

Identification of TMD Subtypes: The OPPERA Study

Eric Bair
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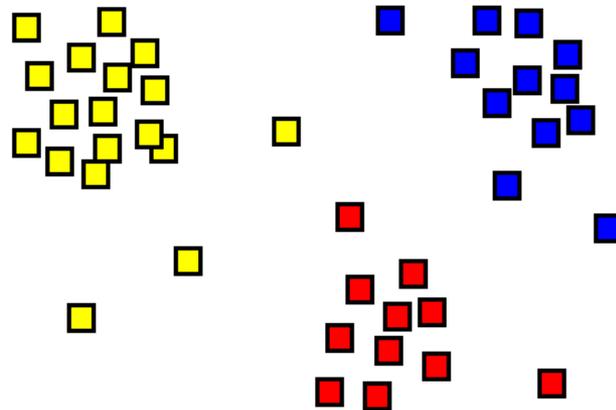
Classification of Orofacial Pain

- TMD and other chronic pain conditions are heterogeneous
- Different possible causes for orofacial pain
 - Optimal treatment may depend on the cause
- Non-cases of TMD may share characteristics of TMD cases
 - May be at higher risk of developing TMD



Cluster Analysis

- Cluster analysis: grouping a data set into subsets or “clusters” such that observations within each cluster are more closely related than observations in different clusters



Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) Study

- Prospective cohort study of TMD with nested case-control study
- Participants recruited at 4 U.S. study sites from 2006-2013
- Includes 1,031 chronic TMD cases and 3,247 initially TMD-free controls
 - 260 controls developed TMD during a 3-year follow up period

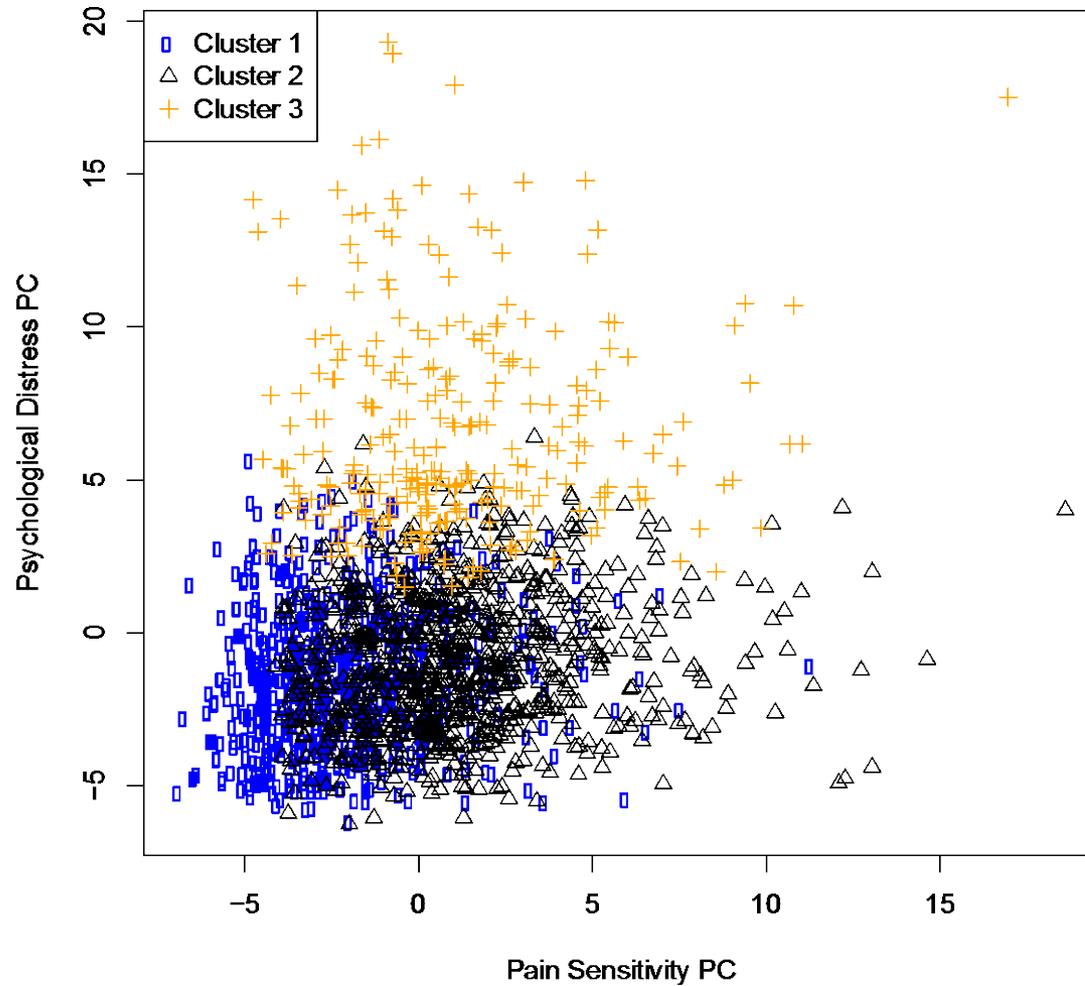


OPPERA Clustering

- Collected various measures of experimental pain sensitivity, psychological distress, and clinical pain symptoms
- Semi-supervised clustering applied to pain sensitivity and psychological variables
- Identified 3 putative clusters



OPPERA Cohort Clusters



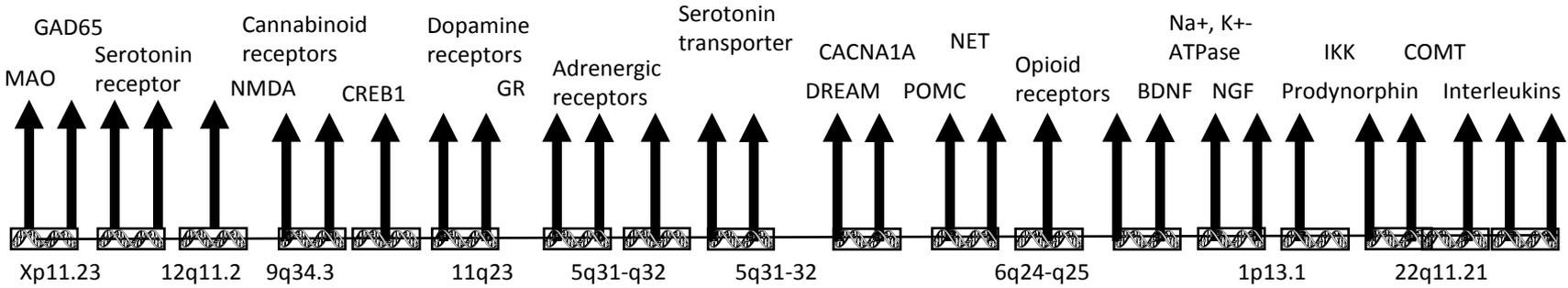
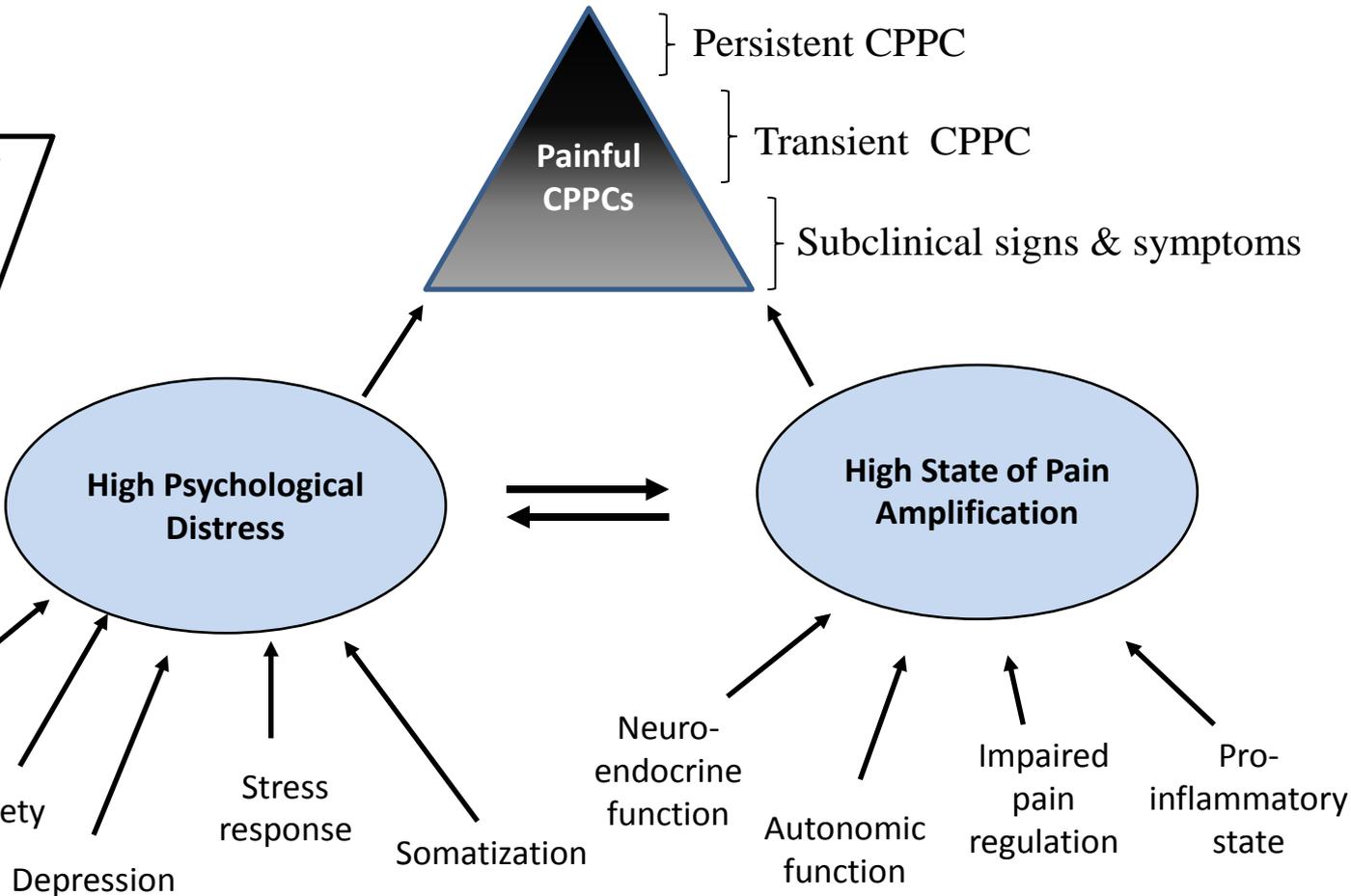


ENVIRONMENTAL CONTRIBUTIONS

Physical
trauma
abuse
infection
smoking

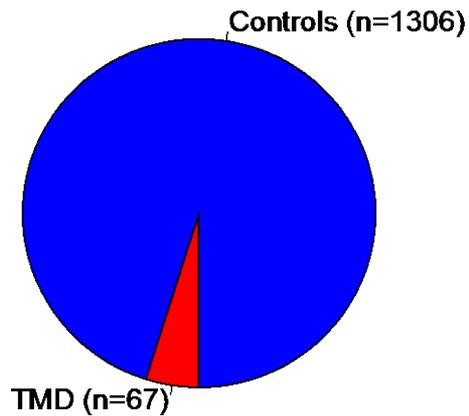
Psychological
life stressors

Culture
health beliefs

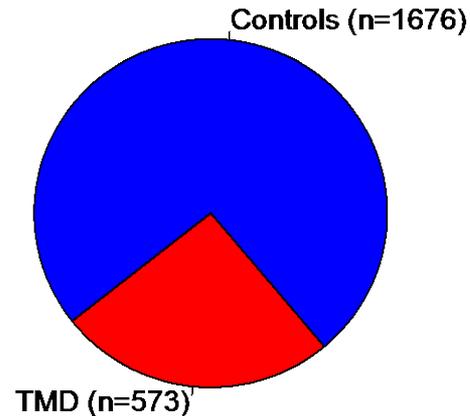


Proportions of TMD Cases and Controls in Each Cluster

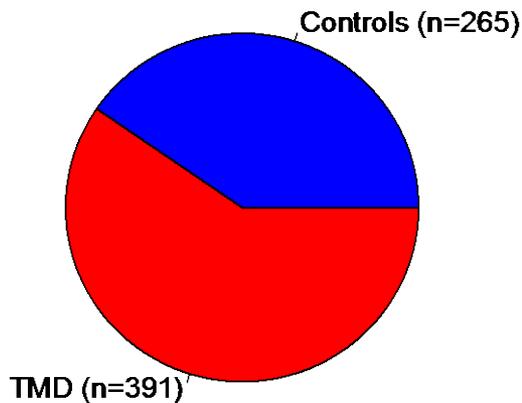
Cluster 1



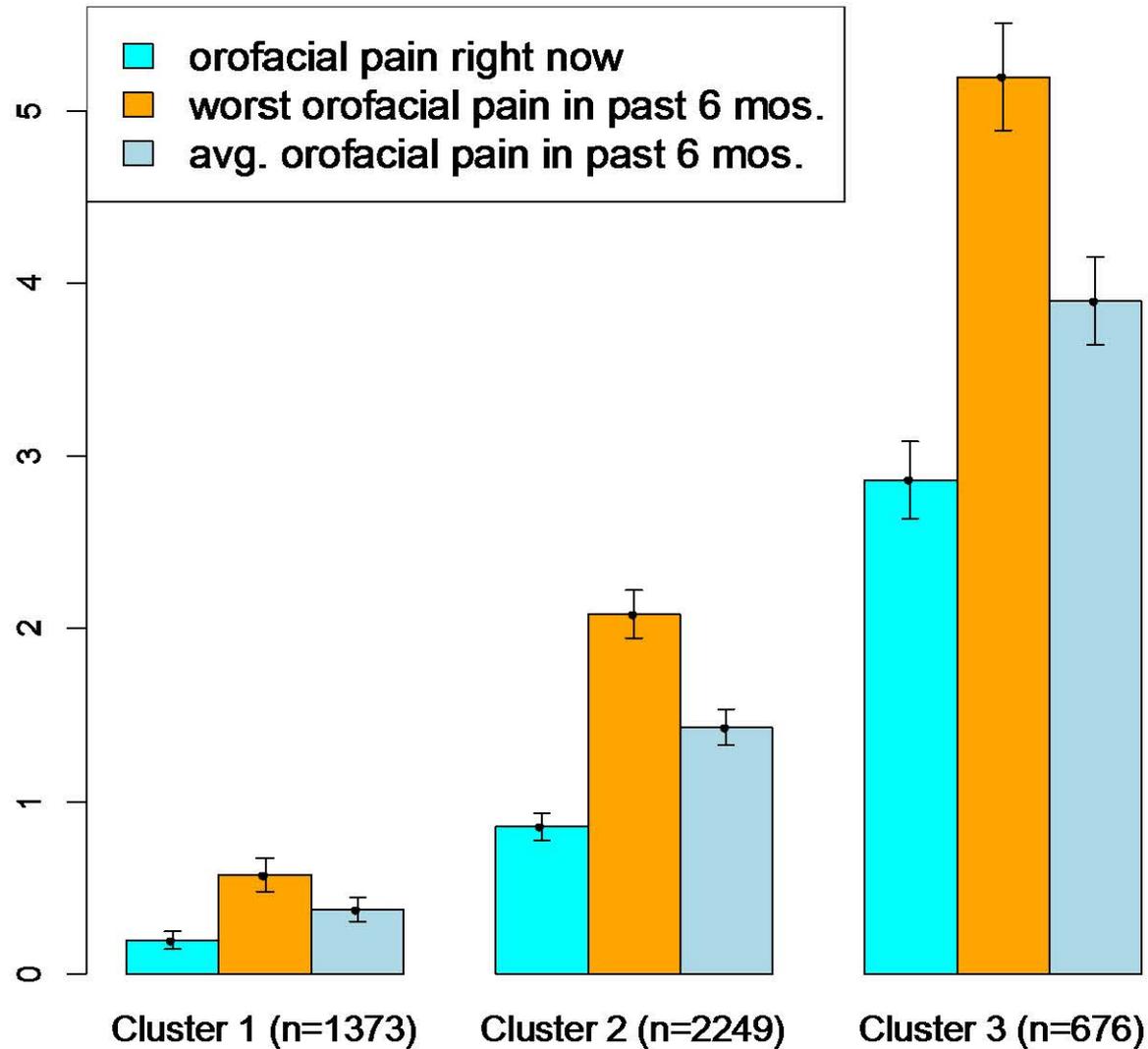
Cluster 2



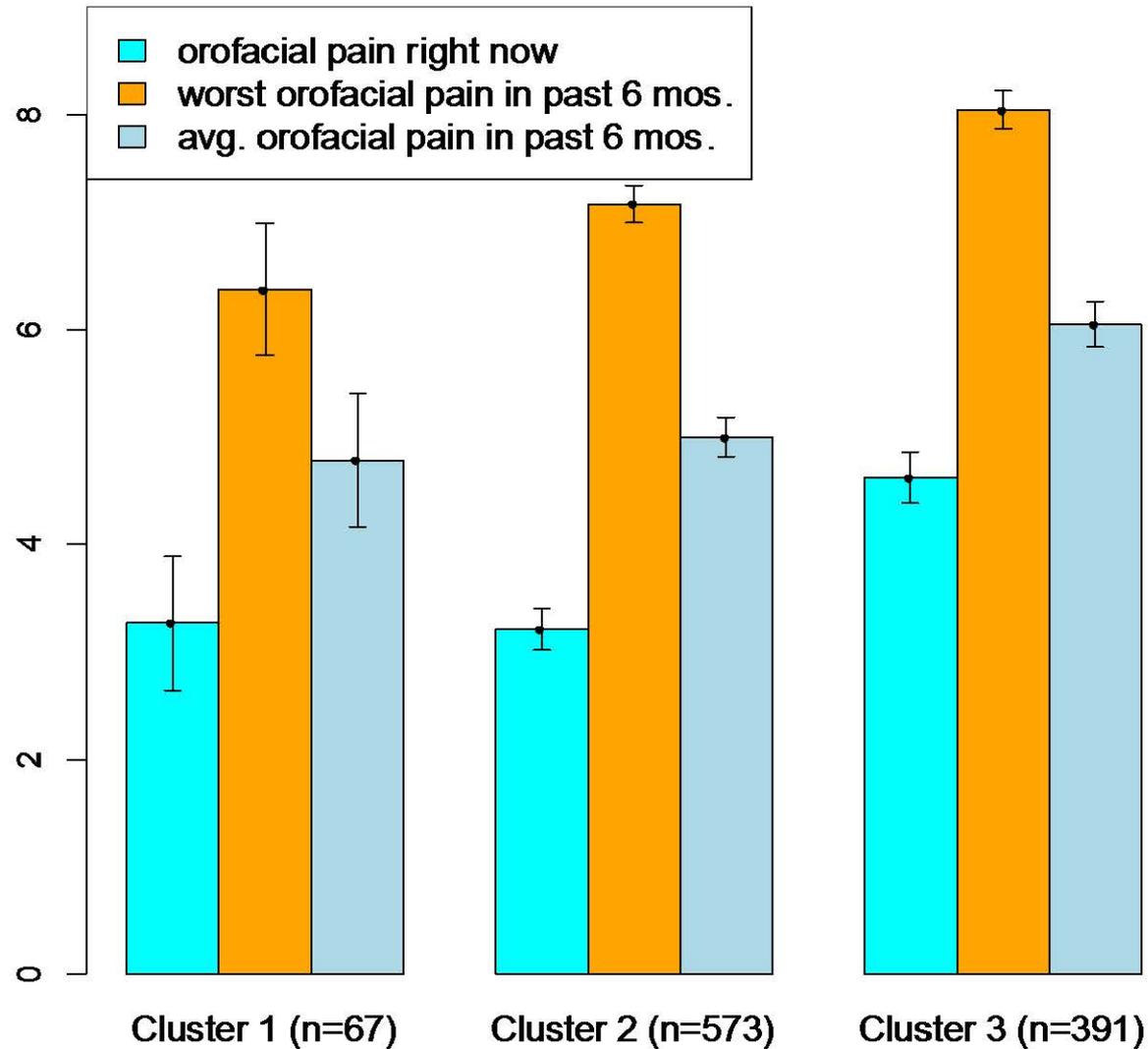
Cluster 3



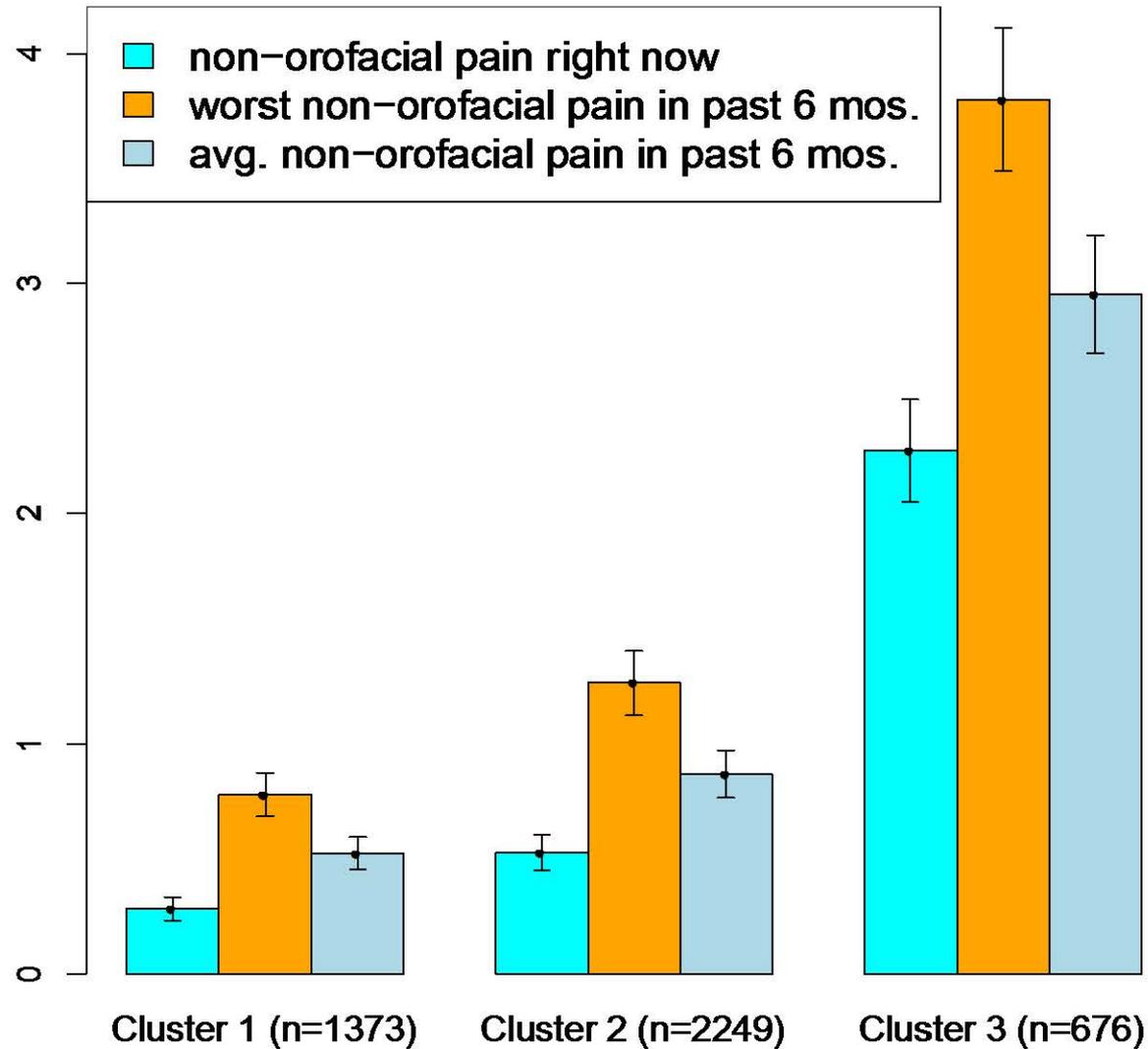
Orofacial Pain Intensity Based on Cluster Assignment



Orofacial Pain Intensity Based on Cluster Assignment (TMD Cases Only)

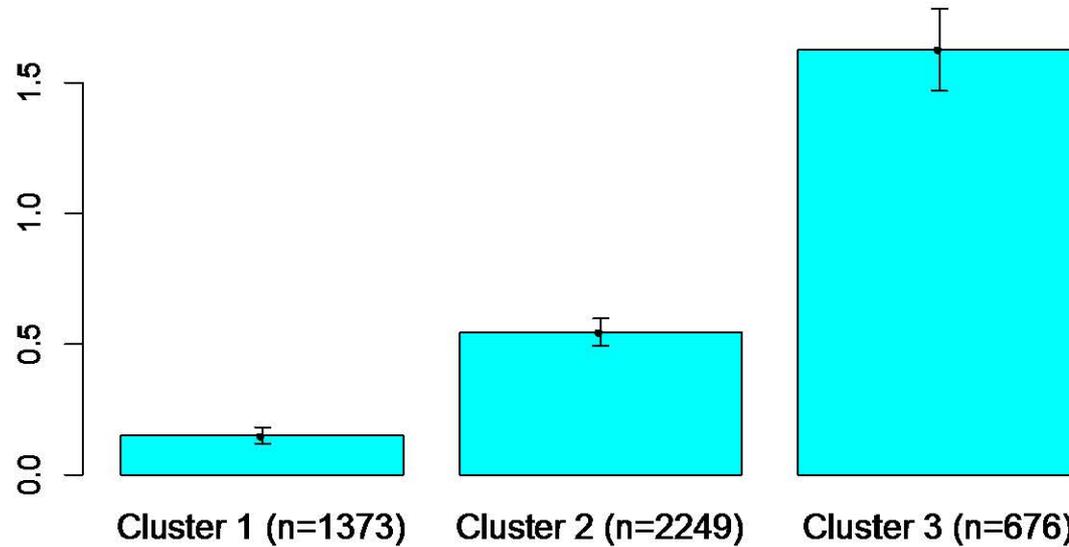


Non-Orofacial Pain Intensity Based on Cluster Assignment

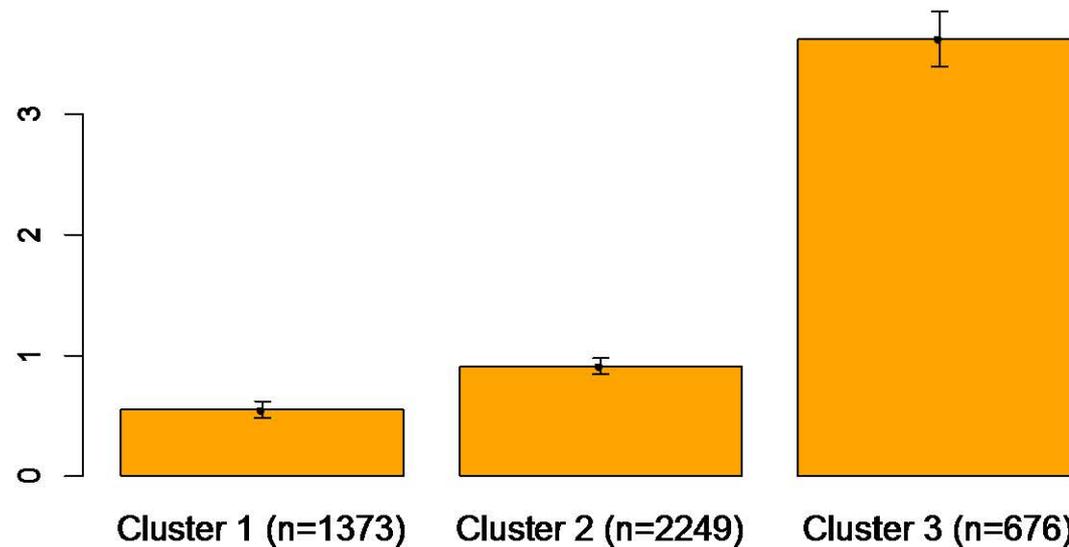


Jaw Function Limitation and Comorbid Conditions

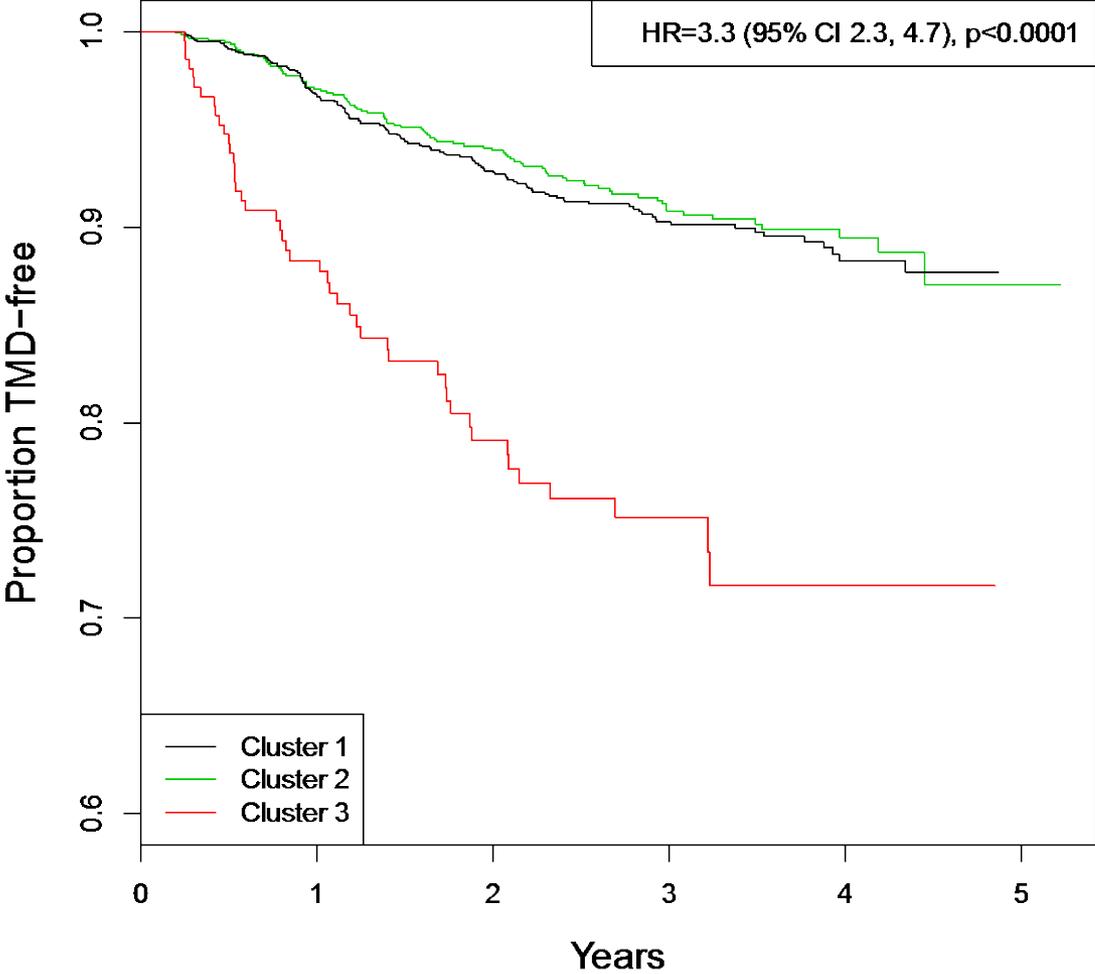
Jaw function limitation (JFLS)



Count of 20 comorbid conditions



Hazard Ratio (C1 vs C3) for First-Onset TMD



N = 2,731 TMD-free individuals

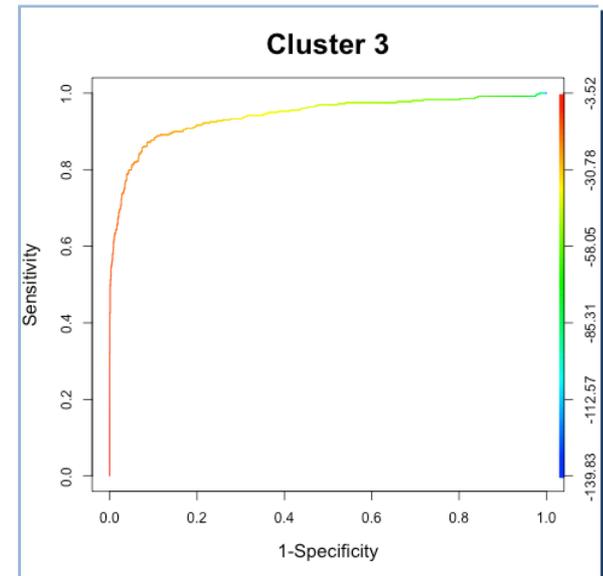
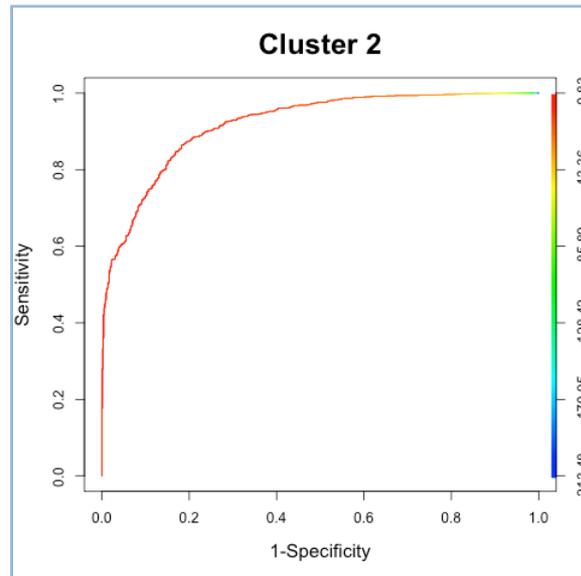
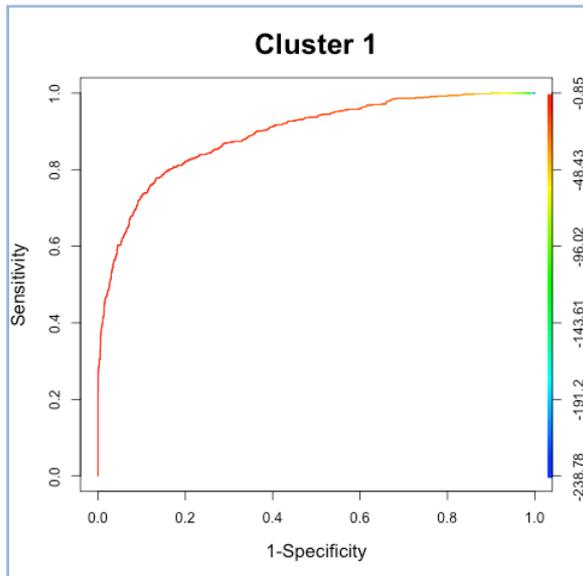


Cluster Reproducibility

- Must verify that clusters can be reproduced
- Replication procedure:
 1. Randomly split the data in half (training set and test set)
 2. Cluster both halves separately
 3. Fit a model to predict test set clusters based on training set clusters
 4. Plot ROC curves



ROC Curves for Predicting Correct Cluster Assignment of OPPERA Participants – Within Cohort



Summary

- Identified 3 putative subtypes of TMD
- Demonstrated reproducibility
- Different subtypes had different clinical characteristics
- TMD-free individuals in cluster 3 had greater risk of first-onset TMD



Future Research

- Further development/validation of methods to assign individuals to clusters
- Personalized medicine

