

## APPLICATION FOR FEDERAL ASSISTANCE

## SF 424 (R&amp;R)

3. DATE RECEIVED BY STATE		State Application Identifier
1. TYPE OF SUBMISSION*		4.a. Federal Identifier CA232357
<input type="radio"/> Pre-application <input checked="" type="radio"/> Application <input type="radio"/> Changed/Corrected Application		b. Agency Routing Number
2. DATE SUBMITTED	Application Identifier 26691 Cosme	c. Previous Grants.gov Tracking Number
<b>5. APPLICANT INFORMATION</b> <span style="float: right;">Organizational DUNS*: 0792896260000</span>		
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: Ms.      First Name*: Stephanie      Middle Name:      Last Name*: Gray      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)*		1464727800A1
7. TYPE OF APPLICANT*		H: Public/State Controlled Institution of Higher Education
Other (Specify): <input checked="" type="radio"/> Small Business Organization Type <input type="radio"/> Women Owned <input type="radio"/> Socially and Economically Disadvantaged		
8. TYPE OF APPLICATION*		If Revision, mark appropriate box(es).
<input type="radio"/> New <input checked="" type="radio"/> Resubmission <input type="radio"/> Renewal <input type="radio"/> Continuation <input type="radio"/> Revision		<input type="radio"/> A. Increase Award <input type="radio"/> B. Decrease Award <input type="radio"/> C. Increase Duration <input type="radio"/> D. Decrease Duration <input type="radio"/> E. Other (specify) :
Is this application being submitted to other agencies?* <input type="radio"/> Yes <input checked="" type="radio"/> 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* 04/01/2019      03/31/2021		13. CONGRESSIONAL DISTRICTS OF APPLICANT OR-004

**SF 424 (R&R)** APPLICATION FOR FEDERAL ASSISTANCE**Page 2****14. PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR CONTACT INFORMATION**

Prefix: First Name\*: Danielle Middle Name: Last Name\*: Cosme Suffix:

Position/Title: Graduate Student

Organization Name\*: UNIVERSITY OF OREGON

Department: Psychology

Division: College of Arts and Sciences

Street1\*: Department of Psychology

Street2: 1227 University of Oregon

City\*: Eugene

County: Lane

State\*: OR: Oregon

Province:

Country\*: USA: UNITED STATES

ZIP / Postal Code\*: 974031227

Phone Number\*: [REDACTED] Fax Number: Email\*: dcosme@uoregon.edu

**15. ESTIMATED PROJECT FUNDING**

a. Total Federal Funds Requested\* \$114,960.00

b. Total Non-Federal Funds\* \$0.00

c. Total Federal & Non-Federal Funds\* \$114,960.00

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. SFLL or OTHER EXPLANATORY DOCUMENTATION**

File Name:

**19. AUTHORIZED REPRESENTATIVE**

Prefix: Dr. First Name\*: David Middle Name: O. 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\*: 1227 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\***

Completed on submission to Grants.gov

**Date Signed\***

07/09/2018

**20. PRE-APPLICATION** File Name:**21. COVER LETTER ATTACHMENT** File Name: CoverLetter.pdf

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**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\*: 974035219  
Project/Performance Site Congressional District\*: OR-004

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**Additional Location(s)**

File Name:

## RESEARCH &amp; RELATED Other Project Information

<b>1. Are Human Subjects Involved?*</b> <input checked="" type="radio"/> <b>Yes</b> <input type="radio"/> <b>No</b>	
1.a. If YES to Human Subjects Is the Project Exempt from Federal regulations? <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b> If YES, check appropriate exemption number:      — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 If NO, is the IRB review Pending? <input checked="" type="radio"/> <b>Yes</b> <input type="radio"/> <b>No</b> IRB Approval Date: Human Subject Assurance Number      00005914	
<b>2. Are Vertebrate Animals Used?*</b> <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	
2.a. If YES to Vertebrate Animals Is the IACUC review Pending? <input type="radio"/> <b>Yes</b> <input type="radio"/> <b>No</b> IACUC Approval Date: Animal Welfare Assurance Number	
<b>3. Is proprietary/privileged information included in the application?*</b> <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	
<b>4.a. Does this project have an actual or potential impact - positive or negative - on the environment?*</b> <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	
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? <input type="radio"/> <b>Yes</b> <input type="radio"/> <b>No</b> 4.d. If yes, please explain:	
<b>5. Is the research performance site designated, or eligible to be designated, as a historic place?*</b> <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	
5.a. If yes, please explain:	
<b>6. Does this project involve activities outside the United States or partnership with international collaborators?*</b> <input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>	
6.a. If yes, identify countries: 6.b. Optional Explanation:	
<b>7. Project Summary/Abstract*</b>	Filename ProjectSummaryAbstract.pdf
<b>8. Project Narrative*</b>	ProjectNarrative.pdf
<b>9. Bibliography &amp; References Cited</b>	BibliographyReferencesCited.pdf
<b>10. Facilities &amp; Other Resources</b>	FacilitiesOtherResources.pdf
<b>11. Equipment</b>	Equipment.pdf

## 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 to 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 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 and validate a neural signature of craving reappraisal in an independent sample of existing data, and 2) establish the predictive and incremental validity 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, after development, I will test the construct validity of the neural signature by assessing whether expression of the signature is greater while participants reappraise their desire for craved food than while they simply view these foods (Aim 1). 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, above and beyond standard methods (Aim 2). Upon completion of this project, I will have developed and validated a sensitive and specific neurobiological index of craving reappraisal ability that 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 for cancer control, 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.

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## 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.

### Scientific Environment

The UO provides strong support for synergistic and multidisciplinary collaborations across departments, research centers, and institutes, and the Lewis Center for Neuroimaging. The UO Lewis Integrative Science Building also houses several UO strategic interdisciplinary research clusters focused on research across the spectrum of cellular processes to improving communities. The UO 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.

**Center for Translational Neuroscience (CTN).** The CTN, of which Dr. Berkman is Associate Director, is an interdisciplinary research center with the mission of translating discoveries in basic neuroscience, psychology, and related disciplines to improve well-being, promote resilience, and mitigate the effects of early adverse experiences on physical and emotional health. The CTN houses research projects, science communication initiatives, professional development, and intervention program development, implementation, and evaluation activities. The primary leadership of CTN are faculty in the Department of Psychology, where CTN is housed, and affiliated faculty work in departments across the university including biology, human physiology, and counseling psychology. In addition to faculty, CTN is home to numerous postdoctoral research associates, masters and doctoral graduate students, undergraduate research assistants, and University of Oregon employees. *Particularly relevant to the current proposal* are the training opportunities afforded by the CTN. The CTN offers a suite of professional development opportunities related to translational science, including science communication and knowledge dissemination workshops, grant writing seminars, a bi-weekly scientific discussion brownbag, a methods and data science discussion group, as well as a range of one-on-one and team mentorship programs to cross-train students with basic psychological science and neuroscience knowledge in clinical and intervention science, and vice versa.

**Department of Psychology.** 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.

**Health Promotion and Obesity Prevention Initiative.** The UO is home to a unique cluster of faculty, including consultant Dr. Kelly, that were hired as part of the Health Promotion and Obesity Prevention (HPOP) initiative. Building on the strong tradition of prevention science at the UO, this initiative seeks to bring together

faculty from diverse fields to combat the obesity epidemic. The goal of this initiative is to leverage basic research in the biological and social sciences to understand the etiology and underlying mechanisms of obesity and develop effective interventions and outreach programs to prevent and mitigate associated negative health outcomes. *This initiative provides expertise and opportunities, such as reading groups, colloquia, and graduate seminars, that are highly relevant to the current proposal.*

### 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 2<sup>nd</sup> floor of LISB, directly above the LCNI. Dr. Zeithamova's office and lab space are also on the 2<sup>nd</sup> 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 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.

## **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

## RESEARCH &amp; RELATED Senior/Key Person Profile (Expanded)

PROFILE - Project Director/Principal Investigator				
Prefix:	First Name*: Danielle	Middle Name	Last Name*: Cosme	Suffix:
Position/Title*:	Graduate Student			
Organization Name*:	UNIVERSITY OF OREGON			
Department:	Psychology			
Division:	College of Arts and Sciences			
Street1*:	Department of Psychology			
Street2:	1227 University of Oregon			
City*:	Eugene			
County:	Lane			
State*:	OR: Oregon			
Province:				
Country*:	USA: UNITED STATES			
Zip / Postal Code*:	974031227			
Phone Number*:	[REDACTED]		Fax Number:	
E-Mail*: dcosme@uoregon.edu				
Credential, e.g., agency login: DCOSME16				
Project Role*: PD/PI			Other Project Role Category:	
Degree Type: PHD,MS,MS,BS			Degree Year: 2021,2015,2016,2009	
Attach Biographical Sketch*:	File Name:	Biosketch.pdf		
Attach Current & Pending Support:	File Name:			

PROFILE - Senior/Key Person				
Prefix:	First Name*: Elliot	Middle Name Todd	Last Name*: Berkman	Suffix: Ph.D
Position/Title*:	Associate Professor			
Organization Name*:	University of Oregon			
Department:	Psychology			
Division:	College of Arts and Sciences			
Street1*:	Department of Psychology			
Street2:	1227 University of Oregon			
City*:	Eugene			
County:	Lane			
State*:	OR: Oregon			
Province:				
Country*:	USA: UNITED STATES			
Zip / Postal Code*:	974031227			
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,MA,BA,BS		Degree Year: 2010,2004,2005,2002,2002		
Attach Biographical Sketch*:		File Name:	Berkman_biosketch.080118.pdf	
Attach Current & Pending Support:		File Name:		

PROFILE - Senior/Key Person				
Prefix:	First Name*: Dagmar	Middle Name	Last Name*: Zeithamova	Suffix: Ph.D
Position/Title*:	Assistant Professor			
Organization Name*:	University of Oregon			
Department:	Psychology			
Division:	College of Arts and Sciences			
Street1*:	1227 University			
Street2:				
City*:	Eugene			
County:	Lane			
State*:	OR: Oregon			
Province:				
Country*:	USA: UNITED STATES			
Zip / Postal Code*:	974031227			
Phone Number*: (541)3466731		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: 2008,2003		
Attach Biographical Sketch*:		File Name:	Zeithamova_bio_Dani_080118.pdf	
Attach Current & Pending Support:		File Name:		



**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 skill set 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, 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, 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 various 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<sup>1</sup>. 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<sup>2</sup>.

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 work resulted in a first author publication<sup>3</sup>. 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<sup>4</sup>. I

have also begun to develop and test competing models of food-related decision making to better understand the neural mechanisms underlying eating behavior<sup>5</sup>. 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. (2018). Choosing to regulate: Does choice enhance craving regulation?. *Social Cognitive and Affective Neuroscience*, 13(3), 300-309.
4. PI Pfeifer J. H. (2017) Choosing to Regulate: An fMRI Investigation of Autonomous Versus Controlled Self-Regulation and Substance Use in Late Adolescence. NIDA (R21DA043015).
5. Giuliani, N. R., Merchant, J. S., **Cosme, D.**, & Berkman, E. T. (2018). Neural predictors of eating behavior and dietary change. *Annals of the New York Academy of Sciences*.

## 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 Society
2017-2018	Vice President of Organizing, Graduate Teaching Fellows Federation
2018	Co-Chair, Brainhack Global Hackathon

### 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
2018	Beverly Fagot Dissertation Fellowship, 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<sup>a</sup> and I presented these findings as an invited speaker at Stockholm University<sup>b</sup>, as well as at several poster sessions<sup>c</sup>.
  - 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 adolescence. Further, these developmental effects are often subtle and not well-powered using traditional analytic methods. Because of this, I helped develop an innovative analysis technique to probe developmental effects across the whole brain while increasing power. We used a standardized parcellation atlas to divide the brain into 350 regions of interest (ROIs) rather than 70,000 voxels (volumetric pixels), 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 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<sup>b</sup>. 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<sup>c</sup> as well as at a poster sessions. We are currently preparing the manuscript for publication and expect to submit in fall 2018.
  - a) Telzer, E. H., McCormick, E. M., Peters, S., **Cosme, D.**, Pfeifer, J. H., & van Duijvenvoorde, A. C. (2018). Methodological considerations for developmental longitudinal fMRI research. *Developmental cognitive neuroscience*.
  - b) **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.
  - 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.
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 the strong theoretical prediction that choice should facilitate regulation, we observed the opposite effect; choice 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. I am the first author on the manuscript<sup>a</sup> and have presented this work as an invited speaker<sup>b</sup>, as well as at various poster sessions<sup>c</sup>.

- a) **Cosme, D.**, Mobasser, A., Zeithamova, D., Berkman, E. T., & Pfeifer, J. H. (2018). Choosing to regulate: Does choice enhance craving regulation?. *Social Cognitive and Affective Neuroscience*, 13(3), 300-309.
- b) **Cosme, D.** (2015) Choosing to regulate: Autonomy alters neural responses during craving regulation. Seminar presented at Stockholm University's Gösta Ekman Lab, 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.

#### 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 successful grant application to conduct this study in a well-powered sample, funded by the National Institute on Drug Abuse<sup>a</sup>. I am also first author on a manuscript in press at the *Journal of Health Psychology* that extends this work beyond college freshman to discusses ways in which autonomy might facilitate the self-regulation of emotion across the lifespan, both in healthy adults as well as in adults with cancer<sup>c</sup>.

- a) PI Pfeifer J. H. (2017) Choosing to Regulate: An fMRI Investigation of Autonomous Versus Controlled Self-Regulation and Substance Use in Late Adolescence. NIDA (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.
- c) **Cosme, D.**, & Berkman, E. T. (In Press) Autonomy can support affect regulation during illness and in health. *Journal of Health Psychology*.

#### 5. **Eating behavior and reactivity, regulation, and valuation.** A strong understanding of the mechanisms underlying eating behavior is required to develop effective interventions to improve dietary habits and reduce the prevalence of overweight and obesity. My colleagues and I have put forth a neuroscience-informed model that focuses on the interplay between three key psychological processes—cue reactivity, self-regulation, and valuation<sup>a</sup> in food-related decision making. In contrast to predominant dual-systems models of food choice, which emphasize the antagonistic relationship between reactivity and regulation, our model posits that subjective value plays a critical role in reactivity and regulation during decision making. Along with my colleagues, I am currently testing this model in the context of an ecologically valid food decision making paradigm in which participants place monetary bids on healthy and unhealthy foods. We extracted estimates of neural activation from regions associated with reactivity, regulation, and valuation, and used multilevel modeling to test the predictions of these two models. Preliminary results supported our model emphasizing the importance of valuation and were not consistent with the dual-systems model regulation<sup>b</sup>. This research adds critical evidence that refines models of self-regulation and eating behavior. We have completed analyses and are currently preparing the manuscript for publication.

- a) Giuliani, N. R., Merchant, J. S., **Cosme, D.**, & Berkman, E. T. (2018). Neural predictors of eating behavior and dietary change. *Annals of the New York Academy of Sciences*.
- b) Ludwig, R. M., **Cosme, D.**, Zeithamova, D., & Berkman, E. T. (2018) Preferences revealed: Classifying valuation based on competing models of choice. Poster presented at the Society for Personality and Social Psychology annual meeting, March 1-3, Atlanta, GA.

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

YEAR	COURSE TITLE	GRADE	COURSE TITLE	GRADE
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	College biology	A
	Introduction to ethics	A	Human nutrition	A
	Introduction to psychology	A	General physics for life science I	FW R*
	Ecology and evolution	A-	*Retaken in 2007 for an A (see below)	
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	Seminar programming in R	P	Seminar developmental research	P
	Seminar adolescence	A+	Seminar first year research	P
	Seminar social personality group	P	Data analysis I	A+
	Research developmental social neuro.*	P	*Credits taken every quarter; passed each time	
2016	Seminar first year ethics	P	Advanced applications in MRI	P
	Social personality core	A	Data analysis III	A
	Data analysis II	A	Reading first year project	A+
	Seminar first year research	P	Seminar programming in R	P
	Advanced cognitive neuroscience	A+		
2017	Seminar brain decoding	A	Seminar statistical analyses in R	P
	Seminar grant writing	A	Developmental core	A
	Reading machine learning	A	Structural equation modeling	A
2018	Seminar data science	A-		

**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, Dr. Chavez, with whom our lab group collaborates, and Dr. Kelly, who is my colleague in the Prevention Science Institute, 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. Cosme, D., Mobasser, A., Zeithamova, D., Berkman, E.T., & Pfeifer, J.H. (2018). Choosing to regulate: Does choice enhance craving regulation? *Social Cognitive and Affective Neuroscience*, 13, 300-309.
2. 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.
3. Berkman, E. T. (2017). Value-based choice: An integrative, neuroscience-informed model of health goals. *Psychology and Health*, in press.
4. 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.

## 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, <i>Social and Personality Psychology Science</i>
2017-	Associate Editor, <i>Journal of Personality and Social Psychology</i> , Section I
2017-	Associate Editor, <i>Social Cognitive and Affective Neuroscience</i>
2017-	Standing 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
2018	APS Janet Taylor Spence Transformative Early Career Contributions Award
2018	Excellence in Graduate Mentorship Award, University of Oregon Graduate School

## 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. **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 overweight/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. Berkman, E.T. (2018). Value-based choice: An integrative, neuroscience-informed model of health goals. *Psychology & Health*, 33, 40-57.
- b. 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.
- 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.

3. **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* (3<sup>rd</sup> 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.

4. **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.

**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-UAAAJ&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.

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.

**Completed Research Support**

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.

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.

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.

**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.

Bowman, C.R. & **Zeithamova, D.** (2018). Abstract memory representations in the ventromedial prefrontal cortex and hippocampus support concept generalization. *Journal of Neuroscience*, 38(10), 2605-2614.

## 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

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## 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: 03/31/2020**Introduction**1. Introduction to Application  
(for Resubmission applications)

IntroductionApplication.pdf

**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  
(for Renewal applications)

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

LettersSupport.pdf

**Institutional Environment and Commitment to Training Section**

11. Description of Institutional Environment and Commitment to Training

DescriptionInstitutionalEnvironmentCommitmentTraining.pdf

**Other Research Training Plan Section****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

12. 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

13. Vertebrate Animals

## PHS Fellowship Supplemental Form

**Other Research Training Plan Information**

14. Select Agent Research

15. Resource Sharing Plan

16. Authentication of Key Biological and/or Chemical Resources

**Additional Information Section****17. 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):


18. Alternate Phone Number: [REDACTED]

19. Degree Sought During Proposed Award:

Degree:

If "other", indicate degree type:

Expected Completion Date (MM/YYYY):

PHD: Doctor of Philosophy

06/2021

20. Field of Training for Current Proposal\*:

612 Developmental &amp; Child Psychology

21. Current or Prior Kirschstein-NRSA Support?\*

☐ Yes ☒ No

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

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

22. Applications for Concurrent Support?\*

☐ Yes ☒ No

If yes, describe in an attached file:

23. 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 applying for an award that requires permanent residency status, and expect to be granted a permanent resident visa by the start date of the award, check here: ☐

Name of Former Institution:\*

24. ☐ Change of Sponsoring Institution



**PHS Fellowship Supplemental Form****Budget Section****All Fellowship Applicants:**

25. Tuition and Fees\*:

☐ None Requested☒ Funds Requested

Year 1 \$28,455.00

Year 2 \$28,995.00

Year 3 \$0.00

Year 4 \$0.00

Year 5 \$0.00

Year 6 (when applicable) \$0.00

**Total Funds Requested:** \$57,450.00**Senior Fellowship Applicants Only:**

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

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

a. Federal Stipend Requested:	Amount	Number of Months

b. Supplementation from Other Sources:	Amount	Number of Months

Type (e.g., sabbatical leave, salary)

Source

**Appendix****28. Appendix**

## INTRODUCTION TO APPLICATION

First, we would like to express gratitude to the reviewers for their thoughtful, addressable, and largely positive comments. We appreciate their helpful feedback and have carefully made changes to address the concerns they raised. Based on this feedback, we have: modified the proposed analyses and reduced the scope of the research project; increased and enriched our samples to improve generalizability; added an expert on obesogenic eating behaviors as a consultant; and more effectively communicated the public health impacts of this proposal. Below is a summary of how we have specifically addressed these concerns.

Construct validation. We have revised our approach for establishing construct validity of the neural signature based on the suggestions of reviewer 1. Within the Aim 1 validation sample, we will now compare the mean level of expression in the look and regulate conditions, and expect that if the neural signature is specific to craving reappraisal, we will see significantly greater expression for regulate versus look.

Project scope. To address the concern that this project is too ambitious in scope, we have condensed the aims, removed the 12-month follow up, and removed several analyses that were deemed unnecessary after modifying our plan to establish construct validity. Although we have reduced the project scope, we have, however, increased the sample size for Aim 2 (N = 150) to mitigate concerns regarding limited power in the SEM growth curve models.

Sample characteristics. To alleviate the concern that overweight individuals may react differently to craved foods than healthy weight individuals and improve the generalizability of the neural signature of craving reappraisal, we will include additional existing data from young, healthy weight individuals. Our sample for Aim 1 will now be comprised of 172 individuals across a range of body mass (lean to obese) and ages (18-46).

Expertise on obesity and eating behavior. We have updated the nutrition literature cited in our research strategy and clarified the two distinct pathways between diet and risk for cancer—a direct link via the consumption of carcinogenic foods and an indirect link through overweight and obesity, precipitated by the consumption of energy dense foods that promote increases in body mass (e.g., those high in refined sugar). Although the analyses suggested by a reviewer on the effect of appetite regulators on the neural signature are highly relevant, they are beyond the scope of this proposal and will therefore serve as future directions once we have developed and validated the neural signature. To broaden our team's expertise and ensure the PI receives clinical training on obesity and obesogenic eating behavior, we have added a consultant with expertise in these areas who is a licensed clinical psychologist and faculty in the UO Health Promotion and Obesity Prevention cluster.

Public health impact. We have more clearly articulated the potential public health impacts of this project. Specifically, we have elaborated on specific ways that this proposal will advance scientific understanding of the neurobiological underpinnings of self-regulation—a critical skill for healthy eating, dietary change, and healthy behavior more broadly—and clarified how adapting this highly innovative approach will establish novel avenues for inquiry in the field of translational neuroscience that will ultimately reduce the prevalence of obesity and diet-related cancers.

Non-representative sample. We acknowledge that the lack of racial and ethnic diversity in our sample is a limitation. Because the sample is dictated by the available existing data and the parent R01, the demographics are reflective of Lane County, Oregon and the state of Oregon more broadly. A critical next step will be to validate this initial work in more diverse samples. One strength of this proposal is that the neural signature can easily be utilized by other researchers to pursue this aim.

PI authorship. One reviewer raised a concern about the PI having a “below average” number of publications; however, since the initial submission, the PI has published four papers, including two first author publications.

RCR training. We have added additional information clarifying how the PI will continue training in the responsible conduct of research.

## 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. 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. Whereas classic sensitization experiments typically use electrical shocks, 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, I piloted a project using sub-lethal attacks by natural predators to induce sensitization in *Aplysia*. This informed later work using lobsters that was ultimately published by my colleagues in *Learning and Memory*. Although the theoretical implications were striking, I realized that my passion lay in understanding neuroplasticity in humans rather than animals, and consequently switched my major to psychobiology. 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 emotion 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 travel grant to present one of these posters abroad. 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 exhibit 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*. Not only did this work give me the opportunity to experience 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 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.

Working with Dr. Pfeifer, an expert in developmental social neuroscience, convinced me that adolescence is a unique window of opportunity for interventions 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. Further, these developmental effects are often subtle and not well-powered using traditional analytic methods. Because of this, I helped develop an innovative analysis technique to probe developmental effects across the whole brain while increasing power. We used a standardized parcellation atlas to divide the brain into 350 regions of interest (ROIs) rather than 70,000 voxels (volumetric pixels), 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. 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. To introduce this novel method to others, I was invited to present at the NSF sponsored Modeling Developmental Change workshop. I also won a Jacobs Foundation Young Scholars Award to present this work at the Flux congress in the Netherlands. We are currently preparing this manuscript for publication and expect to submit in fall 2018. Overall, this was a formative experience, providing me with the skill set 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 began examining the ability to regulate **emotional responses to appetitive stimuli**. Although self-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 only 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 promotes intrinsic motivation and enhances self-regulation, we expected choice to facilitate 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 at *Social Cognitive and Affective Neuroscience* and 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 freshmen. 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. 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 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**.

### **Eating behavior and reactivity, regulation, and valuation**

Clarifying the mechanisms underlying **eating behavior** is essential for developing interventions to improve dietary habits and reduce the prevalence of overweight and obesity. Together with Dr. Berkman and others, I helped develop a framework for understanding the interplay between three key psychological processes involved in food choice—**cue reactivity, self-regulation, and valuation**. In contrast to predominant dual-systems models, which emphasize the antagonistic relationship between reactivity and regulation, our framework proposes that subjective value plays a critical role in food choice, moderating the role reactivity and regulation play during decision making. We published a review of this work in the *Annals of the New York Academy of Sciences*. I am currently testing this model in the context of an ecologically valid food decision making paradigm in which participants place monetary bids on healthy and unhealthy foods. We extracted estimates of neural activation from regions associated with reactivity, regulation, and valuation, and used **multilevel modeling** to test predictions of these two models. While preliminary results showed evidence for the moderating role of subjective value, we did not observe evidence for the dual-systems. Through this research, I've reviewed the neuroscientific literature on the psychological processes involved in human eating behavior and gained experience with **statistical model comparison**.

### **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**

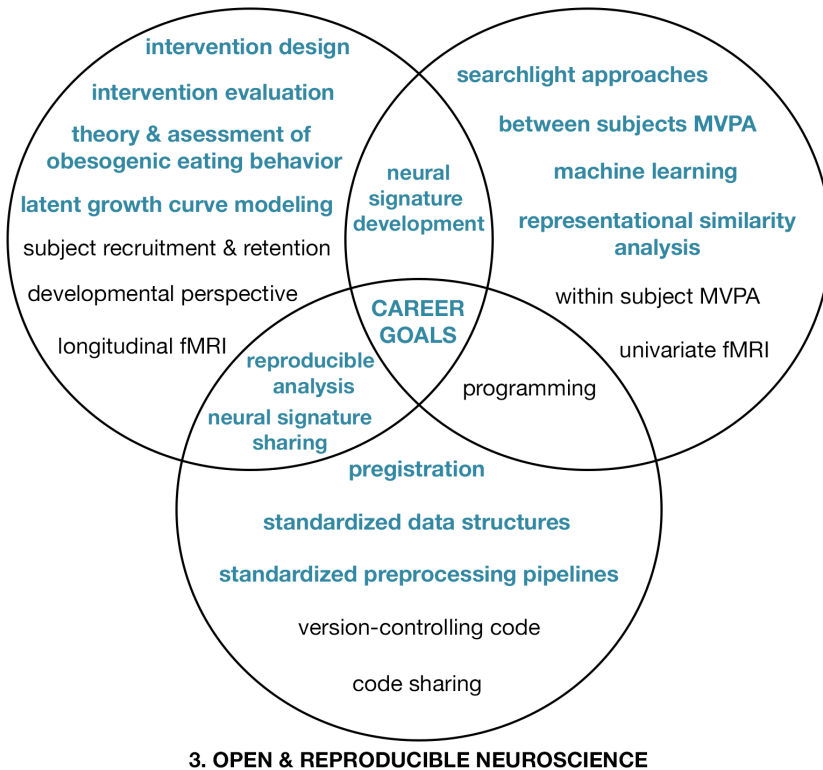
My long-term career goal is to become a leading independent researcher in the field of translational neuroscience. My primary research focus will be understanding how appetitive self-regulation develops during adolescence, can be improved through training, and protects against engagement in health-risking, 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**.

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 establish its predictive validity it under the mentorship of Dr. Berkman, an expert in translational neuroscience and advanced statistical

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

1. TRANSLATIONAL NEUROSCIENCE 2. MULTIVARIATE & MACHINE LEARNING



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 *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. To gain clinical training related to obesity and eating behavior, I will also be mentored by Dr. Nichole Kelly. Dr. Kelly is an expert on obesity and eating behavior and is a faculty member in the University of Oregon Health Promotion and Obesity Prevention (HPOP) cluster. Together, Dr. Kelly and I will develop a reading list of seminal papers on obesogenic eating behavior. Through coursework, quarterly individual meetings with Dr. Kelly, bi-weekly meetings with Dr. Kelly's lab and the HPOP reading group, I will review the literature and gain critical knowledge about obesogenic eating behavior and obesity prevention and intervention. 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 MVPA under the guidance of Dr. Zeithamova and our analysis was published 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. **Obesogenic eating behavior**: Literature review and discussion of obesogenic eating behavior and current approaches to obesity prevention and intervention from a clinical perspective
- e. Weekly individual meetings with Dr. Berkman
- f. Weekly project meetings with the NCI R01 team
- g. Monthly leadership team meetings with NCI R01 PI, co-Is, consultants, and full-time project staff
- h. Monthly collaborative mentorship meetings with Drs. Berkman and Zeithamova
- i. Quarterly individual meetings with Dr. Kelly to discuss seminal papers on reading list
- j. Bi-weekly Center for Translational Neuroscience brownbag to present and receive feedback
- k. Bi-weekly lab meetings with Dr. Kelly to gain conceptual and practical knowledge



- l. Bi-weekly HPOP reading group to learn about contemporary obesity-related issues
  - m. PSY 607 Translational Neuroscience (Fall 2019)
  - n. PSY 610 Multilevel Modeling (Spring 2020)
  - o. PSY 610 Structural Equation Modeling (Completed Fall 2017)
  - p. HYPY 522 Physiology of Obesity (Fall 2019)
- 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. PSY 607 Data Science (Completed Spring 2018)
  - g. 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 = summer quarter, yellow = fall quarter, blue = winter quarter, green = spring quarter.

Domain	Activity	Year 1	%	Year 2	%
<b>Research Training</b>	Aim 1 analysis				
	Aim 2 data collection				
	Aim 2 preprocessing		55		10
	Aim 2 analysis				
<b>Manuscript Preparation</b>	Paper from Aim 1		15		
	Paper from Aim 2				50
<b>Mentorship &amp; Supervision</b>	Individual meetings				
	Project & leadership meetings		15		10
	Collaborative mentorship meetings				
	Lab meetings				
<b>Professional Development</b>	Presentation at professional meetings				
	Brownbags, colloquia		5		10
	PSY 607 Professional Development				
	PSY 607 Grant Writing				
<b>Coursework &amp; Requirements</b>	PSY 610 Multilevel Modeling				
	PSY 607 Open and Replicable Science				
	PSY 607 Translational Neuroscience		10		20
	HYPY 522 Physiology of Obesity				
	Dissertation				



## 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—the appetitive motivation to eat. However, craving 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. 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 novel machine learning and multivariate neuroimaging methods to develop and validate a sensitive and specific neurobiological index (i.e., neural signature) of craving reappraisal and use it to predict cancer-relevant outcomes in the context of a cognitive reappraisal intervention to reduce unhealthy eating in overweight and obese adults. Based on previous findings, my central hypothesis is that individuals exhibiting increased expression of the neural signature of craving reappraisal following reappraisal training (indicating greater ability) 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 better understand the critical issue of individual differences in responsivity to treatment. Further, this project will extend our knowledge of the neural basis of appetitive self-regulation, which supports a variety of cancer-relevant, health-promoting behaviors.

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- and 6-month follow-ups to evaluate the persistence of intervention effects.

**Aim 1. Develop and validate a neural signature of craving reappraisal.** Using existing functional neuroimaging data from a craving reappraisal paradigm previously employed in our lab (N = 172), 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 = 120) and assessing generalizability of the resulting signature in an independent, hold-out sample (N = 52). To validate the neural signature, I will compare the average expression of the signature when participants in the independent validation sample view craved, unhealthy foods to when they reappraise their desire for these foods. I expect significantly greater expression in the reappraisal condition than in the viewing condition, indicating specificity of the signature to reappraisal.

**Training goals:** *Learn multivariate neuroimaging and machine learning techniques to build and validate a neural signature of a target psychological process, while utilizing open and reproducible methods.*

**Aim 2. Establish the predictive and incremental 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. In testing this hypothesis, I will also assess the incremental validity of the reappraisal signature above and beyond the now-standard subtractive method.

**Training goals:** *Learn to design and evaluate a randomized control trial using functional neuroimaging. Gain further experience with 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 (e.g., foods high in refined sugar) increases body mass and risk for obesity<sup>1,2</sup>. Obesity in turn increases risk for several cancers, including endometrial, kidney, esophageal, colon, and liver cancer<sup>3-6</sup>. This indirect effect of obesity is significant. In North America, high body mass is estimated to cause approximately 4-9% of all cancer cases and 19-21% of obesity-related cancers<sup>7</sup>. Second, consumption of specific foods, such as charred or processed meat or foods with high glycemic load, increases the risk for several cancers even in the absence of overweight or obesity<sup>8-11</sup>. Indeed, the American Cancer Society now includes healthy eating and weight maintenance in their cancer prevention guidelines<sup>12</sup>. Given that two in three American adults are overweight or obese, costing nearly \$150 billion in health-related expenses<sup>13</sup>, *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<sup>14,15</sup>. These cues are highly salient and are associated with automatic reward value<sup>16</sup>. In response to these cues, there are physiological changes, including increased heart rate, salivation, and neural activity in the subcortical reward regions<sup>15,17,18</sup>, as well as cognitive changes, including food cravings, or the strong, conscious desire to eat the food<sup>19</sup>. Both food cue exposure and cue-induced craving are associated with increased eating and weight gain<sup>20</sup>. Because cue-induced food craving stimulates eating behavior, *craving reduction is a promising intervention target to decrease unhealthy eating and therefore cancer risk.*

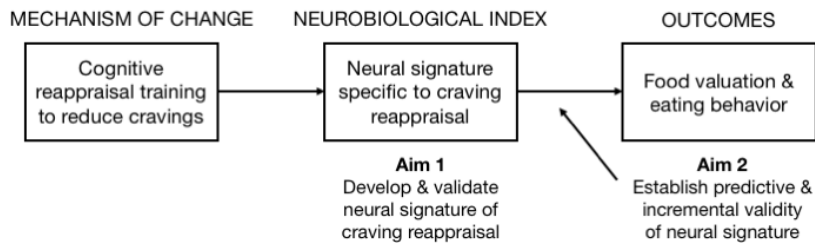
**Cognitive reappraisal reduces craving and modulates the reward value of food.** One effective strategy for reducing cue-induced food cravings is cognitive reappraisal, or the reframing of a stimulus to change its affective meaning<sup>21</sup>. Reappraisal can be used to make the costs of food consumption 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<sup>22-28</sup>. 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<sup>29</sup>. 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<sup>23,26-28</sup>. However, these regions are involved in a variety of different cognitive processes, including planning, working memory, inhibition, and shifting attention<sup>30</sup>, and therefore are unlikely to be specific indicators of reappraisal. In addition, because 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<sup>31</sup>. In a translational context, these multivariate models have frequently been used to predict clinical outcomes (e.g., disease status<sup>32</sup>), 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<sup>33-35</sup>. In addition to indexing a specific psychological process, because they use all available neural data, they may have greater sensitivity<sup>31</sup> and explain more variance in behavior than univariate ROIs<sup>33,36</sup>.

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<sup>37</sup>. *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 and validate a sensitive and specific multivariate neural signature of craving reappraisal (see Figure 1). This research product will be made publicly available to researchers and is significant for several reasons. First, it advances the field of affective neuroscience by refining knowledge

**Figure 1. Conceptual model**



of the specific neurobiological mechanisms underlying craving reappraisal, which is a critical self-regulatory skill. The ability to resist temptations and make healthy choices is essential for positive development and cancer prevention. Indeed, it has been estimated that nearly 40% of deaths in America are due to preventable, behavioral causes, such as smoking, poor diet, and obesity, that may be mitigated with better self-regulation<sup>38</sup>. The NIH itself recognizes the ubiquitous salutary effects of good self-regulation, having published an RFA specifically to investigate its underlying mechanisms. This project is also significant because it produces a sharable neurobiological index of craving reappraisal that can be used on new and existing data, increasing the return on investment. This is important because neuroimaging studies are costly and new tools such as neural signatures can aid in extracting additional value from them. This index would also open the door to a variety of novel and innovative analyses not currently possible. It 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 now-standard subtractive methods, it facilitates the measurement of spontaneous engagement of reappraisal during more naturalistic, uninstructed contexts (e.g., food image/advertisement viewing). Because this more closely approximates the real-world, it is likely that studying craving reappraisal in this way would improve our ability to predict behavior outside the lab—which is a primary goal of translational research and a key line of research that I am currently pursuing. Second, this project advances the field of translational neuroscience by importing to it an innovative methodology from cognitive neuroscience that can be used to create neural signatures for translationally-relevant psychological processes. Specifically, it creates a tool that can be used to evaluate target engagement in reappraisal interventions and individual differences in treatment responsivity. 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.

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 and validate 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<sup>23,26–28</sup>. 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 172 participants (123 females). To increase the generalizability of the results, participants from several studies ranging in age (18–46) and BMI (lean to obese) will be included. All participants completed a craving reappraisal task developed in our lab<sup>22–24,39</sup> 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 its 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 a number of unhealthy, cancer-promoting foods (e.g., barbeque, candy, chocolate, French fries, ice cream, pasta, pizza, processed meats). Each condition contains 20 trials. On each trial (see Figure 2), participants are presented with an

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

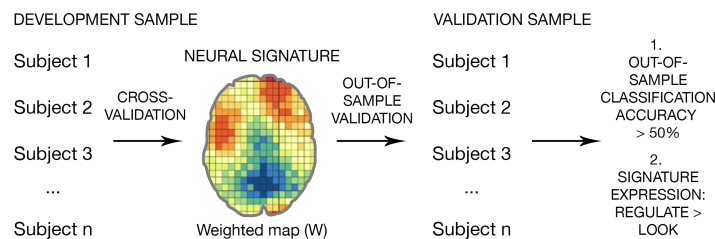


instruction (2s; look or regulate), view a food image while following the instruction (5s), and rate their craving for the food on a 5-point Likert scale (4s; 1 = not at all, 5 = very much). Each 11s trial of this event-related design is followed by a jittered fixation cross ( $M = 1s$ ) and trial order is optimized using a genetic algorithm<sup>40</sup>.

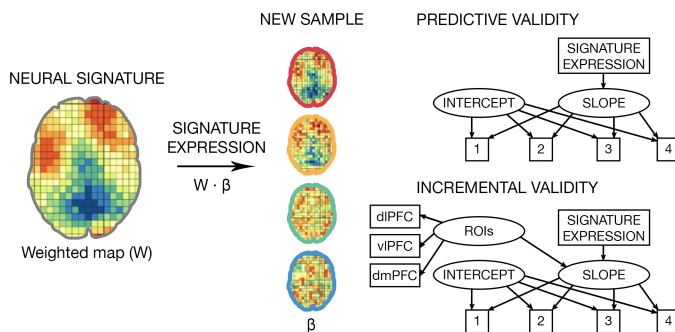
**fMRI data analysis.** Images will be preprocessed and analyzed using the University of Oregon (UO) High Performance Computing cluster. To facilitate reproducibility, images will be stored in the **emerging standard Brain Imaging Data Structure** (<http://bids.neuroimaging.io/>) and preprocessed using a **standard pipeline** from the Center for Reproducible Neuroscience (fmrip; <http://github.com/poldracklab/fmrip>).

**Figure 3. Overview of specific aims and expected outcomes**

**AIM 1: DEVELOP & VALIDATE NEURAL SIGNATURE**



**AIM 2: ESTABLISH PREDICTIVE & INCREMENTAL VALIDITY**



The grey matter mask will be defined using the grey matter tissue segmentation generated by fmrip.

**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<sup>39</sup>). Although MVPA is often conducted within subject, my goal 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<sup>33,35,42</sup>, I expect to be able to classify these two conditions with high accuracy between subjects. However, as this has not yet been 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.

To create the neural signature, I will first divide the data into development ( $N = 120$ ) and validation ( $N = 52$ ) samples and conduct MVPA between subjects (Figure 3; adapted from<sup>43</sup>). 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 = 119 subjects, test = 1 subject). On

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<sup>41</sup>. 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>).

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 120 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.

To establish construct validity, I will compare the mean expression of this neural signature while participants in the validation sample view and reappraise personally-craved foods. For each subject, I will generate a map for the average activation during look and regulate trials separately and multiply each by the neural signature (i.e., calculate the dot-product for look and regulate for each subject). This process yields a single number that will serve as the index of expression of the neural signature for each trial condition. If the neural signature is specific to craving reappraisal, then participants should show greater expression of the signature during regulation trials than during look trials. To test this hypothesis, I will compare the mean expression across participants in the look and regulate trials using a paired *t*-test ( $p < .05$ ). I expect that the expression of the neural signature will be higher in the regulate condition than in the look condition.

## **Aim 2. Establish the predictive and incremental validity of the neural signature of craving reappraisal.**

**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 6 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. We are aware that Aim 2 relies on the neural signature developed in Aim 1. Based on previous research showing superior accuracy for between subjects classification<sup>33,35,42</sup> and data from our lab<sup>39</sup>, 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. Further, to establish incremental validity beyond the gold standard univariate “brain-as-predictor” approach<sup>44</sup>, I will compare the ability of the multivariate neural signature and mean activation within univariate ROIs (e.g., dIPFC, vIPFC, 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, establishing the value added by this approach.

**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 and 6 months. As of August 1, 2018, 22 participants have completed the baseline MRI session. The current proposal builds on the parent grant by analyzing neural data from the MRI sessions, as well as behavioral data from all 4 sessions to characterize the predictive and incremental validity (Aim 2) 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 150 participants who complete the protocol. We are currently enrolling 2-4 subjects per week, so I expect to have complete data from these 150 subjects by July 2019.



**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 4 assessments with these measures at the following intervals:

Baseline MRI	4-Week Intervention	Post-Intervention MRI	Follow-Ups at 3 & 6 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. The same fMRI preprocessing procedure outlined in Aim 1 will be followed for Aim 2.

**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<sup>25</sup>. The task is an economic auction in which participants view images of 30 healthy and

Figure 4. Trial from valuation task used in Aim 2



30 unhealthy, cancer-promoting snack foods and determine how much they are willing to pay for each item. Participants are 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.

**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.

**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. Then, within the cognitive reappraisal intervention group, I will 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<sup>45</sup> in R<sup>46</sup>. 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 1-4;

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 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 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 activation 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<sup>33,35</sup>. 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 Aim 2. 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., both 3- and 6-month follow-ups) for the targeted 150 subjects by the target date, July 2019. This is unlikely given the fact that our team is on track to complete data collection for these participants by this date. However, in the event that we are not able to complete planned data collection for 150 subjects by the beginning of Year 2, I will use all available data for these subjects in Aim 2. Fourth, although we have several protocols in place to ensure participant 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. Last, because we may lack power to detect small effects in the SEM analyses, we will test the generalizability of effects in the full R01 sample ( $N = 300$ ) once it has been collected.

**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 further facilitate generalizability, the neural signature of craving reappraisal will be developed using data from several separate neuroimaging studies that include a relatively wide range of ages and BMIs. 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 two years, I have designated deadlines for the completion data collection, preprocessing and analysis, and manuscript preparation. Preprocessing for Aim 1 is underway will be completed by the earliest start date for this fellowship (April 2019). Analysis for Aim 1 will be completed during the first half of year one and the manuscript will be completed during the second half of year one. MRI data collection for Aim 2 will be completed in the first quarter of year one and behavioral follow-ups will be completed during the first half of year one. Aim 2 preprocessing will be completed during the second half of year one, analysis will be completed during the first half of year two, and the manuscript will be completed during the second half of year two.

## 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 2017, I drafted the initial version of my training plan and after receiving final comments from my mentors, I submitted the proposal in December 2017.

After receiving feedback on my initial submission from the reviewers, I met with Drs. Berkman and Zeithamova to outline changes for the revised submission. Together, we determined that Dr. Nichole Kelly, a licensed clinical psychologist and Assistant Professor at the University of Oregon with expertise in obesogenic eating behavior, would be an outstanding consultant. Dr. Kelly agreed to join my mentorship team and together we developed a plan for me to receive training on the psychological mechanisms underlying eating behaviors associated with overweight. Based on the reviewer comments, I made initial changes to the revised application. Drs. Berkman and Zeithamova made comments on my draft, and after incorporating their feedback, I submitted the final revised submission.

### 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. Kelly to broaden my expertise on the psychological mechanisms underlying obesogenic eating behavior, and 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

These sponsors were selected to provide the optimal mentorship to meet the proposed training goals. 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, and behavioral approaches to cancer prevention. Dr. Berkman combines these techniques to design and refine interventions to improve health and well-being. 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 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 three journal articles. 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 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 been an outstanding mentor on my advising committee for the past two years. Under her guidance, I am rapidly learning simple MVPA analyses and our work together culminated in a co-authored manuscript. 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.

To gain clinical training on obesity, I will be mentored by Dr. Kelly, an Assistant Professor in counseling psychology. Dr. Kelly is a licensed clinical psychologist with expertise on obesogenic eating behavior in children and adults. Her research focuses on identifying cognitive, affective, and sociocultural mechanisms underlying eating behaviors associated with excess weight gain. Dr. Kelly also has extensive experience designing and evaluating randomized control trials to prevent obesity, making her an ideal consultant to help me acquire training on the underlying mechanisms and assessment of obesogenic eating behavior.

The University of Oregon is the ideal setting for this work because of the innovative, interdisciplinary opportunities offered here. A distinctive feature 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, is a research center within the Department of Psychology that fosters an intellectual community on campus around translational neuroscience and provides concrete support such as 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. Further, the University of Oregon is home to a unique cluster of faculty, including consultant Dr. Kelly and collaborator Dr. Nicole Giuliani, that were hired as part of the interdisciplinary Health Promotion and Obesity Prevention initiative. The goal of this initiative is to leverage basic research in the biological and social sciences to understand the etiology and underlying mechanisms of obesity and develop effective interventions and outreach programs to prevent and mitigate associated negative health outcomes.

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 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 places strong value on interdisciplinary collaboration, which is formalized in the Supporting Area Project (SAP) requirement. In the SAP, 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**

### **Previous training**

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.

### **Ongoing and future training**

I will continue my training in the responsible conduct of research in several ways. First, ethical issues are a standing agenda item in our R01 leadership meetings. Together with the team, we discuss issues related to voluntary consent, privacy and confidentiality, harm reduction, and risk assessment and management. These discussions are often centered around specific incidents that have arisen or are likely to arise and therefore provide excellent training for how to practically deal with ethical issues on a research project. Second, I will regularly attend our department's methodological brownbag where we discuss ethical topics related to scientific integrity, reproducibility, replicability, and generalizability. More specifically, I will receive training on issues such as preregistration, power, data sharing, and secondary data analysis. This training will help ensure I am adequately trained to conduct research in an ethical fashion after I have finished data collection. Third, I have previously volunteered to lead discussions on preregistration and data management in the ethics course that all first year graduate students in psychology are required to take, and I will continue to volunteer while on this training grant.

## 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

\* Note that R01 CA211224 is the parent grant for the data collection and analysis proposed in Aim 2. This grant will backstop Ms. Cosme's work on this project in the event of a shortfall on the NRSA. We have begun data collection on the project and are recruiting 2-4 participants per week. 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 = 150 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 4 predoctoral fellows and 1 postdoctoral fellow.

NAME	TIME IN LAB	CURRENT POSITION / ORGANIZATION
Calcott, Rebecca	2011-2017 (predoctoral)	Postdoctoral Scholar, DAAD Fellowship, University of Regensburg
Giuliani, Nicole	2011-2015 (postdoctoral)	Assistant Professor, College of Education, University of Oregon
Kahn, Lauren	2012-2018 (predoctoral)	Center Manager / Research Scientist, University of Oregon
Livingston, Jordan	2012-2018 (predoctoral)	Postdoctoral Scholar, University of Toronto
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, data science, 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. Kelly, who is mentoring Dani in obesogenic eating behavior, 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 now 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 has already finished the structural equation modeling seminar offered in the Psychology Department last fall. She will complete the translational neuroscience graduate seminar that I teach in the Fall of 2019, and will also take my graduate multilevel modeling seminar in the Spring of 2020. 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 approaches have been developed in recent years to 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 interventions to reduce 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, and Brendan Cullen and Krista DeStasio are both supported by NSF GRFPs.

##### **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 was accepted 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.





July 26, 2018

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 through GitHub, and whole-brain neural signature sharing through 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 your career.

Best regards,

A handwritten signature in black ink, appearing to read 'R. Chavez'.

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

Department of Psychology  
1227 University of Oregon, Eugene OR 97403-2253  
541-346-4943 | FAX 541-346-2574 | [rchavez@uoregon.edu](mailto:rchavez@uoregon.edu)

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UNIVERSITY OF OREGON

July 27, 2018

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

To Whom it May Concern,

I am writing to give my enthusiastic support for Ms. Cosme's F31 proposal, "*Cancer prevention through dietary change: Training in translational neuroscience*" and confirm that I will gladly serve as a consultant on this promising project. With her strong background in neuroimaging and statistics, and her demonstrated knowledge of food craving regulation, I believe she is an excellent candidate for this fellowship and will certainly be able to achieve the training goals laid out in this proposal.

In 2016, I started my tenure-track assistant professor position at the University of Oregon. I was one of six faculty hired as part of the Health Promotion and Obesity Prevention initiative. Our cluster hire spans multiple disciplines across campus, including psychology, human services, human physiology and biology. My program of research represents expertise in the cognitive, emotional, and sociocultural mechanisms underlying eating behaviors associated with overweight. My experience examining associations between cognitive and emotional aspects of self-regulation and disinhibited eating using both subjective and objective methods are particularly relevant to Ms. Cosme's proposal. I also have extensive experience designing and executing randomized control trials, which will support Dani's training aims related to translational neuroscience. As such, I am well-positioned to serve as a consultant on the current project and offer Dani expert mentorship regarding diverse yet complementary assessments of energy intake in the context of clinical research.

To help Ms. Cosme gain expertise in obesogenic eating behaviors, we have crafted a plan together. Dani and I will create a reading list of seminal papers on the psychological and biological factors influencing eating behaviors associated with overweight and will meet once per quarter to discuss these articles. To extend this theoretical training, Dani will attend my lab meetings in a bi-weekly manner. Here we will discuss practical issues relating to the assessment of eating behavior and execution of a randomized control trial investigating the effects of acute exercise on children's self-regulation and subsequent energy intake and macronutrient consumption during a laboratory test meal (NIH 1R21HD094661-01). To gain further knowledge on contemporary issues related to obesity prevention, Dani will attend reading group meetings organized by the UO Health Promotion and Obesity Prevention cluster.

**PREVENTION SCIENCE INSTITUTE**

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July 27, 2018

Page 2 of 2

I am excited to serve as a consultant on this innovative and impactful project and I am confident that the aforementioned activities will help immerse Ms. Cosme in the field of obesity prevention from a clinical perspective. Please do not hesitate to contact me regarding my role on this project.

Thank you for your consideration of this promising applicant.

A handwritten signature in black ink, appearing to read "Nichole Kelly". The signature is fluid and cursive, with a large, stylized "N" and "K".

Nichole Kelly, PhD  
Evergreen Assistant Professor  
Counseling Psychology and Human Services  
Prevention Science Institute  
University of Oregon  
[nicholek@uoregon.edu](mailto:nicholek@uoregon.edu)  
541.346.2183

## 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 Center for Translational Neuroscience is a multidisciplinary research Center housed within the Department of Psychology. The CTN functions as an intellectual community for translational neuroscience that bridges several departments including Psychology, Biology, Human Physiology, and Education. The mission of the CTN is to translate knowledge from basic neuroscience and apply it to improve well-being, promote resilience, and mitigate the effects of early adverse experiences. The CTN focuses on training at the undergraduate, graduate, postdoctoral, and junior faculty levels in neuroscience-informed approaches to prevention and intervention. The University of Oregon Graduate School also offers a Graduate Specialization in Translational Neuroscience through the CTN. Doctoral students are eligible to receive a Specialization in Translational Neuroscience if they take a set of courses and complete a Translational Neuroscience Research Project. More details about the CTN are provided in the Facilities and Other Resources document.

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.

## PHS Human Subjects and Clinical Trials Information

OMB Number: 0925-0001 and 0925-0002

Expiration Date: 03/31/2020

Are Human Subjects Involved

☒ Yes

☐ No

Is the Project Exempt from Federal regulations?

☐ Yes

☒ No

Exemption Number

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ 8

Other Requested Information

### Human Subject Studies

Study#	Study Title	Clinical Trial?
<u>1</u>	Cancer prevention through dietary change: Training in translational neuroimaging	Yes

## Section 1 - Basic Information (Study 1)

OMB Number: 0925-0001 and 0925-0002

Expiration Date: 03/31/2020

### 1.1. Study Title \*

Cancer prevention through dietary change: Training in translational neuroimaging

### 1.2. Is this study exempt from Federal Regulations \*

☐ Yes ☒ No

### 1.3. Exemption Number

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

### 1.4. Clinical Trial Questionnaire \*

1.4.a. Does the study involve human participants?

☒ Yes ☐ No

1.4.b. Are the participants prospectively assigned to an intervention?

☒ Yes ☐ No

1.4.c. Is the study designed to evaluate the effect of the intervention on the participants?

☒ Yes ☐ No

1.4.d. Is the effect that will be evaluated a health-related biomedical or behavioral outcome?

☒ Yes ☐ No

### 1.5. Provide the ClinicalTrials.gov Identifier (e.g. NCT87654321) for this trial, if applicable

NCT03557710



Section 2 - Study Population Characteristics (Study 1)

2.1. Conditions or Focus of Study

- Overweight and Obesity
- Cancer
- Self-regulation

2.2. Eligibility Criteria

For the sample used in Aim 2, the following criteria will be used:

Inclusion Criteria:

- overweight to obese range (BMI 25-35)

Exclusion Criteria:

- metal implants (e.g., braces, permanent retainers, pins)
- metal fragments, pacemakers or other electronic medical implants
- claustrophobia
- weight > 550 lbs.
- women who are pregnant or believe they might be pregnant
- people who have been diagnosed with past or current medical, psychiatric, neurological, eating disorders, or are taking psychotropic medications
- urine screen to exclude participants who are acutely intoxicated
- screen for handedness

Beyond these criteria, participants will be recruited without exclusions based on gender, race, or ethnicity, so our sample will reflect the diversity in the local population (Lane County, Oregon) with regard to gender, race, and ethnicity.

2.3. Age Limits	Min Age: 18 Years	Max Age: 60 Years
2.4. Inclusion of Women, Minorities, and Children	InclusionWomenMinoritiesChildren.pdf	
2.5. Recruitment and Retention Plan	RecruitmentRetentionPlan.pdf	
2.6. Recruitment Status	Recruiting	
2.7. Study Timeline	StudyTimeline.pdf	
2.8. Enrollment of First Subject	04/02/2018	Actual

## **INCLUSION OF WOMEN, MINORITIES, AND CHILDREN**

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 150 participants that have completed the intervention in the parent grant. The target population of the parent grant will consist of 300 individuals between ages 18 and 60 and will be equally balanced between males and females. 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. 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% Black/African American, and 85.8% White. 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, Black/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.

## RECRUITMENT AND RETENTION PLAN

Below is the Recruitment and Retention protocol from the parent grant, R01 CA211224.

### Recruitment plan

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.

### Retention plan

We will use the following strategies to maximize participant retention. First, participants will be assigned one staff person to be the “point person” for scheduling and the main interventionist. Second, participants will be compensated \$60 per session for the baseline and endpoint sessions, \$30 for each of the three follow-ups, and \$100 throughout the training sessions. Participants will be paid \$10 per session plus a max bonus of \$20 for at-home work. We have successfully achieved response rates of 94% using a similar incentivization schedule for completion. Third, they will provide names, addresses, phone numbers, and e-mail addresses of 3 people who “will always know where you are” for tracking purposes; this info will be updated every 6 months. Subjects who move will be invited to complete assessments during visits back to Eugene, which minimizes attrition. These procedures that have resulted in retention rates of 84-95% through 3 yr follow-up in randomized trials of obesity and eating disorder prevention and treatment interventions (Stice et al., 2011, 2013, 2015).

## **STUDY TIMELINE**

Below is the study timeline from the parent grant, R01 CA211224.

Recruitment and data collection will begin in the second half of Year 1 and continue through the first half of Year 4. Consistent with the current productivity of the research team, participants will be recruited at the pace of approximately 4-5 per week. This will yield a full sample of  $N = 330$  (allowing 10% attrition) by the end of Month 54 at the latest, even accounting for academic breaks and 50% slower summer recruitment. Data cleaning of behavioral measures and preprocessing and first-level modeling of fMRI data will be ongoing throughout this period. All data will be collected and ready for group-level analysis by the end of Month 54. Group-level analysis, interpretation, and write-up will occur during Months 48–60.

**Inclusion Enrollment Reports**

IER ID#	Enrollment Location Type	Enrollment Location
<u>Study 1, IER 1</u>	Domestic	Eugene, Oregon
<u>Study 1, IER 2</u>	Domestic	Eugene, Oregon

**Inclusion Enrollment Report 1**Using an Existing Dataset or Resource\* : ☒ Yes ☐ NoEnrollment Location Type\* : ☒ Domestic ☐ Foreign

Enrollment Country(ies): USA: UNITED STATES

Enrollment Location(s): Eugene, Oregon

Comments: Cumulative enrollment report for Aim 1

**Planned**

Racial Categories	Ethnic Categories				Total
	Not Hispanic or Latino		Hispanic or Latino		
	Female	Male	Female	Male	
American Indian/ Alaska Native	0	0	0	0	0
Asian	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0
Black or African American	0	0	0	0	0
White	0	0	0	0	0
More than One Race	0	0	0	0	0
Total	0	0	0	0	0

**Cumulative (Actual)**

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	2	1	0	0	0	0	0	0	0	3
Asian	7	3	0	0	0	0	0	0	0	10
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	96	36	1	9	5	0	0	0	0	147
More than One Race	2	0	0	0	0	0	0	0	0	2
Unknown or Not Reported	0	0	0	0	0	0	5	2	0	7
Total	109	41	1	9	5	0	5	2	0	172

**Inclusion Enrollment Report 2**Using an Existing Dataset or Resource\* : ☐ Yes ☒ NoEnrollment Location Type\* : ☒ Domestic ☐ Foreign

Enrollment Country(ies): USA: UNITED STATES

Enrollment Location(s): Eugene, Oregon

Comments: Planned enrollment for Aim 2; based on the parent R01 planned enrollment.

**Planned**

Racial Categories	Ethnic Categories				Total
	Not Hispanic or Latino		Hispanic or Latino		
	Female	Male	Female	Male	
American Indian/ Alaska Native	1	1	0	0	2
Asian	5	5	0	0	10
Native Hawaiian or Other Pacific Islander	1	1	0	0	2
Black or African American	2	2	0	0	4
White	53	53	8	8	122
More than One Race	4	4	1	1	10
Total	66	66	9	9	150

**Cumulative (Actual)**

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	0	0	0	0	0	0	0	0	0	0
Asian	0	0	0	0	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0	0	0	0
Black or African American	0	0	0	0	0	0	0	0	0	0
White	0	0	0	0	0	0	0	0	0	0
More than One Race	0	0	0	0	0	0	0	0	0	0
Unknown or Not Reported	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0

### Section 3 - Protection and Monitoring Plans (Study 1)

3.1. Protection of Human Subjects

ProtectHumanSubjects.pdf

3.2. Is this a multi-site study that will use the same protocol to conduct non-exempt human subjects research at more than one domestic site?

☐ Yes    ☒ No    ☐ N/A

If yes, describe the single IRB plan

3.3. Data and Safety Monitoring Plan

DataSafetyMonitoringPlan.pdf

3.4. Will a Data and Safety Monitoring Board be appointed for this study?

☒ Yes    ☐ No

3.5. Overall structure of the study team

OverallStructureStudyTeam.pdf



## 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 150 male and 150 female participants. *The current proposal will use the data from the first 150 participants 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. *The current proposal will only use data from the baseline endpoint MRI sessions and the 3 and 6 month follow ups.*

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. *The current proposal will only use data from the 3 and 6 month follow ups.*

**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. Study Procedures, Materials, and Potential Risks**

**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 172 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.

**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. Informed Consent and Assent**

**Process for obtaining informed consent.** 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 Participants 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.

## **DATA AND SAFETY MONITORING PLAN**

The PI will gain clinical trial experience through the parent grant, R01 CA211224, under the supervision of the Sponsor Berkman, who is lead investigator of the clinical trial. The independent Data and Safety Monitoring Board is located at the Oregon Research Institute. The Safety Monitor is Emma Lee Junior, M.D.

## **OVERALL STRUCTURE OF THE STUDY TEAM**

For the parent grant R01 CA211224, all administration, enrollment, and data collection will be conducted at the University of Oregon under the leadership of Sponsor Berkman. The independent Data and Safety Monitoring Board is located at the Oregon Research Institute. For more information concerning the structure of the study team, please see the parent grant.

## Section 4 - Protocol Synopsis (Study 1)

### 4.1. Brief Summary

### 4.2. Study Design

#### 4.2.a. Narrative Study Description

#### 4.2.b. Primary Purpose

#### 4.2.c. Interventions

Type	Name	Description
------	------	-------------

#### 4.2.d. Study Phase

Is this an NIH-defined Phase III Clinical Trial? ☐ Yes ☐ No

#### 4.2.e. Intervention Model

4.2.f. Masking ☐ Yes ☒ No

☐ Participant ☐ Care Provider ☐ Investigator ☐ Outcomes Assessor

#### 4.2.g. Allocation

### 4.3. Outcome Measures

Type	Name	Time Frame	Brief Description
------	------	------------	-------------------

### 4.4. Statistical Design and Power

### 4.5. Subject Participation Duration

4.6. Will the study use an FDA-regulated intervention? ☐ Yes ☐ No

4.6.a. If yes, describe the availability of Investigational Product (IP) and Investigational New Drug (IND)/ Investigational Device Exemption (IDE) status

### 4.7. Dissemination Plan

### Delayed Onset Studies

Delayed Onset Study#	Study Title	Anticipated Clinical Trial?	Justification
The form does not have any delayed onset studies			



PROGRAM CONTACT:  
JEANNETTE KORCZAK  
240-276-5642  
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**SUMMARY STATEMENT**  
( Privileged Communication )

*Release Date:* 11/15/2018  
*Revised Date:*

*Application Number:* 1 F31 CA232357-01A1

COSME,DANIELLE  
UNIVERSITY OF OREGON  
Department of Psychology  
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:* 11/05/2018

*Council:*

JAN 2019

*PCC:* K0TR

*Requested Start:* 04/01/2019

*Dual IC(s):* EB, DK

*Project Title:* Cancer Prevention through Dietary Change: Training in translational  
neuroimaging

*Requested:* 2 Years

*Sponsor:* Berkman, Elliot T

*Department:* Psychology

*Organization:* UNIVERSITY OF OREGON

*City, State:* EUGENE OREGON

*SRG Action:* Impact Score:22 Percentile:9

*Next Steps:* Visit [https://grants.nih.gov/grants/next\\_steps.htm](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.

*Gender:* 1A-Both genders, scientifically acceptable

*Minority:* 1A-Minorities and non-minorities, scientifically acceptable

*Children:* 3A-No children included, scientifically acceptable

**1F31CA232357-01A1 Cosme, Danielle**

**SCIENTIFIC REVIEW OFFICER'S NOTE**

**RESUME AND SUMMARY OF DISCUSSION:** This application requests support for training in appetitive self-regulation and research that focuses on the development of a neurobiological index of craving reappraisal. In discussion, the reviewers noted that the applicant was responsive to the prior reviews. Strengths of the revised submission include the well-prepared applicant with a greatly improved publication record and enthusiastic letters of recommendation. The mentoring team has most of the needed experience and expertise to guide the applicant to successful completion of the research and training activities. Concerns were raised that although the team was expanded with an expert in clinical obesity, the team lacks sufficient depth in the psychological aspects of overweight, obesity, and disordered eating. The research project addresses the potentially important process of reappraisal as a means to modify cancer-promoting eating patterns. The project has been strengthened by an increased sample size, the addition of young healthy weight individuals, and simplified aims. Minor concerns were raised that no information is provided about the healthy weight individuals and that the revised aims are dependent. The training plan includes relevant activities to broaden the applicant's skills and expertise; the training goals are well-integrated with the research activities. Overall, the application is now excellent. Strengths of a talented applicant, a committed mentoring team, and thoughtfully revised research and training activities will support the applicant in her trajectory toward scientific independence.

**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 to 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 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 and validate a neural signature of craving reappraisal in an independent sample of existing data, and 2) establish the predictive and incremental validity 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, after development, I will test the construct validity of the neural signature by assessing whether expression of the signature is greater while participants reappraise their desire for craved food than while they simply view these foods (Aim 1). 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, above and beyond standard methods (Aim 2). Upon completion of this project, I will have developed and validated a sensitive and specific neurobiological index of craving reappraisal ability that 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 for cancer control, 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: 2

Sponsors, Collaborators, and Consultants: 2

Research Training Plan: 2

Training Potential: 1

Institutional Environment & Commitment to Training: 1

**Overall Impact/Merit:** This is a revised application for predoctoral funding from an applicant interested in identifying biomarkers (or neural signatures) of effective cognitive reappraisal and intervention outcomes. The application seems to be responsive to previous critiques by increasing the number of participants, simplifying the Aims, adding a healthy-weight control group, and addition of a consultant with clinical obesity expertise. Other strengths of the application include the promising Applicant, experienced mentoring team, well-designed and innovative fMRI paradigm and analytic approaches, and strong linkages between the Specific Aims of the research project and the training goals. A few minor and addressable weaknesses were noted but did not detract from overall enthusiasm for the research and training plans, and the future potential of the applicant.

### **1. Fellowship Applicant:**

#### **Strengths**

- 4<sup>th</sup> year PhD student in Psychology at the University of Oregon
- Clearly articulated goal to become an independent translational neuroscientist studying the brain basis of health behaviors
- 5 peer reviewed publications, 3 as first author

#### **Weaknesses**

- The applicant outlines 5 areas of research focus, which seems like a lot at this early stage of her professional development.

### **2. Sponsors, Collaborators, and Consultants:**

#### **Strengths**

- The Sponsor, Dr. Berkman, is an Associate Professor in the Department of Psychology at the University of Oregon.
- He has expertise in neuroimaging and other methods of studying brain factors underlying behavior change

- Good publication record and active funding, including PI on the parent study to the current application
- The Co-Sponsor, Dr. Zeithamova, provides expertise in fMRI and the use of multivariate approaches including planned machine learning analyses

#### **Weaknesses**

- None noted

### **3. Research Training Plan:**

#### **Strengths**

- fMRI methods appear to be appropriate, with a good targeted sample size (n=172) and use of development and validation samples.
- Use of an “Open Science” framework, including sharing data and scripts and preregistration of planned analyses
- Aims 1 (identifying biomarkers) and 2 (testing predictive ability) are logically connected and linked directly to the training plan
- The proposed study leverages the new NIH funded project from the Sponsor
- The applicant appears to have been responsive to previous critiques, including increasing sample size to address concerns about statistical power, addition of a healthy weight control group, and addition of a consultant (Dr. Nichole Kelly) to provide expertise in clinical aspects of obesity and obesity interventions.

#### **Weaknesses**

- It is noted that “neural signatures can be used to assess the degree to which individuals engage in reappraisal strategies.” This seems like an example of reverse inference. The applicant will not know whether any identified neural signature is specific to reappraisal. Other strategies might share the same or very similar signature.
- The Introduction notes the addition of a healthy weight sample, but I can find no discussion of this in the Research Plan.
- The plan to scan participants up to 550 pounds is naive, even with the wide-bore Skyra scanner. It might be helpful to have a “comfort” test for some larger participants before they are enrolled.

### **4. Training Potential:**

#### **Strengths**

- Specific Aims are explicitly linked to training goals
- Clearly specified training goals in translational neuroscience, multivariate neuroimaging and machine learning analytic methods, and open and reproducible science.
- Activities specified match each goal
- Combination of formal coursework and face-to-face meetings with mentors
- Nice job outlining current expertise, long-term goals, gaps in training, and specification of a training plan to address each gap.

#### **Weaknesses**

- None noted

## **5. Institutional Environment & Commitment to Training:**

### **Strengths**

- The environment at the University of Oregon is outstanding

### **Weaknesses**

- None noted

### **Protections for Human Subjects:**

Acceptable Risks and Adequate Protections

- acceptable

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

Acceptable

- Part of the Sponsor's parent project

### **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: Not applicable
- Inclusion/Exclusion of Children under 18: Excluding ages <18; justified scientifically
- They plan to oversample underrepresented groups

### **Vertebrate Animals:**

Not Applicable (No Vertebrate Animals)

### **Biohazards:**

Not Applicable (No Biohazards)

### **Resubmission:**

- This application seems responsive to previous critiques

### **Training in the Responsible Conduct of Research:**

Acceptable

Comments on Format (Required):

- coursework and meetings with mentors

Comments on Subject Matter (Required):

- appropriate

Comments on Faculty Participation (Required):

- adequate

Comments on Duration (Required):

- appropriate

Comments on Frequency (Required):

- appropriate

**Budget and Period of Support:**

Recommend as Requested

**CRITIQUE 2**

Fellowship Applicant: 2

Sponsors, Collaborators, and Consultants: 1

Research Training Plan: 2

Training Potential: 1

Institutional Environment & Commitment to Training: 1

**Overall Impact/Merit:** This is a revised application that was highly responsive to previous critiques and with significant improvement. The applicant is strong, with solid grades and recent increase in publications, good letters of recommendation. Her goal is to develop and validate a neural signature of craving reappraisal using fMRI and establish the predictive validity of the signature. The mentors are strong, experienced, and funded, although the team is small and applicant may benefit from working with clinical psych or psychiatrist to better understand the emotional aspects of disordered eating. The research plan is solid and well defined as is the training plan and they are integrated well with each other. This is a very well done revised application.

**1. Fellowship Applicant:**

**Strengths**

- Goal is to become a translational neuroscientist and has developed strong foundation in psychology and neurology
- 6 publications, 4 since last submission
- Grades are very good and recommendation letters are strongly supportive
- Winner of several scholarships

**Weaknesses**

- Conference presentations are not publications and should not be included in the personal statement

**2. Sponsors, Collaborators, and Consultants:**

**Strengths**

- Dr. Berkman is a psychologist and PI of parent study providing support for training, very experience in topics related to training goals and research plan, well published neural measure, food cravings, executive functions, and ecological validity. Significant prior funding
- Dr. Zeithamova is a cognitive neuroscientist with expertise in memory, fMRI and process dissociations, prior F32 recipient

**Weaknesses**

- While both mentors are well qualified this is a small team for the applicant's goals and research plan – benefit may be seen from a clinical psychologist with active practice seeing patients with these issues.

### **3. Research Training Plan:**

#### **Strengths**

- Goal is to develop and validate a neural signature of craving reappraisal using fMRI and establish the predictive validity of the signature
- The aims are well defined and described
- The research takes place within the context of the parent grant of the PI – but it is clear the applicant's goals are a derivative and not duplicative – access to sample of 300
- Great image (fig 4) to help explain valuation task
- Uses latent growth curve modeling to assess predictive validity
- Considers 24 hour recall using automated format
- Well developed alternative strategies
- Reasonable timeline

#### **Weaknesses**

- There is concern that if Aim1 is not accomplished, Aim 2 cannot be done
- There is missed potential for a better understanding of the human side of unhealthy eating – may benefit from clinical psychologist with expertise and routine practice of seeing patients with obesity/maladaptive eating.

### **4. Training Potential:**

#### **Strengths**

- Very well detailed goals for fellowship and paths to obtain them through: past experiences combined with translational neuroscience, Multivariate neuroimaging, and reproducible neuroscience with a dissertation focused on appetitive self-regulation, cancer control. And neural signature creation.
- This will be accomplished through systematic activities in each category along with professional development in manuscripts and grant writing
- The timeline for the research training, research plan, and associated activities is well designed and appropriate

#### **Weaknesses**

- None noted

### **5. Institutional Environment & Commitment to Training:**

#### **Strengths**

- Excellent environment well suited for research and training needs.

#### **Weaknesses**

- None noted

**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 justified scientifically
- For NIH-Defined Phase III trials, Plans for valid design and analysis: Not applicable
- Inclusion/Exclusion of Children under 18:
- Not clear about the ages

**Vertebrate Animals:**

Not Applicable (No Vertebrate Animals)

**Biohazards:**

Not Applicable (No Biohazards)

**Training in the Responsible Conduct of Research:**

Unacceptable

Comments on Format (Required):

- Reliance on prior completed course and unstructured future training that does not address duration, faculty participation or frequency

Comments on Subject Matter (Required):

Comments on Faculty Participation (Required):

Comments on Duration (Required):

Comments on Frequency (Required):

**Budget and Period of Support:**

Recommend as Requested

**CRITIQUE 3**

Fellowship Applicant: 2

Sponsors, Collaborators, and Consultants: 3

Research Training Plan: 3

Training Potential: 2

Institutional Environment & Commitment to Training: 3

**Overall Impact/Merit:** This revised F31 application seeks two years of funding to support the candidate's project during the completion of the doctoral degree at the University of Oregon in



Psychology. The research focus has been in the relationship between appetite self-regulation and risky health behaviors (e.g. substance use and unhealthy eating). The candidate's goal is to progress as an independent investigator in the field of translational neuroscience, with specific focus on interventions to improve self-regulation and reduce engagement in health risking, cancer relevant behaviors such as unhealthy eating. This proposal seeks to build upon the candidate's existing knowledge and skill set to accomplish the research aims set forth in this proposal. Specifically, aim 1 seeks to identify a neural signature of craving reappraisal and aim 2 seeks to establish the predictive capacity of the neural signature in the context of an ongoing clinical trial of cognitive reappraisal training for overweight and obese adult participants. The study will be performed using a dataset as part of the mentor's R01. The candidate has notable experience in research projects and the publication record is adequate for this stage in her career. Presentations at conferences round out the basis of a budding career.

Mentoring team's expertise will provide training in the areas of translational neuroscience, multivariate neuroimaging and machine learning, and open and reproducible neuroscience.

### **1. Fellowship Applicant:**

#### **Strengths**

- Ms. Cosme has a BS in psychobiology and has an MS in psychology from Stockholm University
- The candidate has five papers in peer reviewed journals, three of which are first author. Several presentations at conferences are noted in the biosketch.
- The candidate has a solid academic record.

#### **Weaknesses**

- No real weaknesses.

### **2. Sponsors, Collaborators, and Consultants:**

#### **Strengths**

- Sponsor biosketches detail how the training of this candidate fits within their expertise and specifically describes the role of each mentor on the team.
- Elliot Berkman, PhD, is an associate professor of social psychology with expertise in translational neuroscience. His research focuses on the neurocognitive underpinnings of cancer relevant health goals, such as dietary change and smoking cessation. This focus emphasizes the roles of valuation, motivation, and executive function, with integration of neurocognitive measures into prevention and intervention trials as indices of underlying targeted processes. Prolific publication record. Current research funding serves as parent grant for this project.
- Dagmar Zeithamova Demircan, PhD, is an assistant professor of psychology, and co-I on the parent grant. Their research focus is understanding brain mechanisms that support memory for specific events and memory generalization using univariate and multivariate fMRI methodologies.
- Dr. Nichole Kelly, clinical psychologist and assistant professor, recruited to provide expertise in obesogenic eating behavior.

#### **Weaknesses**

- The training record of the two mentors include 4 predocs and 1 postdoc (Berkman) and 2 predocs and 1 postdoc (Zeithamova).

### **3. Research Training Plan:**

### **Strengths**

- The training plan details how all the planned coursework dovetails with different pieces of the research aims.
- Grant writing, with intention of a postdoctoral NRSA application is detailed.
- At least one paper from each aim is planned.
- This project addresses one aspect of an important public health issue using a dataset supported by the parent grant.

### **Weaknesses**

- A limitation of this study is that the sample is not diverse. Potentially limits generalizability.
- Despite the understanding that additional analyses of the appetite regulators on neural signature is deemed beyond scope of the current proposal, the proposal itself would have been strengthened by acknowledging these explicitly in the research background to provide greater confidence that these potential confounders will not invalidate the findings of the currently proposed study. Overweight/Obese phenotypes are complicated and understanding how neural signatures change during the course of an intervention is a tiny piece of a complicated puzzle.

## **4. Training Potential:**

### **Strengths**

- The candidate has a solid research background and has a focused mentoring team to support the research.
- Research study design was streamlined from the original proposal and refocused to 2 years.

### **Weaknesses**

- No real weaknesses

## **5. Institutional Environment & Commitment to Training:**

### **Strengths**

- University environment and training capacity are good.

### **Weaknesses**

- No real weaknesses.

## **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 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

- While the predominantly white sampling is justified by the population available for study, it is a limitation of this study.

**Vertebrate Animals:**

Not Applicable (No Vertebrate Animals)

**Biohazards:**

Not Applicable (No Biohazards)

**Resubmission:**

- PI has addressed a number of the concerns from prior reviewers by streamlining the aims and proposal itself, as well as adding an expert consultant.
- Sample size was increased to bolster power and generalizability.
- The application could still benefit from discussion of the confounders previously mentioned by reviewers.
- While the RCR section may provide clarity, the predominant message is that formal ethics training is not planned for the two year period of the grant. Informal training and discussions is planned.

**Training in the Responsible Conduct of Research:**

Acceptable

Comments on Format (Required):

- Prior training is described in detail and includes 2 ethics courses during graduate training. Candidate states that recertification is required bi-annually and should have been completed in July 2018.
- Ongoing training is limited to discussions during team meetings, brownbag seminars, and participation in leading two discussions in the first year graduate student ethics course.

Comments on Subject Matter (Required):

- Overall content across all the different courses contains the subject areas outlined in the NIH notice.

Comments on Faculty Participation (Required):

- No commentary about faculty participation is included in the description

Comments on Duration (Required):

- Courses were 10 weeks, 80 minutes per class.
- Brownbags and team meetings are not fully dedicated to discussing ethical issues, so duration is undetermined.

Comments on Frequency (Required):

- Coursework during the semester was regular, but discussions during team meetings and/or brownbags are not able to be assessed.

**Budget and Period of Support:**

Recommended as requested.

- Budget is appropriate for this research proposal

**THE FOLLOWING SECTIONS WERE PREPARED BY THE SCIENTIFIC REVIEW OFFICER TO SUMMARIZE THE OUTCOME OF DISCUSSIONS OF THE REVIEW COMMITTEE, OR REVIEWERS' WRITTEN CRITIQUES, ON THE FOLLOWING ISSUES:**

**PROTECTION OF HUMAN SUBJECTS: ACCEPTABLE**

**INCLUSION OF WOMEN PLAN: ACCEPTABLE**

**INCLUSION OF MINORITIES PLAN: ACCEPTABLE**

**INCLUSION OF CHILDREN PLAN: ACCEPTABLE**

**SCIENTIFIC REVIEW OFFICER'S NOTE:** Training in the responsible conduct of research was judged unacceptable; see Reviewer 2 comments.

**COMMITTEE BUDGET RECOMMENDATIONS:** The budget was recommended as requested.

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Footnotes for 1 F31 CA232357-01A1; PI Name: Cosme, Danielle

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](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)

11/05/2018 - 11/06/2018

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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Consultants are required to absent themselves from the room during the review of any application if their presence would constitute or appear to constitute a conflict of interest.