such as pre- and post-award support, pilot funds, and project management resources. The CTN's mission is to leverage knowledge from neuroscience to improve health and well-being, promote resilience, and mitigate the negative effects of early adversity. The CTN emphasizes research approaches that advance the identification of mechanisms of change and moderating factors within interventions, and is home to core faculty with extensive expertise in intervention design and evaluation. The CTN provides training for graduate students through formal mentoring, as well as through colloquia and bi-weekly brownbags. The core facilities of the CTN are co-located in the Lewis Integrative Sciences Building alongside the labs of Drs. Berkman and Zeithamova as well as the Lewis Center for Neuroimaging (Sabb, Director).

My home academic department, the Department of Psychology has a vibrant intellectual cultural, offering rigorous coursework and providing students with ample opportunities to learn cutting edge methodologies such as machine learning and open science. For example, the Department of Psychology hosts the weekly "Meth Lab" Methods and Statistics group as well as a formalized programming seminar, "Data Science Club" in which students learn coding, open science, and modern data sharing tools. The department also places strong value on interdisciplinary collaboration, which is formalized in the Supporting Area Project requirement. During this project, doctoral students are mentored by a faculty member from a different area, helping facilitate the development of novel ideas and fruitful collaborations.

Finally, UO is home to the Lewis Center for Neuroimaging (LCNI). LCNI is designed to facilitate high-quality neuroimaging research and houses a research-dedicated MRI scanner, employs several full-time staff, and provides training to graduate students formally as courses and informally as workshops.

TRAINING IN THE RESPONSIBLE CONDUCT OF RESEARCH

This project will strictly adhere to all human subjects procedures set forth by the University of Oregon's Office for the Protection of Human Subjects. Further, all research proposals will be submitted to and reviewed by the UO's Institutional Review Board before any data is collected. Each year, a renewal application will be submitted until the project has been completed. All researchers working on the project will complete ethics training through the Collaborative Institutional Training Initiative, which must be renewed bi-annually. All researchers using the UO Lewis Center for Neuroimaging (LCNI) will also complete the required safety course and test to demonstrate understanding of the responsible conduct of MRI research, which must be renewed yearly. The parent grant for this project has been approved by the UO Institutional Review Board.

As a graduate student, I have completed two ethics courses. First, I have completed ethics training through the Collaborative Institutional Training Initiative (CITI). This is a web-based program is designed to educate and test researchers on ethical issues in human subjects research. I have completed the course for Social-Behavioral-Educational Researchers, as well as the course for Responsible Conduct of Research for Social and Behavioral Sciences. Each course include modules on specific topics, and I have completed modules for the following topics: history and ethical principles, federal regulations for protecting human subjects, informed consent, defining human subjects, assessing risk, conflicts of interest, privacy and confidentiality, research with children, international research, research misconduct, data management, authorship, peer review, mentoring, using animal subjects in research, collaborative research, and research involving human subjects. Researchers are required to be recertified bi-annually. I last completed recertification on July 12, 2016 and will recertify prior to expiration on July 12, 2018. Second, I have completed ethics training through the UO psychology department winter 2016. All first year graduate students are required to take a course in research ethics as part of the first year seminar program. This course is 10 weeks long and covers ethical issues in the following domains: data acquisition, management, and ownership, questionable research practices, research fraud, publication and authorship, ethics of research with human subjects, non-human animal research, conflicts of interest, peer review, and mentoring. Each class is 80 minutes and consists of lecture and group discussion. Weekly readings are assigned and students also complete two short reflection papers.

I have also completed MRI operator training through LCNI in March 2016. This training included 40 hours of supervised training by the LCNI Director Dr. Fed Sabb, MR physicist, Dr. Jolinda Smith, and MRI technician, Scott Watrous. MRI operator status is maintained through yearly written quizzes and by operating a minimum of one scan per month. To date, I have completed nearly 100 hours operating the MRI scanner.

To continue my training in responsible conduct of research, I will engage in regular discussions with my mentors, lab members, and members of the research community in the UO psychology department. This will allow me to discuss and receive feedback on ethical and practical issues related to the design and implementation of this research project.

SPONSOR AND CO-SPONSOR STATEMENTS

A. Research Support Available

Dr. Berkman's support

FUNDING SOURCE	ID NUMBER	TITLE	PI	DATES	ANNUAL DIRECTS
NIH	*R01 CA211224	Devaluing Energy-Dense Foods for Cancer Control: Translational Neuroscience	Berkman	07/01/17 – 06/30/22	$435,960
NIH	R01 MH107418	Puberty, neural systems for social processes, and early adolescent mental health: A longitudinal neuroimaging study	Pfeifer	08/01/15 – 04/30/20	$418,653
NIH	P50 DA035763	Translational drug abuse prevention center	Chamberlain / Fisher	07/15/13 – 04/30/18	$1,739,581
Bezos Family Fndn	Center for the Developing Child Subaward	Motivational Boost at Scale	Berkman	09/01/16 – 4/28/18	$137,247

* Note that R01 CA211224 is the parent grant for the data collection and analysis proposed in Aim 2. We are currently beginning data collection on the project and have been successful in recruiting at least 4 participants per week in previous large-scale functional neuroimaging studies of overweight and obesity. The parent grant proposes to collect pre-post data on 300 participants in the first 4.5 years. Therefore, we are confident that we will have N=100 for Dani to use for Aim 2 by the end of year 1 of the proposed training period.

Dr. Zeithamova's support

FUNDING SOURCE	ID NUMBER	TITLE	PI	DATES	ANNUAL DIRECTS
University of Oregon Start-up Research Support		Neural mechanisms supporting memory specificity and generalization	Zeithamova	9/2014 – 9/2020	$150,000
NIH	*R01 CA211224	Devaluing Energy-Dense Foods for Cancer Control: Translational Neuroscience	Berkman	07/01/17 – 06/30/22	$435,960

B. Sponsor's/Co-Sponsor's Previous Fellows/Trainees

Dr. Berkman's previous trainees

Dr. Berkman has previously sponsored 2 predoctoral fellows and 1 postdoctoral fellow.

NAME	TIME IN LAB	CURRENT POSITION / ORGANIZATION
Calcott, Rebecca	2011-2017 (predoctoral)	Postdoctoral Scholar, DAAD Fellowship, University of Regensberg
Giuliani, Nicole	2011-2015 (postdoctoral)	Assistant Professor, College of Education, University of Oregon
May, Lisa	2010-2017 (predoctoral)	Project Director (soft money), Social and Affective Neuroscience Lab at UO

Dr. Zeithamova's previous trainees

Dr. Zeithamova is a junior faculty member. She has 1 postdoctoral and 2 predoctoral trainees, all current. Dr. Zeithamova has additional mentoring experience from her postdoctoral training. She closely mentored two graduate students: Sasha Wolosin (successful pre-doctoral NRSA recipient, currently data scientist at Apple) and Margaret Schlichting (currently faculty at the University of Toronto).

NAME	TIME IN LAB	NOTE
Caitlin Bowman	2015-current (postdoctoral)	NRSA recipient
Stefania Ashby	2015-current (predoctoral)	
Lea Frank	2016-current (predoctoral)	

C. Training Plan, Environment, Research Facilities

Dr. Berkman's (sponsor) training plan

This proposal seeks support for Ms. Cosme to complete her doctoral training in social and developmental psychology at the University of Oregon, and to allow her to learn and apply a range of innovative methodological approaches and statistical tools that would otherwise not be feasible. I direct the Social and Affective Neuroscience Laboratory and co-direct the Center for Translational Neuroscience (CTN; http://ctn.uoregon.edu) at the University of Oregon. The CTN is a research center that promotes translational neuroscience by supporting an intellectual community, providing formalized pre- and postdoctoral training, and housing pre- and post-award infrastructure. Translational neuroscience is the interdisciplinary field that applies

knowledge and methods from human and animal neuroscience to improve health and well-being. The University of Oregon is the ideal site for Ms. Cosme to complete her NRSA training because of the *strong infrastructure for all aspects of her training plan*, including a highly productive and collaborative translational neuroscience group (Elliot Berkman, Jennifer Pfeifer, Philip Fisher, Nicholas Allen, Maureen Zalewski, and others), a strong neuroimaging group with training and specializations in multivariate methods (Dagmar Zeithamova, Brice Kuhl, Robert Chavez) who collaborate with the translational neuroscience group, and an emphasis on open and reproducible neuroscience (see, for example, our department's open-source "Data Science Club" website, https://blogs.uoregon.edu/rclub and associated GitHub account, https://github.com/uodatascience). The CTN and the Department of Psychology are on the forefront of teaching and implementing open science practices. For example, we offer a seminar in open and replicable science and have specifically mentioned that we consider open science practices in the evaluation of new faculty candidates in each of the 4 most recent faculty searches in Psychology.

Completed training. The University of Oregon Doctoral Program in Psychology is highly collaborative and encourages an interdisciplinary approach that exposes students to a wide range of topics through core coursework, small seminars, informal brownbag series, lab meetings, as well as other intellectual opportunities. The primary goal of the program is to develop outstanding researchers with high quality training combined with substantive and methodological breadth. Towards this goal, students complete "core" courses in three of the five areas in our program (i.e., developmental, social/personality, clinical, systems neuroscience, cognitive neuroscience), as well as a year-long comprehensive sequence in statistics during the first two years of the program. Ms. Cosme has completed these requirements, selecting core coursework in developmental, social/personality, and cognitive neuroscience. To receive further training in support of the career goals outlined in this proposal, Ms. Cosme has completed additional coursework in: adolescent development, brain decoding, grant writing, machine learning, and structural equation modeling, and has developed her teaching and computer programming skills as a facilitator for the Data Science Club. Students are also required to complete three major requirements. During their first year, students design, conduct, and write up an original research study, and present their project to the department in the fall of second year. To support intellectual breadth and foster interdisciplinary collaboration, students complete a "supporting area" project, in which they are mentored by a faculty member from a different area and complete a research project under their guidance. By the end of fourth year, students must also complete a major preliminary examination, in which they integrate knowledge from a relatively broad area of psychology through written and oral presentation. Ms. Cosme has successfully completed all major requirements and advanced to candidacy in August 2017.

Training plan. Ms. Cosme's long-term goal is to become an independent translational neuroscientist who designs and evaluates interventions to change cancer-related behaviors in adolescents and adults. The objectives of her training plan therefore are to (1) develop skills to conduct rigorous and reproducible cutting edge research in the field of translational neuroscience and (2) publish and present scientific findings, building a track record in order to successfully compete for academic positions. These objectives will be met as Dani completes three interrelated Training Aims, which are to develop expertise in *translational neuroscience*, *multivariate neuroimaging tools and machine learning*, and *open and reproducible neuroscience methods*.

The team that Ms. Cosme has assembled is exceptionally well suited to provide the proposed training. Dr. Zeithamova and I are faculty members in the Department of Psychology, and collaborate on several projects including the parent R01 project. Several other faculty in the department will provide ancillary support, including Dr. Pfeifer, who is Dani's primary advisor in the program, Dr. Chavez, who is mentoring Dani in open neuroscience practices, and Dr. Sabb, the director of our imaging center (see letters). My expertise is in applying a translational neuroscience approach to develop and refine behavior change efforts in the area of cancer control. For example, the parent R01 is testing the theoretical prediction that two effective interventions for dietary change (response training and cognitive reappraisal) both operate by altering the same underlying reward valuation system. If this is true, then other interventions that are known to influence this system might also change diet, and it might be possible for people to be assigned to the most effective intervention ideographically based on which intervention was most likely to influence the valuation system for that individual. I have completed two other NIH-funded trials that used neuroimaging to index whether and how interventions for behavior change - especially cancer-related behavior - target underlying neurobiological systems. This makes me uniquely suited to provide expertise in translational neuroscience for cancer control. Dr. Zeithamova has used multivariate neuroimaging and machine learning techniques to produce new insights into how memories are encoded, retrieved and represented in the brain. Her innovative work has been published in *Neuron*, *Journal of Neuroscience*, *Journal of Experimental Psychology: General*, among other top journals in neuroscience and psychology. Dr. Zeithamova will provide mentorship to Dani in the application of

these techniques. Together, we provide a unique and complementary blend of expertise related to Dani's training goals in translational neuroscience and advanced multivariate imaging methods.

I will provide specific training in translational neuroscience, and particularly the development, conduct, and assessment of longitudinal interventions that utilize human neuroimaging. With NRSA support, Dani would be able to immerse herself deeply in the leadership and supervision of the parent R01 that is just getting under way (funding began August 2017). Dani would attend leadership team meetings; help design and implement the pre- and post-intervention neuroimaging assessment; help design and implement the cognitive reappraisal arm; assist with the delivery and fidelity monitoring of the intervention; and learn to supervise research staff and manage grant budgets. Critically, Dani will be centrally involved in the neuroimaging analyses to test whether the intervention arms altered neural activation in the reward valuation system and whether those changes mediated behavioral effects. As part of those analyses, Dani will work with me on the longitudinal analyses including latent growth curve modeling, group-by-time longitudinal modeling, and intent-to-treat analyses. Dani will also take the lead in grant preparation for follow-up projects related to her interests, supported by preliminary data gathered as part of her NRSA training project. Dani will be first author on at least one manuscript per year related to her NRSA project and/or the parent project.

Dani and I will interact extensively to accomplish her training in translational neuroscience. The mentorship will primarily occur during our weekly one-on-one meetings in which I will provide regular assessments of her progress and specific guidance of additional steps she could take or changes that need to be made to accomplish her training aims. We will also interact in weekly project meetings with the staff and monthly project leadership meetings, which are attended by the PI, co-Is, consultants, and full-time project staff. Dani will learn about planning, budgeting, and staff supervision in the leadership meetings. Also, as my lab follows the Agile system for project management, we all work in the same shared space and have fast, brief, scheduled check-ins three to four times per week. We also have numerous informal meetings throughout the course of each two-week "sprint" as well as longer, scheduled meetings at the beginning and end of each sprint. For example, in one sprint we might plan all intervention assessment activities in a three-hour planning meeting, and then the entire team would dedicate two full weeks to working only on assessment, meeting each morning to discuss accomplishments since the previous meeting, work plans until the next one, and barriers. We would then meet for a two-hour meeting at the end of the sprint to take stock of our progress. Finally, I will also provide Dani with regular, clear, and prompt feedback and guidance on her writing as she prepares manuscripts and grant proposals related to her project. In sum, NRSA support will allow Dani to dedicate herself to learning to design, manage, analyze, and report a longitudinal translational neuroscience trial.

In terms of formal pedagogy, Dani will complete the translational neuroscience graduate seminar that I teach in the Winter of 2020, and will also take my graduate multilevel modeling seminar in the Fall of 2018. (Dani is currently finishing the structural equation modeling seminar offered in the Psychology Department.) Dani will also attend and present regularly in our CTN brownbag series. The CTN brownbag is a standing bi-weekly meeting of the CTN group that is attended by the core CTN faculty (Berkman, Pfeifer, Fisher) and several additional faculty, as well as graduate students and postdocs in those labs. The CTN brownbag series is an ideal way for Ms. Cosme to learn about a variety of approaches and problems in translational neuroscience, as well as to receive regular feedback on her own project as it progresses.

Research environment. My main lab room occupies approximately 400 sq. ft. on the 2nd floor of the Lewis Integrative Sciences Building (LISB), which also houses our 8 small (100 sq. ft) run rooms. The full-time project manager for the parent R01 has an office in the main lab room. My and Dr. Zeithamova's offices are co-located on the 3rd floor of the LISB, and the neuroimaging facility, the Lewis Center for Neuroimaging (Sabb, Director) is located on the 1st floor. As noted above, though I have my own office, my students and I work together in the main lab room during regular business hours. Our run rooms were designed for individual neuropsychiatric testing, and each contain a computer equipped with the necessary software to acquire behavioral task data (e.g., cognitive reappraisal, food valuation) and self-report questionnaires. Each run room also has a medical grade scale and measuring tape to measure BMI. A "BodPod" air displacement measurement device to calculate body fat percentage is housed in a separate, larger (~200 sq. ft.) room that is dedicated for that purpose. The LISB has 5 parking spaces dedicated for research subjects. Research participants come to our 2nd floor run rooms for the consenting process and initial task and questionnaire completion, then have a biometric assessment across the hall, and finally enter the imaging facility one level below. The co-location of participant space, research lab space, and faculty office space greatly facilitates supervision, mentorship, and collaboration because informal, face-to-face interactions can occur as needed. Also, the CTN administrative staff (e.g., project management and grants management personnel) are also housed in the LISB, and the CTN brownbags take place in the neuroimaging center conference room on the

1st floor. Thus, nearly all training activities take place literally under the same roof, and all project personnel are within steps of each other.

Dr. Zeithamova's (co-sponsor) training plan

Understanding neural mechanisms of behavioral change helps inform the development of new interventions as well as tailor interventions to individual profiles to improve efficacy. Novel neuroimaging analytical approaches have been developed in recent years that improve our ability to index internal representations of external stimuli, detect engagement in various cognitive processes in the absence of an overt response, and predict individual differences in cognition or response to reward from individuals' neural profile. However, a challenge to a wide adoption of these techniques across neuroscience areas is the need to combine extensive expertise in a content area, such as translational neuroscience of behavioral interventions reducing risk behaviors, with expertise in novel neuroimaging approaches, within a single lab. Collaboration across labs makes it possible to overcome this challenge, and, even more excitingly, train a new generation of scientists that can combine the expertise from multiple mentors. After the completion of the proposed training, Ms. Cosme will become such a scientist and position herself at the cutting edge of translational neuroscience research.

My expertise positions me ideally as a co-sponsor on Ms. Cosme's training proposal. I helped to pioneer the use of multivariate fMRI analyses and machine learning approaches in the domain of memory generalization, demonstrating their utility for indexing all aforementioned aspects - content, process, and individual differences - from patterns of brain activation. I also teach a graduate seminar, PSY 607 Brain Decoding, and conduct methodological research on design optimization for the decoding analyses, in addition to my content research area of memory. Dr. Berkman and I are collaborating to apply multivariate neuroimaging and machine learning approaches to translational neuroscience questions with fruitful results. We are also collaborating on the parent R01, which provides funding for the data collection under Aim 2 of the current training proposal. Dr. Berkman, Ms. Cosme and I have already been working together to optimize task design, scanning procedures and analysis plan for the project. I have also taught Ms. Cosme in two classes, PSY 610 Advanced Cognitive Neuroscience core course and PSY 607 Brain Decoding, and we have an excellent working relationship.

My primary role will be to provide Ms. Cosme hands on training in multivariate neuroimaging and machine learning methods, including multivoxel pattern analysis and representational similarity analysis, and their application to the proposed project. This training goal will also come with training in additional research skills. While various labs have shared advanced fMRI data analysis tools in the form of computer code, there is no ready-to-use GUI-based software. Rather, the successful use of cutting-edge approaches to fMRI data analysis requires a great deal of computer programming and the ability to manipulate "big data." Conducting the proposed research will strengthen Ms. Cosme's computer programming skills (MATLAB, R, Python, shell scripting) and enable her to carry out novel analyses that are not implemented in standard software packages. These skills will come handy carrying out computationally intensive analyses, and the in the future, when she is setting up analysis pipelines in her own lab. I will also provide career mentorship from a perspective of a female junior faculty member recently on a job market, to complement Dr. Berkman more senior perspective.

To achieve these training goals, I will have regular bi-weekly individual meetings with Ms. Cosme to assess progress, provide feedback, and set goals. To hone her presentation skills, Ms. Cosme will regularly present her research in my lab, which will help her to articulate her work to a wider audience not familiar with her content domain. In addition, Ms. Cosme will meet with me together with Dr. Berkman during monthly project meetings and mentorship meetings. Finally, I am an accessible mentor with an open door policy to answer quick questions in person or over email as they arise.

Coordination between co-sponsors

Drs. Berkman and Zeithamova have an excellent working relationship as evidenced by their successful submission and initiation of the parent R01. The success of their collaboration in part flows from their clearly defined roles on the project, which are echoed in Ms. Cosme's training plan. Namely, as PI, Dr. Berkman is responsible, overall, for making sure all proposed activities are carried out, and specifically for design, implementation, assessment, and reporting of the trial. Zeithamova is responsible for providing input on the design of the neuroimaging tasks and assisting with the multivariate and machine learning aspects of the analyses. This same structure will apply to the proposed training: Berkman is responsible for making sure all proposed activities occur on schedule and specifically for training in translational neuroscience, and Zeithamova is responsible for training in advanced neuroimaging and machine learning analyses. The Co-Sponsors have already collaborated successfully in designing the neuroimaging tasks to be optimized for the proposed analyses. Formally, we will interact during the monthly project leadership team meetings and the monthly mentorship meetings with Ms. Cosme. In the mentorship meetings, Berkman and Zeithamova will

provide specific feedback on past performance and plan concrete future goals for Ms. Cosme's work on the project and her overall career progress. Additionally, we have both agreed to be on Ms. Cosme's dissertation committee, which meets annually to review and plan dissertation progress. Finally, because of our co-location in LISB and dedication to this project, we both are available to Ms. Cosme in person and digitally as needed.

D. Number of Fellows/Trainees to be Supervised During the Fellowship

Dr. Berkman's trainees

Dr. Berkman will supervise 3 predoctoral trainees in addition to Ms. Cosme. Rita Ludwig is supported by a university fellowship, Brendan Cullen is supported by the parent R01, and Krista DeStasio is supported by an NSF GRFP. Two additional current trainees (both former NSF GRFP winners) are expected to graduate before the proposed training period begins.

Dr. Zeithamova's trainees

Dr. Zeithamova will supervise 1 postdoctoral trainee (Caitlin Bowman, supported by NIH F32 postdoctoral NRSA) and 3 predoctoral trainees in addition to co-mentoring Ms. Cosme.

E. Applicant's Qualification and Potential for a Research Career

Dr. Berkman's (sponsor) assessment

Dani is exceptionally well prepared for NRSA training. I know Dani well because I have been her co-advisor in our doctoral program (along with Dr. Jenn Pfeifer) since 2015, and she was our lab manager for a full year before that. She is easily one of the best students in our department in terms of aptitude, productivity, and trajectory, and is well on her way to a tenure-track position at a research university. Dani basically functions at the level of a postdoc in her ability to critique the literature, generate hypotheses to advance the field, independently seek funding to test her hypotheses, and analyze and report her data in a rigorous, open, and ethical way following the best available practices. Dani is a clear and engaging speaker and a sought-after mentor to her fellow students. NRSA training would further propel Dani along her path to becoming an independent, federally-funded researcher in the area of cancer control by providing her with a unique blend of training and research opportunities in translational neuroscience that would not otherwise be available.

Dani has long shown a strong dedication to science in general and translational neuroscience in particular. Dani contacted me about our program in 2014 and traveled to Eugene twice (once from Sweden!) to meet with my colleagues and me, so she's quite committed to graduate training. She applied when we opened a lab manager position and was easily our top choice among a pool of about three dozen promising researchers. She began working full time at the University of Oregon (splitting her hours between my lab and Jennifer Pfeifer's Developmental Social Neuroscience lab) in the summer of 2014. Our initial impressions of her as an unusually bright, dedicated, and mature researcher were strongly and repeatedly confirmed. She was so capable that we steadily increased the complexity of her work to be commensurate with her abilities. After 6 months, she was performing at the level we'd expect of a second or third year doctoral student (e.g., quite a bit of research, neuroimaging skills development, and RA supervision). Dani is also extremely organized and conscientious, which has made her an invaluable team member on our larger longitudinal studies that involve repeated contacts for each subject, pre and post functional neuroimaging, and elaborate inclusion criteria.

Though Dani was an outstanding lab manager, her real passion is for the substantive psychological questions. When she applied to graduate school, we naturally did everything we could to keep her here, and feel fortunate to have succeeded. Dani hit the ground running given her strong research background and familiarity with our lab. For her "First Year Project" (FYP), she conducted an ambitious longitudinal neuroimaging study of the transition to the college freshman year. This project involved scanning the entire sample (N > 30) in a narrow window before their first year began, then conducting intensive surveys assessments throughout the academic year. Her objective was to examine the role of autonomous self-regulation (i.e., choosing freely to engage in self-regulation as opposed to being told to by, say, a parent or experimenter) in risky behaviors and well-being. The rationale is that college is a time of greatly increased autonomy – for better or for worse – so knowing something about a kid's ability to autonomously engage self-regulation will enable us to predict health and well-being outcomes that are related self-regulation. The paper that she first-authored about this project is under revision at a top-tier journal.

This project illustrates several of Dani's notable qualities. First and foremost, Dani wants her science to have an impact. The study uses a brain-as-predictor approach to be able to extract as much predictive information as possible about subsequent behavior from the fMRI data. Indeed, initial analyses revealed that activation in a network of self-regulation regions during autonomous (vs. exogenous) regulation predicted

increases in substance use over the following 4 months. Using these preliminary data, Dani assisted Dr. Pfeifer in writing an R21 proposal to NIDA to follow-up on this result in a larger, riskier sample and with better assessment of drug use, which got funded a few months ago. So, Dani is already an experienced and successful grant writer.

The second quality that her FYP illustrates is Dani's advanced statistical and coding skills. Of course, we began our interrogation with standard univariate analyses, contrasting activity during regulation with passive viewing, and during high- with low-autonomy regulation. But, as is her inclination, Dani wanted to dig deeper and do more than just the bare minimum required for a publication. She built regions-of-interest using a priori parcellation maps based on resting-state functional connectivity. She ported the data into R because she's learning that language and wanted to force herself to practice it more. She built whole-brain visualizations of the parcellation results into very cool 3D animations. Inspired by Dr. Zeithamova's seminar in brain decoding, Dani learned to apply multivariate pattern analysis (MVPA) to train a classifier to distinguish brain activity during regulation from passive viewing. Interestingly, the classifier had greater rates of accuracy during low- than high-autonomy regulation, possibly indicating more similarity between regulation and passive viewing in the high autonomy condition. That initial MVPA result is fascinating and potentially important, and we never would have known it if not for Dani's inquisitiveness. That set of analyses represented Dani's first foray into the world of multivariate neuroimaging analysis and working with Dr. Zeithamova; it perfectly set the stage for more in-depth training in that family of methods.

The predoctoral NRSA represents the perfect opportunity for Dani to build on her already formidable skill set in longitudinal neuroimaging research, multivariate neuroimaging, and open science. She has already demonstrated a taste and aptitude for these things, and has devised a well-conceived plan to take advantage of the strong infrastructure and resources at UO to elevate her training in them to the next level. NRSA support will ensure that Dani will continue her stellar development as a scientist over the next few years, and the training laid out in this proposal guides that development toward a career of innovative, significant work. Dani possesses the intellectual, statistical, and methodological skills and a deep familiarity with the literature on par with the best postdoctoral scholars I've worked with, plus her work is benefitted by her conscientiousness, smarts, and a strong personal dedication to and interest in conducting open and ethical science. I have no doubt that Dani will continue to flourish as a scholar throughout her graduate career and well beyond.

Dr. Zeithamova's (co-sponsor) assessment

I fully agree with Dr. Berkman's evaluation of Dani as an exceptional young scientist. While Dani was always on my radar as an exceptionally capable lab manager and then doctoral student of my colleagues, Drs. Pfeifer and Berkman, I got to know her more closely when she became a student in my graduate core class PSY 610 Advanced Cognitive Neuroscience. Dani's insightful questions in the class and on the discussion board caught my attention first, but she continued to do exceptionally well on all aspects of the class, ending among the top two students in the class. This was even more notable given that cognitive neuroscience was not her area of specialization. Her final paper - a research study proposal - was exceptionally well written and brought very realistic ideas of how some of the analytical tools developed in the cognitive neuroscience area could be applied to her own line of research. While reading, I forgot that I was grading a class paper and instead commented on the proposal as I would comment on a collaborative project with a colleague. This was during the time when Dr. Berkman and I were discussing a possible collaboration, but before outlining specific projects or analytical approaches. The ideas in Dani's proposal were thus truly her own, and I believe they helped to seal our subsequent collaboration. Dani's interests to adopt more advanced brain analytical tools led her take my PSY 607 Brain Decoding seminar where she continued to impress. The class focused on conceptual understanding of several methods, with an emphasis on multivoxel pattern analysis (MVPA) and representational similarity analysis. That year I also included two hands-on sessions where students got to run those analyses on sample data. Dani was able to see how such an approach could help her interpret an unexpected finding in a study she was analyzing and writing up for publication at that time. With small help from me, she was able to get a basic MVPA analysis up and running on her data, and the results indeed helped explain the seeming mismatch between her behavioral and univariate activation results. The ability to learn about a concept in one domain (such as how a method has been developed and used in cognitive neuroscience of memory) and envision how it may be utilized in a different domain on very different questions (such as interventions for self-regulation) highlights how bright and creative Dani is a scientist. With her inquisitive mind, firm conceptual understanding of her research domain, and the aptitude to quickly learn new knowledge and skills, I have no doubt she will excel in the proposed research and training plan. This work will result in high-quality, cutting-edge research and produce a rising star junior scientist with exceptional qualifications to become an impactful leader in the field of translational neuroscience.

UNIVERSITY OF OREGON | College of Arts and Sciences

December 5, 2017

Danielle Cosme
Department of Psychology
1227 University of Oregon
Eugene, Oregon, 97403

I am pleased to serve as a consultant for your F31 NRSA proposal, “Cancer prevention through dietary change: Training in translational neuroimaging.” The proposed project’s goal of developing a multivariate neural signature of craving reappraisal has the potential to advance our understanding of the relationship between food consumption and individual differences cancer risk, using some of the latest advancements in neuroimaging-based biomarkers. Having completed advanced training workshops in multivariate neuroimaging methods and scientific computing, I believe you are in a very strong position to be able to both execute the proposed projects and disseminate the tools you develop to the broader scientific community.

As a researcher with over a decade of experience in multimodal neuroimaging and extensive training in reproducible neuroscience practices, I am well-suited to provide consultation on these topics within the proposed aims. Specifically, I plan to share and my expertise and provide mentorship in overseeing reproducible neuroscientific practices such as utilizing Jupyter Notebooks in Python for full analytical documentation, collaborative code sharing though GitHub, and whole-brain neural signature sharing though resources such as NeuroVault and DataLad. We have already met to discuss some of these exciting ideas, and I am happy to continue to regularly meet to discuss and supervise your ongoing progress in these domains. Moreover, I will make myself available for more in-depth training through individualized hands-on training sessions in my laboratory which have proven to be efficient in integrating study-specific workflows with the latest advancements in reproducibility practices.

In summary, I am excited to be able to contribute and help you achieve the aims of your F31 NRSA fellowship. Your project is significant not only for its translational aims but also as a representative of the cutting-edge computational approaches that will become standard in our field in the near future. These skills will no doubt help you advance your scientific goals and make you well-positioned for the next stages of you career.

Best regards,

Robert S. Chavez, Ph.D.
Assistant Professor
Department of Psychology
University of Oregon

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DESCRIPTION OF INSTITUTIONAL ENVIRONMENT AND COMMITMENT TO TRAINING

Educational Information. University of Oregon, Psychology Doctoral Program, Developmental and Social/Personality focus. The psychology doctoral program is a research and scholarly degree with the expectation that students will engage in research throughout their graduate career. Our program is highly collaborative and encourages an interdisciplinary approach that exposes students to a wide range of topics through small seminars, informal brownbag series, lab meetings, and a variety of other opportunities. The primary goal of the program is to train outstanding researchers with high quality training combined with substantive and methodological breadth.

Within our developmental area, our program offers extensive coverage of development during infancy, childhood, and adolescence, with some additional interest in aging. Topics strongly represented include cognitive development, socioemotional development, developmental psychopathology, developmental social and affective neuroscience, theory of mind, perspective taking. These connect with research on self-evaluation; affective and appetitive motivations; and decision-making. Another area within development includes research on infant processing of action; language; and the statistical properties of everyday visual, linguistic, and musical environments. Shared across the developmental area is also the shared interest in social contextual effects on infant, child, and adolescent well-being, ranging from the “micro” (familial and peer influences, early adversity) to the “macro” (cultural and global contexts of development).

Within our social/personality area, one will find an intellectually diverse research approach to understanding intrapersonal and interpersonal processes and individual differences. Current research topics include: Emotion and motivation; self, identity, and social cognition; groups, networks, and organizations; culture, values, and worldviews; personality structure and development; and, decision making and risk perception. Research in these areas draws upon a wide range of methods, including individual, dyadic, and group methods, psychophysiology, neuroimaging, neuroendocrinology, experience sampling, longitudinal studies, surveys, computational methods, and field studies.

The Department of Psychology at the University of Oregon encourages multidisciplinary collaborations with students and colleagues from other areas of psychology and other academic departments.

Requirements, Milestones, Timing.

Requirement	Completion Deadline
Data Analysis I, II, III	End of spring term, first year
First Year Research Series including Ethics	End of spring term, first year
Departmental Core Sequence (3 of 5 core courses)	End of spring term, second year
First-Year Research Requirement	November 15, second year
Supporting Area Requirement	October 15, fourth year
Major Preliminary Examination	October 15, fourth year
Advancement to Candidacy	After completion of the above
Doctoral Dissertation & Final Oral Defense	Expected within six years
Doctorate of Philosophy	Awarded after completion of all of the above, within seven years

During their time in our program, the majority of our doctoral students serve as teaching assistants, research assistants, or sole instructor throughout most of their academic career.

Doctoral students are evaluated on several levels: Final course grades, performance on major requirements (First Year Research Project, Supporting Area Requirement, Major Preliminary Examination), as

teaching/research assistants or course instructor. Although doctoral students meet regularly with their Advising Committee, only once each academic year will they evaluate and formally report on the student's progress in the program.

Danielle Cosme is a third year doctoral student in the developmental and social/personality areas in psychology, has already Advanced to Candidacy, and has begun her dissertation research.

Information is provided by Lori Olsen, UO Department of Psychology Graduate Secretary.

PROTECTION OF HUMAN SUBJECTS

Below is the Protection of Human Subjects protocol from the parent grant, R01 CA211224. Addendums pertinent to this proposal are *italicized*.

1. Risks to Human Subjects

A. Human Subjects Involvement, Characteristics, and Design

Characteristics of the subject population. Our goal of the parent grant is to obtain usable data from 300 adult participants. These participants will be overweight or obese adults between the ages of 18 and 60, inclusive. In the previous experience of the research team, the loss of usable data resulting from study noncompliance, attrition, or excessive movement in the scanner is less than 10%. Therefore, our recruitment goal is to enroll 330 participants (165 females, 165 males) in the study. From this, we estimate that we will have usable data from 300 male and 300 female participants. *The current proposal will use the data from the first 100 subjects collected.*

Involvement. All participants will make between 11 and 13 visits to the Lewis Integrative Sciences Building (LISB) at the University of Oregon: two to the Lewis Center for Neuroimaging (LCNI; “baseline” and “endpoint” sessions) and 9-11 to the Social and Affective Neuroscience (SAN) Laboratory (6-8 training sessions and 3 follow-ups at 3-, 6-, and 12-months post baseline). The baseline and endpoint sessions will take place approximately 30 days apart. The intervention sessions occur between the baseline and endpoint sessions.

Participants will be recruited via physical and digital ads and online postings (e.g., on bus advertisements, newspapers ads, at grocery stores and markets, via direct mailing, radio, and on Craigslist, Google, and Facebook) then screened for eligibility over the phone. To be eligible, participants must meet the sample criteria in terms of age and BMI status, absence of medical, psychiatric, neurological, and eating disorders, absence of tobacco and substance use, be psychotropic medication-free, not be dieting (past 6 months, current, or planned for the following 6 months), and also be safe to enter the magnetic resonance imaging (MRI) scanner.

At the baseline and endpoint sessions, participants will be situated in the fMRI scanner at LCNI to complete four behavioral tasks that will involve inhibitory control (e.g., pressing buttons rapidly to some stimuli and withholding them to others), cognitive reappraisal (e.g., viewing images of appetitive foods and thinking about them in a different way to make them seem less appealing), and valuation (e.g., bidding on various foods to be purchased from an endowment provided by the experimenter). Before the tasks, participants will complete a brief questionnaire about the kinds of healthy and unhealthy foods that the participants find palatable and eat regularly. Participants will also complete a urine toxicology screen for a range of illicit substances at both sessions. Participants will be told during the phone screening and at the pre-session that drug tests will be used to ensure sobriety at the time of the scan.

Between the baseline and endpoint sessions, participants will be randomized to one of two interventions for changing food valuation (a behavioral or cognitive training) or a generic inhibitory control training involving non-food stimuli. Participants will be scheduled for 6-8 training sessions (depending on their condition) to take place across the following 4 weeks, between the baseline and endpoint sessions. Participants will return to the lab at 3-, 6-, and 12 months following the baseline session for follow-ups to measure long-term intervention effects on the proximal processes (behavioral responses and cognitive reappraisal), on valuation, and on eating and body composition. In these sessions, participants will complete all self-report and task-based behavioral measures as in the baseline and endpoint sessions, and also have their body fat assessed with the BodPod, BMI, and waist-to-hip ratio. There will be no neuroimaging in these sessions.

Sampling plan. Participants will be recruited for the parent grant without exclusions based on gender, race, or ethnicity. Thus, our subject population will reflect the percentages in the local population (Lane County, Oregon) with regard to gender, race, and ethnicity, as indicated in the Targeted/Planned Enrollment Table. Because of the high Caucasian population of Lane County, we will oversample minorities to increase the generalizability of our findings. Participants who cannot undergo an MRI scan will be excluded from the proposed research. These MRI contraindications include metal implants (e.g., braces, permanent retainers, pins) or metal fragments, pacemakers or other electronic medical implants, claustrophobia, and weight greater than 550 lbs. We will perform this screening twice, once during the telephone screening and again immediately before the baseline scan to ensure that no answers had changed since the original screening. Although there are no known risks of MRI to a developing fetus, female participants who are pregnant or believe they might be

pregnant will be excluded, per the policy of the Institutional Review Board of the University of Oregon. However, participants will not disclose their pregnancy status; female participants will be told during the screening that if they are pregnant or believe that they might be pregnant should withdraw from the study.

Because the purpose of the proposed research in the parent grant is to identify mechanisms and moderators of food valuation interventions among people at elevated risk for food-related cancers, we will screen participants to have BMI in the overweight to obese range (25-35). We will not exclude individuals who report current psychiatric, neurological, or substance use disorders, but will exclude those who do not pass a urine toxicology screen during either of the fMRI sessions to ensure that the neuroimaging data are as homogeneous and reliable as possible. We will also exclude individuals who meet any of the MRI contraindications described above (e.g., claustrophobic, pregnant).

Rationale for involvement of special vulnerable populations (children). Because the purpose of the proposed research in the parent grant is to study eating and weight change in adults as defined by state law, we will recruit children ages 18-20. The rationale is that their weight status confers cancer risk even at that young age.

Assignment to study group. The proposed research in the parent grant empirically tests a randomized, controlled trial of mediators and moderators of an eating and weight change intervention for adults who are at elevated risk for eating-related cancers. Therefore, we will randomly assign participants into three equal groups: behavioral training, cognitive training, or active control. Study groups are expected to be matched for age, sex, and SES.

Collaborating sites. All data will be collected at the University of Oregon. Parent grant Co-I Stice is located at the Oregon Research Institute, and his role in the study to oversee the delivery of the interventions, which take place at the University of Oregon. Dr. Stice will also provide a BodPod for the study, which will be re-located to the University of Oregon. Thus, all research activity involving human subjects takes place at the University of Oregon.

B. Sources of Materials

Research materials and data collected from human subjects. Data will be obtained from participants using questionnaires, physiological assessments (i.e., height, weight, body fat %), behavioral (task) sessions, and MRI scans. Data will be obtained solely for research purposes. *This project will also use functional neuroimaging data from 144 human subjects previously scanned in Dr. Berkman's lab.*

Access to identifiable private information. To protect individually identifiable private information, each participant will be assigned a numerical identifier. This numerical identifier will be attached to all data collected from participants, including questionnaires, behavioral task performance, MRI data, and biometric assessments. This numerical identifier will ensure the strictest participant confidentiality.

Collection, management, and protection of data. Dr. Berkman, who will match data to numerical identifiers, will maintain the list of numerical identifiers. Participants' numerical identifiers, names, phone numbers, body composition data, behavioral or MRI data, and survey responses will never all appear in the same file. To ensure the strictest participant confidentiality, electronically stored data will be password protected and paper data will be stored in locked file cabinets in the Dr. Berkman's office. Access to all data will be limited to the key investigators and the project coordinator for this study. Any data being analyzed will be stripped of identifying information. Only group-based analysis will be reported in publications, not information about individuals.

C. Potential Risks

Potential risks to subjects. The proposed research in the parent grant poses risk that is generally mild, and at most minimal, in severity. The safety of MRI has been evaluated during the past 20 years, and no short-term effects have been observed. However, the long-term effects of MRI on the body are not fully known. Individuals with claustrophobia may find the MRI equipment too confining, which may cause anxiety. The MRI scanner makes loud noises, which could be damaging to the ears if not protected with earplugs. In addition, a person cannot have an MRI if they have any metal in or near their brain. There are also possible risks for participants if metal is drawn to the magnet while a participant is within or near the bore. Accordingly, participants will be asked to leave all jewelry and metal objects outside of the scanning room, and no loose metal objects will be allowed near the magnet. We exercise careful safety procedures outlined by the LCNI and have never had an adverse event while performing more than 600 scans. Regarding surveys and behavioral tasks, participants may find some of the experimental tasks or questionnaires to be boring or difficult. There is also a slight risk that research records (e.g., surveys, MRI data) might be obtained by persons not authorized

to do so, though it is unlikely that our records will contain sensitive information, because participants with psychiatric disorders will be excluded at baseline.

Alternative treatments and procedures. There are no alternative treatments or procedures beyond those outlined in the parent grant. However, subjects are always reminded that they may stop their participation in the experiment at any time, with no adverse consequences.

2. Adequacy of Protection Against Risks

A. Recruitment and Informed Consent

Recruitment of subjects and process for obtaining informed consent. The primary recruitment tools will be advertisements placed in the Eugene/Springfield *Register-Guard* daily and the *Eugene Weekly* newspapers, on Craigslist, Google, and Facebook, in direct mail and email campaigns, radio stations, bus posters, and on flyers in and around the Eugene/Springfield area, including community centers, pools, churches, and libraries. Additional advertisement for this study may occur via ads placed in other newspapers (e.g., *The Oregonian*) or on online message boards. These methods have been used successfully in the past by the research team to recruit large and representative community samples including samples of overweight and obese individuals. Our minority recruitment plan is to post flyers in physical and online settings that involve high percentages of ethnic minority individuals. In addition, all recruitment posters will contain pictures of adults who are of ethnic minority. These procedures will enable us to recruit samples that are more ethnically diverse than the general population in our region. Eligibility will be determined using a telephone screening interview. This interview will be conducted by phone by the project manager after participants have received information about this study, have had a chance to ask any questions, and have expressed the desire to participate in the study, as detailed in the following section. Ethically and legally acceptable procedures will be followed for the identification and recruitment of participants. No form of coercion will be applied.

Circumstances under which consent will be sought and obtained. Participant consent will be solicited in a private setting during the participant's first visit to UO ("baseline") by a trained and certified member of the research team. Under no circumstances will coercion be applied to obtain informed consent, and participants will be thanked for their participation in the study and compensated on a prorated basis for their time regardless of whether they choose to continue in the research study. Potential participants will be given the opportunity to discuss their participation with family, friends, or other advisors prior to signing the consent form. If needed, all participants will be allowed to terminate their participation after giving consent but before completing the study.

B. Protections Against Risk

Procedures for protecting against or minimizing potential risks. We will minimize any discomfort associated with engagement in the study by informing participants about what to expect prior to participation. There are no known adverse effects resulting from exposure to MRI. The only known risk of MRI scanning is that of bringing metal objects into the scanner room or dislodging any implanted metal objects. To prevent this from occurring, participants are carefully screened prior to having an MRI scan. Participants with any history of surgery involving metal objects or implants are excluded from the study. Also, the MRI scanning procedure requires that the participant be as still as possible while lying in a small, partially enclosed space. Although the fMRI session will be about 90 minutes long, participants will be required to hold still only for periods of up to 9 minutes each. The other primary risk of MRI scanning is psychological, that is, fear of the unfamiliar MRI environment or annoyance with the loud noise. This can be mitigated by allowing the participants to become familiar with the scanner environment in our mock scanner suite before the actual MRI scan, and reducing noise by wearing earplugs. Participants may find some experimental tasks to be boring or difficult, but they will be given multiple breaks to ease fatigue. Participants will communicate with the MR technologist via an intercom system and may trigger an audible alarm at any time to stop the MR session if he or she is uncomfortable or anxious. In addition, all imaging center staff and the project manager will participate in safety training annually. All scans will be conducted with at least two team members present, an MRI technologist and a researcher, all of whom will have been MR safety-certified and extensively trained.

As part of informed consent procedures, participants will be advised that the MRI scans will not provide "diagnostic" results and that the MRI technicians at the LCNI are not medically trained and would not be able to provide a medical interpretation of the MRI data. They will also be advised that project staff would advise them if incidental or anomalous findings are discovered (Illes et al., 2004), encourage them to contact their primary care physician, and provide a report of the relevant findings. Specifically, if the MRI technician perceives a potentially concerning abnormality, the UO neuroimaging center policy (for all users) is as follows. Participants

will not be informed of potential abnormalities until these images are reviewed by a licensed clinical radiologist; potentially abnormal images will be sent for review via secure transmission to a radiologist at a partner hospital (UCLA Medical Center); the radiologist will inform LCNI staff of results; if positive results are found, participants will be contacted by the LCNI director, informed of the procedure and the finding, and advised to contact a medical professional.

As mentioned earlier, all personal information will be stored in locked file cabinets in Dr. Berkman's office, with access limited to the key investigators and the project coordinator for this study. All potential subjects will be assigned an ID number upon receipt of their contact information so that no personal identifiers will appear on any subsequent form, assessment, questionnaire, behavioral task, MRI scan, or text message. Access to the code linking the subject name to the identification number will be strictly limited to Dr. Berkman. All key investigators will complete the NIH Protection of Human Subjects: Computer-Based Training Program before any of the funded research activities begin.

3. Potential Benefits of the Proposed Research to Human Subjects and Others

Participants are not guaranteed to obtain any direct benefit from participation in this project (other than a picture of their brain, acquired during the MRI scan). However, participants assigned to any of the groups might experience reductions in desire for cancer-risk foods, increases in desire for healthy foods, and changes in body fat, along with associated reductions in cancer risk. All participants will be informed of study hypotheses upon completion of the study, so that all participants may benefit from the intervention arm that shows the greatest effect on eating and body composition, and at a minimum improve knowledge regarding the effect of our interventions on eating and weight, and their underlying mechanisms. Furthermore, by becoming involved in this project, participants will be contributing to the advancement of translational neuroscientific research for cancer risk reduction. Also, the MRI scan may reveal an undiagnosed problem that would be beneficial for the participant to know about. As described earlier, if the MRI technician perceives a potentially concerning abnormality, the UO neuroimaging center policy (for all users) is to refer those cases to a neuroradiologist for review. If the findings are determined to have clinical significance, the participant will be notified by the UO neuroimaging center.

4. Importance of the Knowledge to Be Gained

This study will greatly advance scientific understanding of the mechanisms and moderators of interventions to change eating patterns and reduce weight. There is robust evidence that behavioral and cognitive interventions can change food intake and/or weight, but those changes are not durable. An impediment to making progress in improving the interventions is that their underlying mechanisms are unknown. Thus, establishing the mechanisms of these interventions will ultimately allow scientists to make them more effective. Additionally, detailed knowledge about the individual difference moderators of treatment effectiveness will allow treatment providers to triage at-risk individuals to one intervention or another that may be more effective for a given person or group based on a personalized profile that is known to respond to particular treatment mechanisms. Furthermore, better knowledge about how interventions operate will enable the development of more efficient interventions that could targeted the specified system while using fewer resources than interventions that are currently available.

INCLUSION OF WOMEN AND MINORITIES

For Aim 1, existing data from our lab will be used. The cumulative enrollment is reported in the Inclusion Enrollment Report for Aim 1. For Aim 2, enrollment will be based on the data from the first 100 participants that have completed the intervention in the parent grant. The target population of the parent grant will consist of 330 individuals between ages 18 and 60 and will be equally balanced between males and females. Participants will be recruited for the parent grant without exclusion based on gender, race, or ethnicity. Thus, the subject population is anticipated to reflect the percentages in the local population of Eugene, Oregon (Lane County) with regard to gender, race, and ethnicity, as indicated in the Planned Enrollment Report. According to the 2010 census, Eugene is 7.8% Hispanic/Latino, 1% American Indian/Alaskan Native, 4% Asian, 0.2% Native Hawaiian/Pacific Islander, 1.4% African American, and 85.8% Caucasian. We have taken this demographic information into account when creating our Inclusion Enrollment Report for Aim 2. We will oversample the Hispanic/Latino, Asian, Native American/Alaskan Native, African American, and Native Hawaiian/Pacific Islander populations so as to collect data from a more diverse sample of participants. This oversampling is reflected in the Inclusion Enrollment Report for Aim 2.

PHS Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

OMB Number:0925-0001 and 0925-0002
Expiration Date: 10/31/2018

***Study Title:** Cancer prevention through dietary change: Training in translational neuroimaging (Aim 1)

***Delayed Onset Study?** ❑ Yes ☑ No

If study is not delayed onset, the following selections are required:

Enrollment Type ❑ Planned ☑ Cumulative (Actual)

Using an Existing Dataset or Resource ☑ Yes ❑ No

Enrollment Location ☑ Domestic ❑ Foreign

Clinical Trial ❑ Yes ☑ No

NIH-Defined Phase III Clinical Trial ❑ Yes ☑ No

Comments:

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/Alaska Native	1	0	0	0	0	0	0	0	0	1
Asian	7	1	0	0	0	0	0	0	0	8
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	0
Black or African American	2	1	0	0	0	0	0	0	0	3
White	87	26	1	8	3	0	0	0	0	125
More than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	0	0	0	0	0	5	2	0	7
Total	97	28	1	8	3	0	5	2	0	144

PHS Inclusion Enrollment Report

This report format should NOT be used for collecting data from study participants.

OMB Number:0925-0001 and 0925-0002
Expiration Date: 10/31/2018

***Study Title:** Cancer prevention through dietary change: Training in translational neuroimaging (Aim 2)

***Delayed Onset Study?** ❑ Yes ☑ No

If study is not delayed onset, the following selections are required:

Enrollment Type ☑ Planned ❑ Cumulative (Actual)

Using an Existing Dataset or Resource ❑ Yes ☑ No

Enrollment Location ☑ Domestic ❑ Foreign

Clinical Trial ❑ Yes ☑ No

NIH-Defined Phase III Clinical Trial ❑ Yes ☑ No

Comments: This enrollment plan for the present proposal is based on the planned enrollment report for the parent grant R01 CA211224, which is a clinical trial. The present project proposal includes secondary data analysis using data collected from the first 100 subjects in the parent grant.

Racial Categories	Ethnic Categories									Total
	Not Hispanic or Latino			Hispanic or Latino			Unknown/Not Reported Ethnicity			
	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	Female	Male	Unknown/ Not Reported	
American Indian/Alaska Native	1	1		0	0					2
Asian	3	3		0	0					6
Native Hawaiian or Other Pacific Islander	1	1		0	0					2
Black or African American	3	3		1	1					8
White	34	34		3	3					74
More than One Race	3	3		1	1					8
Unknown or Not Reported										
Total	45	45		5	5					100

Report 2 of 2

Funding Opportunity Number: PA-16-309. Received Date: 2017-12-07T14:04:28.000-05:00

INCLUSION OF CHILDREN

In accordance with the parent grant for this proposal, participants are adults, aged 18-60, who have BMIs in the 25-35 range. Children aged 18-20 will be included in the sample, but are considered legal adults in the state of Oregon. They will provide informed consent using procedures approved by our institutional ethics board.

SUMMARY STATEMENT

PROGRAM CONTACT:
Susan Perkins
240-276-5630
perkinsu@mail.nih.gov

(Privileged Communication)

Release Date: **03/28/2018**
Revised Date:

Application Number: **1 F31 CA232357-01**

COSME,DANIELLE
UNIVERSITY OF OREGON
1227 University of Oregon
Eugene, OR 974031227

Review Group:	**ZRG1 F16-L (20)** **Center for Scientific Review Special Emphasis Panel** **Fellowships: Risk, Prevention and Health Behavior**		
Meeting Date:	**03/05/2018**		
Council:	**MAY 2018**	***PCC:***	**S9TR**
Requested Start:	**07/01/2018**	***Dual PCC:***	**RAJ DUAL**
		Dual IC(s):	**DK, EB**
Project Title:	**Cancer prevention through dietary change: Training in translational neuroimaging**		
			***Requested*: 3 Years**
Sponsor:	**Berkman, Elliot T**		
Department:	**Psychology**		
Organization:	**UNIVERSITY OF OREGON**		
City, State:	**EUGENE OREGON**		
SRG Action:	**++**		
Next Steps:	**Visit https://grants.nih.gov/grants/next_steps.htm**		
Human Subjects:	**30-Human subjects involved - Certified, no SRG concerns**		
Animal Subjects:	**10-No live vertebrate animals involved for competing appl.**		

++NOTE TO APPLICANT: Members of the Scientific Review Group (SRG) were asked to identify those applications with the highest scientific merit, generally the top half. Written comments, criterion scores, and preliminary impact scores were submitted by the assigned reviewers prior to the SRG meeting. At the meeting, the more meritorious applications were discussed and given final impact scores; by concurrence of the full SRG, the remaining applications, including this application, were not discussed or scored. The reviewers' comments (largely unedited by NIH staff) and criterion scores for this application are provided below. Because applications deemed by the SRG to have the highest scientific merit generally are considered for funding first, it is highly unlikely that an application with an ND recommendation will be funded. Each applicant should read the written critiques carefully and, if there are questions about the review or future options for the project, discuss them with the Program Contact listed above.

1F31CA232357-01 Cosme, Danielle

DESCRIPTION (provided by applicant): Unhealthy eating increases the risk of developing several kinds of cancer. This occurs directly through consumption of carcinogenic food, and indirectly through overweight and obesity. Because nearly 70% of American adults are overweight or obese, it is critical that we develop effective interventions to alter eating behavior. One key factor that influences eating behavior and weight gain is cue-induced food craving. Craving stimulates appetitive motivation to eat, but can be regulated via cognitive strategies such as reappraisal, or the reconstrual of a stimulus to change its affective meaning. Reappraisal increases the salience of consumption- related costs and reduces food craving for, and the reward value of, unhealthy food. Craving reappraisal is therefore a promising target for interventions designed to reduce unhealthy eating and risk for diet-related cancers. However, individual differences in treatment efficacy remain a persistent problem with interventions. To understand why an intervention works for some individuals and not for others requires clearly defined neurobiological mechanisms of change, as well as sensitive and specific tools to evaluate individual differences in psychological targets. To fill this gap, the goal of this project is to leverage machine learning and multivariate neuroimaging methods to develop and validate a sensitive and specific neural signature of craving reappraisal that can be used as a neurobiological index of craving reappraisal ability. To achieve this goal, this project will pursue the following Aims: 1) develop a neural signature of craving reappraisal in an independent sample of existing data, and 2) validate the neural signature in the context of an ongoing randomized control trial of cognitive reappraisal training to reduce unhealthy eating in overweight and obese adults. Specifically, I will test the reliability and construct validity of the neural signature by assessing the extent to which the cognitive reappraisal training produces changes in the neural signature of craving reappraisal (Aim 2A). I will also test the predictive and incremental validity of the neural signature by assessing the extent to which individual differences the neural signature change predict intervention outcomes, such as the value of unhealthy food and eating behavior (Aim 2B). Upon completion of this project, I will have developed and validated a neurobiological index of craving reappraisal ability that is sensitive and specific, and can be readily used by other researchers to evaluate intervention efficacy and individual differences in responsivity to treatment. I will also receive in-depth training in translational neuroscience interventions and multivariate neuroimaging and machine learning. This work will facilitate the refinement of reappraisal-based interventions to reduce unhealthy eating that will ultimately reduce the prevalence of overweight and obesity and risk for diet-related cancers. Further, by documenting my analysis process and sharing my analysis code, the results of this work can readily be adopted by others to study a variety of psychological processes relevant to eating behavior and cancer risk.

PUBLIC HEALTH RELEVANCE: Cognitive reappraisal can be used to reduce food craving and unhealthy eating (a key risk factor for several kinds of cancer), but interventions to train reappraisal ability are not equally effective for all individuals. This project aims to leverage multivariate neuroimaging and machine learning techniques to develop an objective, neurobiological index of craving reappraisal ability that can be used to assess individual differences in treatment responsivity. The knowledge and research training gained from this project will prepare the trainee to build and refine interventions to reduce unhealthy eating that will ultimately reduce the prevalence of overweight and obesity, and risk for diet-related cancers.

CRITIQUE 1

Fellowship Applicant: 5
Sponsors, Collaborators, and Consultants: 3
Research Training Plan: 3
Training Potential: 2
Institutional Environment & Commitment to Training: 2

Overall Impact/Merit: In this F31 pre-doctoral fellowship application, the PI proposes to use data from her Sponsor's R01 award to develop machine learning and multivariate neuroimaging methods to obtain a neural signature of craving reappraisal in a validation sample of 96 overweight and obese (BMI = 25-35) adults (aged 18-60 years), and then test this model on a hold-out sample of 48 overweight and obese adults. Because the parent grant is not addressing multivariate models of craving reappraisal, the present project is novel. Because obesity is correlated with an increased risk in certain types of cancer, the present project also has a potential public health component—especially if the baseline multivariate activation pattern differs across people for which the craving reappraisal intervention works versus for those in which it does not work. In this case, the multivariate activation pattern at baseline could be used to select participants that are more likely to benefit from the intervention. There is much to like in this novel and potentially important proposal. However, there are also a few concerns. First, it appears that all of the participants will be overweight and obese (and the PI does not address whether these two groups are at the same risk for cancer—certainly obese individuals have a higher risk for early death than overweight individuals). It would be useful to have normal-weight control (unless overweight and obese individuals can be compared). Second, the PI emphasizes the comparison of the cognitive reappraisal group to the active control group (both groups have inhibitory control training, but the active control intervention does not involve food), but it appears that the more important comparison is between "look" versus "regulate" conditions. It appears that the "look" condition is assumed to index food arousal (perhaps subcortical reward circuit), but the "regulate" condition is designed to index inhibitory control. It would seem, then, that the key issue for assessing the construct validity of the multivariate neural signature is to compare "look" and "regulate" rather than a comparison of two type of inhibitory control interventions. Note that this latter concern is easily addressed by different analyses of existing data.

1. Fellowship Applicant:

Strengths

- The applicant has one publication and several papers in the pipeline (including two papers under revision at quality journals).
- The applicant has a solid background in cognitive reappraisal research and fMRI methods.

Weaknesses

- This proposal involves both arousal/activation and inhibition/regulation components related to ventral and dorsal attentional streams that the University of Oregon has considerable expertise. Perhaps it would be useful to add a consultant to the project with expertise on attention.

2. Sponsors, Collaborators, and Consultants:

Strengths

- Drs. Berkman (behavioral approaches to cancer prevention and translation neuroscience) and Zeithamova (multivariate functional neuroimaging methods and machine learning) form the potential for a good sponsorship team on this project designed to develop the multivariate "neural signature" of craving reappraisal.

Weaknesses

- Perhaps an attention and executive function consultant would be helpful.

3. Research Training Plan:

Strengths

- Attempting to develop a model of the multivariate neural signature of craving appraisal using fMRI methods and 144 (96 validation sample and 48 hold-out sample) participants is a strength.
- Attempting to establish the reliability and construct validity of the craving reappraisal multivariate neural signature by assessing its temporal stability and evaluating the degree to which a novel cognitive reappraisal training intervention produces changes in this neurobiological index is a strength.
- Establishing the predictive validity of the craving reappraisal multivariate neural signature by determining the extent to which individual differences in neurobiological index change predict intervention outcomes is a strength.

Weaknesses

- It is quite likely that overweight and obese individuals have either higher “look” activation or lower “regulate” activation than normal-weight individuals (at least, this is an important issue to measure), yet there is apparently no normal-weight control group.
- The PI does not discuss how she will analyze the “look” versus “regulate” data (just the craving reappraisal versus active control groups). All 96 participants in the validation sample will have both “look” and “regulate” trials, but the sample is halved with regard to the two groups. In particular, the construct validity of the multivariate neural signature would appear to require that a greater change occurred for the “regulate” than for the “look” condition after training than at baseline.
- The SEM growth-curve models are ambitious, but may be limited by smaller samples sizes.

4. Training Potential:

Strengths

- The proposed training agenda for professional development and mentored collaborative research training is solid.

Weaknesses

- No real weaknesses.

5. Institutional Environment & Commitment to Training:

Strengths

- There appears to be an institutional commitment to the PI at The University of Oregon.

Weaknesses

- No real weaknesses.

Protections for Human Subjects:

Not Applicable (No Human Subjects)

- Risks to the subjects, adequacy of protection against risks, potential benefits of the proposed research to the subjects and others, and the importance of the knowledge gained are all discussed.

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Not Applicable (No Clinical Trials)

Inclusion of Women, Minorities and Children:

- Sex/Gender: Distribution justified scientifically
- Race/Ethnicity: Distribution justified scientifically
- Inclusion/Exclusion of Children under 18: Distribution justified scientifically
- Half of the sample will consist of females, race/ethnicity are balanced based upon regional distribution, and individuals aged 18-21 are included.

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Training in the Responsible Conduct of Research:

Comments on Format (Required):

- The format of training for the responsible conduct of research is acceptable.

Comments on Subject Matter (Required):

- The subject matter is acceptable.

Comments on Faculty Participation (Required):

- Faculty participation is not adequately discussed.

Comments on Duration (Required):

- The duration of training is appropriate.

Comments on Frequency (Required):

- The frequency of training is not adequately discussed.

Resource Sharing Plans:

Acceptable

- A resource-sharing plan is included.

Budget and Period of Support:

Recommend as Requested

CRITIQUE 2

Fellowship Applicant: 4
Sponsors, Collaborators, and Consultants: 3
Research Training Plan: 3
Training Potential: 4
Institutional Environment & Commitment to Training: 4

Overall Impact/Merit: This is a two-year F31 application from a PhD student in psychology at the University of Oregon.

The goal of this project is to leverage machine learning and multivariate neuroimaging methods to develop and validate a sensitive and specific neural signature of craving reappraisal that can be used as a neurobiological index of craving reappraisal ability. To achieve this goal, this project will pursue the following Aims: 1) develop a neural signature of craving reappraisal in an independent sample of existing data, and 2) validate the neural signature in the context of an ongoing randomized control trial of cognitive reappraisal training to reduce unhealthy eating in overweight and obese adults. Training goals are to develop expertise in 1) translational neuroscience, 2) multivariate neuroimaging and machine learning techniques, and 3) open and reproducible neuroscience. Overall, the applicant has a strong research track record, has strong NIH-funded mentors, and a strong research project. However, public health implications could be improved. In addition, it is surprising the training goals do not include a clinical aspect to the training in order to get exposure to the translational side of the research project.

1. Fellowship Applicant:

Strengths

- Academic track record average; struggled in undergrad.
- Strong prior experience in research.

Weaknesses

- Below average publications, with no first author publication, a couple under review, and mostly presentations.

2. Sponsors, Collaborators, and Consultants:

Strengths

- Team of mentors is well-published.
- Excellent mentor track record with receiving NIH funding.
- Secondary mentor (Zeithamova) had an F32 award, which will be useful in helping the applicant make progress in her F31.

Weaknesses

- Although well-published and well-funded, the mentoring team is not interdisciplinary. Would be good to have an expert in obesity or nutrition research. This may help with the weakness of the application with not having public health implications.

3. Research Training Plan:

Strengths

- Weight and weight-related problems are important public health issues.
- Using a pre-existing data set with strong measures (e.g., fMRI, biological measures, food valuation task).
- Well thought out aims with high potential yield for other researchers.

Weaknesses

- Not a diverse sample (basically all white).
- Public health implications resulting from this project are underdeveloped. This is important given one of the outcomes to be addressed is obesity. Intervention implications would be an important aim of the current study to make this study more impactful.

- It is somewhat surprising that there is not a clinical element to the training plan, which would also improve the translational nature of the study findings.

4. Training Potential:

Strengths

- Has a strong research background.
- Has a strong mentoring team.
- Team has worked together in the past.

Weaknesses

- Research study design is somewhat ambitious.

5. Institutional Environment & Commitment to Training:

Strengths

- Appears the University has good research capacity.

Weaknesses

- Not clear if this University has resources for F31 scholars to make the most of the award; resources not well described.

Protections for Human Subjects:

Acceptable Risks and Adequate Protections

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Not Applicable (No Clinical Trials)

Inclusion of Women, Minorities and Children:

- Sex/Gender: Distribution justified scientifically
- Race/Ethnicity: Distribution not justified scientifically
- For NIH-Defined Phase III trials, Plans for valid design and analysis: Not applicable
- Inclusion/Exclusion of Children under 18: Excluding ages <18; justified scientifically

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Training in the Responsible Conduct of Research:

Unacceptable

Comments on Format (Required):

- Only proposes informal training.

Comments on Subject Matter (Required):

- RCR issues will be talked about at team meetings as needed--no guarantee these issues will come up.

Comments on Faculty Participation (Required):

- Mentoring team faculty are mentioned as being involved with the informal trainings.

Comments on Duration (Required):

- Ongoing for the duration of the 2-year F31 award.

Comments on Frequency (Required):

- Informal training is on a weekly basis.

Resource Sharing Plans:

Acceptable

Budget and Period of Support:

Recommend as Requested

CRITIQUE 3

Fellowship Applicant: 4
Sponsors, Collaborators, and Consultants: 5
Research Training Plan: 6
Training Potential: 6
Institutional Environment & Commitment to Training: 3

Overall Impact/Merit: This F31 application seeks 3-years of funding to support Ms. Cosme's investigation of neuroimaging techniques designed to assess neural signatures of food cravings, engineer reappraisal of such cues, and determine the extent to which such changes influence intervention outcomes. Of particular interest to the applicant is the application of cue reappraisal informed by neural signature to the prevention of diet-related cancers. The applicant is an early-stage doctoral student with a publication record reflective of her junior status. However, she has a strong foundation in statistics including open-source programming that will serve her well given her training plan. However, since Ms. Cosme intends to build a career around appetitive self-regulation and cancer research, it will be in her best interest to include coursework and/or additional mentoring around nutrition, health psychology, and psychoneuroimmunology. The sponsors are well-poised to address the methodological aspects of this project and have a history of collaboration. They are both relatively early career, though, and it is unclear as to whether they will have the financial means to help support the applicant should additional financial concerns arise. The overall methodology of the study is sound and should provide the applicant with the statistical and operational training she requires. The incorporation of the food valuation task is interesting and novel.

Of primary concern, overall, with this application, is its focus on methodology with seemingly little attention paid to the phenomenon of diet, appetite, and eating behaviors. There is no discussion of the implication of the addictive quality of sugar and other non-plant-based carbohydrates. Moreover, some of the support for the basis of the study (e.g., the implied relationship between red meat and fat and cancer, the role of energy imbalance in the development of cancers) is outdated. There is clear support for the role of charred and carcinogenic red meat (but not red meat, in general) as well as sugar in certain cancers. In addition, a high-fat ketogenic diet is often the treatment of choice for certain types of

cancers. There is also no discussion of the roles of appetite regulators such as ghrelin, leptin, or PYY on neural signatures. Such a lack of specificity and accounting for recent dietary research is cause for concern over this application and Ms. Cosme's training.

Finally, the RCR plan is very nonspecific with the bulk of discussion pertaining to previous training. The plan for the next three years was underdeveloped.

Protections for Human Subjects:

Acceptable Risks and Adequate Protections

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Inclusion of Women, Minorities and Children:

- Sex/Gender: Distribution justified scientifically
- Race/Ethnicity: Distribution justified scientifically
- For NIH-Defined Phase III trials, Plans for valid design and analysis:
- Inclusion/Exclusion of Children under 18: Excluding ages <18; justified scientifically

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Training in the Responsible Conduct of Research:

Unacceptable

Comments on Format (Required):

- weak

Comments on Subject Matter (Required):

- undefined

Comments on Faculty Participation (Required):

- undefined

Comments on Duration (Required):

- undefined

Comments on Frequency (Required):

- undefined

Budget and Period of Support:

Recommended as Requested

NIH has modified its policy regarding the receipt of resubmissions (amended applications). See Guide Notice NOT-OD-14-074 at http://grants.nih.gov/grants/guide/notice-files/NOT-OD-14-074.html. The impact/priority score is calculated after discussion of an application by averaging the overall scores (1-9) given by all voting reviewers on the committee and multiplying by 10. The criterion scores are submitted prior to the meeting by the individual reviewers assigned to an application, and are not discussed specifically at the review meeting or calculated into the overall impact score. Some applications also receive a percentile ranking. For details on the review process, see http://grants.nih.gov/grants/peer_review_process.htm#scoring.

MEETING ROSTER

Center for Scientific Review Special Emphasis Panel
CENTER FOR SCIENTIFIC REVIEW
Fellowships: Risk, Prevention and Health Behavior
ZRG1 F16-L (20)
03/05/2018 - 03/06/2018

Notice of NIH Policy to All Applicants: Meeting rosters are provided for information purposes only. Applicant investigators and institutional officials must not communicate directly with study section members about an application before or after the review. Failure to observe this policy will create a serious breach of integrity in the peer review process, and may lead to actions outlined in NOT-OD-14-073 at https://grants.nih.gov/grants/guide/notice-files/NOT-OD-14-073.html and NOT-OD-15-106 at https://grants.nih.gov/grants/guide/notice-files/NOT-OD-15-106.html, including removal of the application from immediate review.

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