

Fostering Resilience in Adolescents with Chronic Musculoskeletal Pain

Statement of Problem

Pediatric chronic musculoskeletal pain (CMP)—chronic pain affecting the bones, joints, muscles or connective tissues for three months or longer—is extremely prevalent, affecting up to 40% of children, primarily adolescents. Despite current treatment practices, long-term outcomes for youth with CMP remain poor, with affected teens experiencing greater anxiety, depression, and overutilization of health care and a greater risk of opioid misuse as adults. While cognitive behavioral therapy (CBT) can effectively treat adolescent CMP, access to a psychologist can be challenging for some families, and CBT alone does not result in improved physical activity among affected teens.

Resilience-training interventions serve as potential alternative psychosocial skills-based interventions for the treatment of adolescent CMP. While rooted in traditional CBT, resilience-training interventions are distinct in that they are brief and target specific stress management skills. More youth can access these interventions since providers, including bachelors-level, non-clinical personnel, can deliver them remotely via telephone or telehealth.

Our long-term goal is to test the efficacy of a resilience-training intervention (Promoting Resilience in Stress Management [PRISM])—which researchers in the Palliative Care and Resilience Research Program at Seattle Children's Hospital originally designed for adolescents and young adults with serious illness—among a population of youth with CMP. However, prior to doing so, we need more research to understand the role of patient and parental resilience in disease management among youth with CMP.

Description

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Our aim is to determine whether:



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Findings from this study will support future studies evaluating the efficacy of resilience training interventions for adolescents with chronic musculoskeletal pain.

Our prior research demonstrates low resilience among youth ages 12-17 with CMP, as well as a link between resilience and measures of disease burden (i.e. pain level and widespreadness of pain). In a single-arm pilot trial of PRISM, we demonstrated excellent feasibility and acceptability of the resilience coaching program among youth with CMP. We enrolled 69% of youth approached over a 6-month period (surpassing target enrollment rate of 25%); total n=27. Eighty-five percent of youth completed all required study visits. Video visit (71%) was the most frequent visit type. Mean participant satisfaction (rated 1=very unsatisfied and 5=very satisfied) was 4.27 (SD 0.94). Exploratory analyses suggested improvements in resilience and clinically relevant outcomes. Qualitative feedback was universally positive and supported our hypothesis that PRISM provides an alternative and acceptable psychosocial intervention for youth unable to access mental health services or perceive a stigma with it.

We also have an ongoing research project, longitudinally assessing resilience and other psychosocial risk factors among youth with CMP at time of initial clinic visit and again approximately 6 months later for adolescents diagnosed with CMP and one of their parents.

Patients and proxies will complete the Connor Davidson Resilience Scale 10-item (CD-RISC-10) and patient-reported outcome measures to assess resilience and treatment adherence. We will link our findings to information from the electronic medical record. We will also assess whether changes in resilience, and other psychosocial risk factors (i.e. pain catastrophizing, mindfulness, optimism, etc.), are associated with a number of symptoms and factors important to patients with CMP including pain intensity, physical disability, health-related quality of life, symptom severity, widespreadness of pain and parental resilience.

Findings from this study will complement the execution of K23-funded pilot randomized controlled trial of PRISM among adolescents with CMP that will 1) evaluate the efficacy of PRISM-C, 2) explore for which patients PRISM is most beneficial, and 3) examine implementation outcomes and identify barrier and facilitators to engagement to inform future implementation efforts. Youth will be randomized to usual care alone or usual care plus PRISM. The team will administer the intervention via telehealth. The team will also interview subjects upon completion to gain additional feedback to help reformat the intervention as needed.

The goal of this body of research is to contribute unique knowledge regarding risk factors associated with long term outcomes in adolescent CMP and identify ways to support adolescents with CMP.

Next Steps

Understanding how resilience relates to symptom severity and treatment adherence among youth with CMP as well as further determining the efficacy and applicability of PRISM in clinical care for youth with CMP will help ensure successful treatment outcomes for this vulnerable patient population. Long-term, we hope this research will result in improved access to and efficacy of non-pharmacologic psychosocial interventions for adolescent CMP.

In our Research in Motion video series, Dr. Sabrina Gmuca explains more about her work in fostering resilience in youth with chronic, including her aims to utilize PRISM to help reduce suicidal thoughts among these youth.

This project page was last updated in May 2023.

Suggested Citation

Children's Hospital of Philadelphia, PolicyLab. *Fostering Resilience in Adolescents with Chronic Musculoskeletal Pain* [online]. Available at: <http://www.policylab.chop.edu>. [Accessed: plug in date accessed here].

PolicyLab Leads

Sabrina Gmuca MD, MSCE

Faculty Member

Sabrina Gmuca (she/her) is a faculty member at PolicyLab at Children's Hospital of Philadelphia (CHOP) and an attending physician in the Division of Pediatric Rheumatology and the Center for Amplified Musculoskeletal Pain Syndrome at CHOP. She is also an instructor of pediatrics at the University of Pennsylvania's Perelman School of Medicine.

Dr. Gmuca's research seeks to enhance the care of children with chronic non-inflammatory musculoskeletal pain. Specifically, her research addresses amplified musculoskeletal pain syndrome (AMPS), which is a major public health issue because of its high prevalence, related socioeconomic burden and associated risk of opioid exposure and polypharmacy. Dr. Gmuca's work aims to identify innovative strategies to improve long-term treatment outcomes for this patient population as well as increased accessibility to non-pharmacologic multidisciplinary treatment modalities. She is specifically interested in the role of resilience in adolescents with chronic pain and their parents, as well as the appropriate evaluation and management of neurocognitive impairment in youth with juvenile fibromyalgia syndrome. Dr. Gmuca is the recipient of the 2017 American College of Rheumatology Distinguished Fellow Award and the 2017 CHOP Distinguished Research Trainee Award. She was also awarded the Thrasher Research Fund Early Career Award in 2018.

Dr. Gmuca earned her Bachelor of Science from the University of Rochester in 2007. She attended State University of New York Downstate where she earned her medical degree in 2011. She was also an intern and resident in pediatrics at NYU Langone Medical Center/Bellevue Hospital. Dr. Gmuca completed her pediatric rheumatology fellowship at CHOP and received her Master of Science in Clinical Epidemiology from University of Pennsylvania.



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Team

Jami Young **PhD**

Faculty Member

Dr. Young has received funding from the National Institute of Mental Health (NIMH) for her research on Interpersonal Psychotherapy–Adolescent Skills Training (IPT-AST), a group preventive intervention for adolescent depression which targets interpersonal vulnerabilities for depression. She has conducted three randomized controlled trials of IPT-AST delivered in schools and has examined the effects of this program on a variety of mental health, interpersonal and school-related outcomes. Currently, Dr. Young has a collaborative R01 to conduct a personalized prevention study to examine whether the effects of depression prevention programs can be maximized by matching youth to programs based on their vulnerabilities for depression.

Dr. Young's research has also included the study of risk factors for later psychopathology. She was the principal investigator of a collaborative R01 longitudinal study of genetic, cognitive and interpersonal risk factors for youth depression. Most recently, Dr. Young has begun to examine the identification and management of adolescent depression in primary care settings.

In addition to her research, Dr. Young has been involved in national and international efforts to train community clinicians in evidence-based prevention and treatment interventions for adolescent depression. She also serves as an NIH Grant Reviewer for the Psychosocial Development, Risk and Prevention study section. Taken together, Dr. Young's work aims to decrease the incidence of adolescent depression and increase children's access to evidence-based assessment, prevention, and treatment of depression and other behavioral health conditions.

Dr. Young received her PhD in clinical psychology from Fordham University. She completed an NIMH-funded post-doctoral fellowship in the Department of Child Psychiatry at Columbia University. Prior to coming to CHOP, Dr. Young was at Rutgers University where she was an Assistant and Associate Professor of Clinical Psychology.



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Peter Cronholm **MD, MSCE, CAQHPM, FAAFP**

Faculty Scholar

Peter Cronholm is a faculty scholar at PolicyLab at Children's Hospital of Philadelphia and an associate professor, director of Community Programs and associate program director in the Department of Family Medicine and Community Health at the Perelman School of Medicine at the University of Pennsylvania. His research interests have focused on health services regarding: 1) integration of trauma-informed care and primary prevention strategies into systems of primary care; and 2) developing novel mixed methodologies and patient-centered outcomes into research paradigms. He is an affiliate faculty member in the Graduate Program in Public Health Studies, a senior fellow in the Center for Public Health Initiatives, a senior scholar at the Leonard Davis Institute of Health Economics, an associate of the Firearm and Injury Center at Penn, an associate of the Philadelphia Collaborative Violence Prevention Center, and an affiliate of the Evelyn Jacobs Ortnier-Unity Program in Family Violence at the University of Pennsylvania School of Social Policy & Practice.

Dr. Cronholm is the co-director of the University of Pennsylvania's Mixed Methods Research Lab (a University of Pennsylvania Service Center that supports investigators in the development of conceptual and methodological approaches for community-based and clinical research questions) and has content expertise in program evaluation of health services using mixed methodologies and Community-Based Participatory Research techniques. He is actively involved in community programs addressing health disparities with a focus on preventing and reducing the impact of trauma throughout the lifespan having served as a member of the Board of Directors for the Academy on Violence and Abuse, Institute for Safe Families, the Men's Resource Center, Women Organized Against Rape, and Prevention Point Philadelphia. Dr. Cronholm is an active member of the Philadelphia Adverse Childhood Experiences (ACEs) Task Force's research committee as Lutheran Settlement House's Research Advisory Board. He has collaborated closely with PolicyLab in developing programming related to early home visitation, child injury and maltreatment and building qualitative and implementation science methodologies into research strategies.



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Clinical Research Assistant

Nellie Butler (she/her) is a clinical research assistant at PolicyLab at Children's Hospital of Philadelphia. Nellie works with Dr. Sabrina Gmuca on research aiming to identify innovative strategies to improve long-term treatment outcomes for adolescents with amplified musculoskeletal pain syndrome (AMPS) as well as increased accessibility to non-pharmacologic multidisciplinary treatment modalities. More specifically, their research explores the role of resilience and other psychosocial factors in adolescents with AMPS and their parents.

Prior to joining PolicyLab, Nellie worked as a research assistant at Nemours Children's Hospital in Delaware, contributing to projects exploring the long-term speech and language outcomes of children born with cleft palate. She served as a research assistant in the Legal Decision Lab while completing her bachelor's degree in psychology at Cornell University, working on a study examining legal decisions from a social-cognitive psychological perspective. Nellie later completed post-baccalaureate coursework in speech-language-hearing science at Temple University in 2022.



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Funders of Project

Snider Foundation, Rheumatology Research Foundation, National Institute of Arthritis and Musculoskeletal and Skin Diseases

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Related Tools & Publications

- [Learning from Teens to Treat Their Chronic Pain](#)
[Blog Post](#)
Apr 05, 2019
- [Tackling Adverse Childhood Experiences and Health Care Disparities in Youth with Chronic Pain](#)
[Blog Post](#)
Nov 02, 2021

- [Resilience Coaching: A Promising Treatment for Adolescent Chronic Musculoskeletal Pain](#)
[Blog Post](#)
May 05, 2022

- [The Role of Patient and Parental Resilience in Adolescents with Chronic Musculoskeletal Pain.](#)
[Article](#)
Apr 2019

- [Patient-proxy Agreement on Health-related Quality of Life in Juvenile Fibromyalgia Syndrome](#)
[Article](#)
May 2019

- [Opioid Prescribing and Polypharmacy in Children with Chronic Musculoskeletal Pain](#)
[Article](#)
Mar 2019

- [Validation of Claims-based Diagnoses of Adult and Pediatric Neuromyelitis Optica Spectrum Disorder and Variations in Diagnostic Evaluation and Treatment Initiation](#)
[Article](#)
Jan 2020

- [The Spectrum of Pediatric Amplified Musculoskeletal Pain Syndrome](#)
[Article](#)
Oct 2020

- [Suicidal Risk and Resilience in Juvenile Fibromyalgia Syndrome: A Cross-sectional Cohort Study](#)
[Article](#)
Jan 2021

- [Disordered Eating Among Adolescents with Chronic Pain: The Experience of a Pediatric Rheumatology Subspecialty Pain Clinic](#)
[Article](#)
Feb 2021

- [Exploring the Intersection of Adverse Childhood Experiences, Pediatric Chronic Pain and Rheumatic Disease](#)
[Article](#)
Feb 2022

- [Evaluation of Pediatric Rheumatology Telehealth Satisfaction During the COVID-19 Pandemic](#)
[Article](#)

Dec 2021

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[Non-pharmacologic Intensive Interdisciplinary Pain Treatment in Pediatrics: Impact on Health-related Quality of Life](#)

[Article](#)

Feb 2024

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[Barriers and Facilitators for Implementing Resilience Coaching for Youth With Chronic Musculoskeletal Pain: Pediatric Rheumatologists' Perspectives](#)

[Article](#)

Apr 2025

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[A Pilot Study on the Freelisting Method Among Adolescents with Chronic Musculoskeletal Pain: Feasibility, Acceptability and Study Findings](#)

[Article](#)

Dec 2024

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[Resilience Coaching for Adolescent Chronic Musculoskeletal Pain: Protocol for a Pilot Randomized Controlled Trial of Promoting Resilience in Stress Management \(PRISM\)](#)

[Article](#)

Jul 2025