

# Disease symptoms, social support, and optimism predict depression in cavernous malformations

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## ABSTRACT

**Background:** Cerebral cavernous malformations (CCM) are enlarged or irregularly-shaped blood vessels in the brain that can rupture and cause hemorrhage in the brain. As a result of this type of brain injury, many experience disabling symptoms such as cognitive deficits, paralysis and seizures. CCM is a rare condition affecting less than one percent of the population, and little research has been done on patient experience in this patient population. **Purpose:** The aim of this study is to investigate 1) the relationship between frequency of CCM symptoms on depression, and 2) whether perceived social support and optimism have direct or mediating effects on this relationship. **Methods:** A total of 272 people with CCM from around the world participated in the online survey. Participants were asked how frequently, if at all, they endorsed any CCM symptoms. The Medical Outcome Study-Social Support Survey (MOS-SSS), Life Orientation Test-Revised (LOT-R) and the Center for Epidemiologic Studies of Depression scale (CES-D) were used to measure perceived social support, optimism and depression, respectively. Multiple linear regression and multiple mediation regression were performed. **Results:** The first multiple linear regression was significant ( $R^2=0.39$ ,  $p<0.01$ ), and frequency of CCM symptoms and total household income predicted CES-D. The second multiple linear regression analysis was also significant ( $R^2=0.60$ ,  $p<0.01$ ). Current CCM symptoms, MOS-SSS and LOT-R together explained a greater variance in CES-D ( $\Delta R^2=0.21$ ). Total household income no longer predicted CES-D in this model. Lastly, the multiple mediation regression analysis was significant ( $R^2=0.60$ ,  $p<0.01$ ), suggesting partial mediation effect. **Conclusions and Implications:** This study demonstrates that current CCM symptoms predict increased depression, while perceived social support and optimism predict lower depression. The relationship between frequency of CCM symptoms and depression is partially mediated by perceived social support and optimism.

## Introduction

- Cerebral cavernous malformations (CCM) is vascular abnormality in the brain where the blood vessels are unusually enlarged
  - Prevalence rate approximately 0.5%
  - CCM symptoms include:
    - Seizures
    - Headaches
    - Neurological deficits
    - Cognitive symptoms
  - Research has shown comorbidity between depression and various neurological conditions (such as vertigo and dizziness<sup>1</sup>, multiple sclerosis<sup>2</sup>, and stroke<sup>3</sup>)
  - Research also demonstrates adequate social support is associated with fewer depressive symptoms in medical conditions (such as stroke<sup>4</sup>, HIV<sup>5</sup>, and traumatic brain injury<sup>6</sup>)
  - Optimism has been associated with lower depression in a variety of different populations<sup>7</sup>
  - Income has been listed as one of the most, if not the most, important social determinants of health as it affects psychological functioning and health-related behaviours<sup>8</sup>
- Research Questions:**
- Is there a relationship between frequency of CCM symptoms and depression?
  - Do perceived social support and optimism have direct or mediating effects on the aforementioned relationship?

## Methods

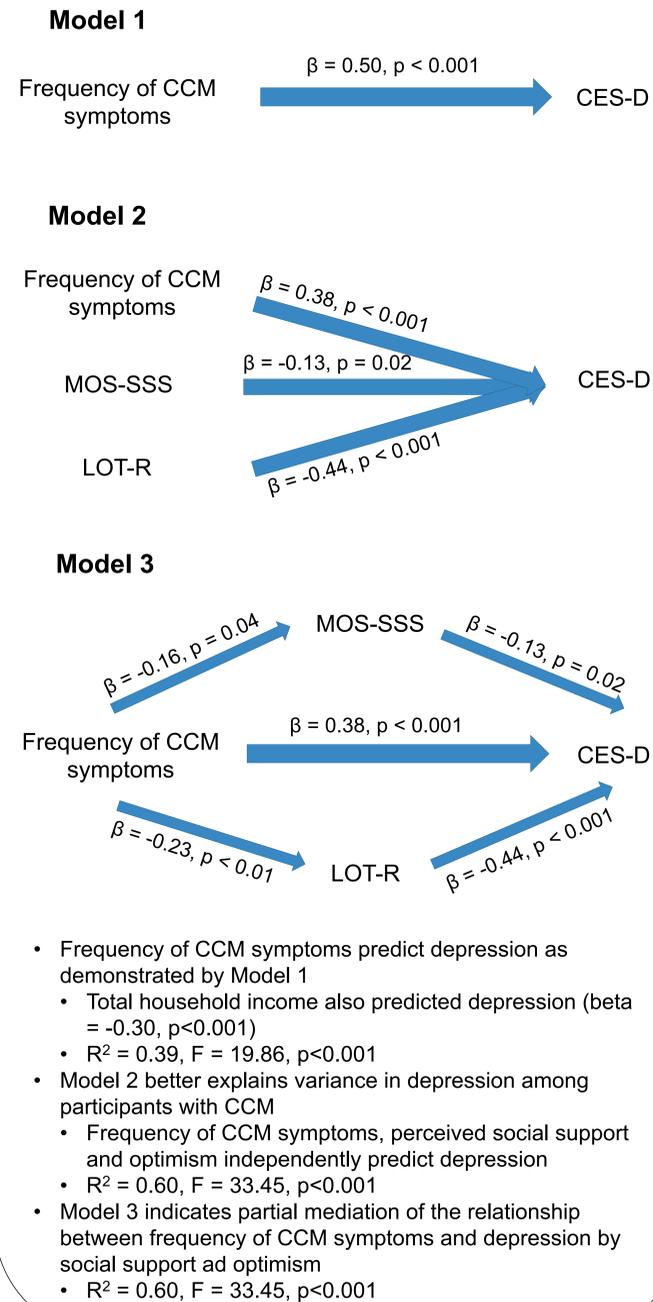
- Online survey of 272 individuals with CCM
- Recruitment assisted by Angioma Alliance (a patient support/advocacy organization for CCM)
- Questionnaires included:
  - Demographic questions
  - Frequency of CCM symptoms in the past year
  - Center for Epidemiologic Studies of Depression scale (CES-D)
  - Medical Outcome Study-Social Support Survey (MOS-SSS)
  - Life Orientation Test-Revised (LOT-R)
- Statistics: multiple linear regression and multiple mediation regression with CES-D as outcome variable
  - Controlled for age, gender, employment, household income, and highest level of education
  - Model 1:
    - Predictor variable: Frequency of CCM symptoms
  - Model 2:
    - Predictor variables: Frequency of CCM symptoms, MOS-SSS, LOT-R
  - Model 3:
    - Predictor variable: Frequency of CCM symptoms
    - Mediators: MOS-SSS and LOT-R

## Results

Table 1. Descriptive statistics for variables used in subsequent analyses.

Factor	Mean (SD) or Proportion
Age	44.45 (11.7)
Gender (Female)	74.5 %
Currently Employed	55.6%
Income (above \$50K/year)	63.3%
Education (some college or higher)	92.6%
Frequency of CCM Symptoms	46.5 (21.2)
CES-D	18.2 (13.0)
MOS-SSS	4.1 (1.0)
LOT-R	14.3 (6.0)

## Results



## Conclusions/Implications

- Symptom frequency is an important predictor of depression in patients with CCM, a rare neurological condition.
- Optimism and social support partially mediated the relationship between frequency of CCM symptoms and depression
- Practitioners must consider physical health symptoms in order to understand depression in patients with chronic neurological conditions.
- Practitioners should consider instilling hope in their patients with CCM to increase patients' optimism and may consider exploring the kind of social support patients have as it may lessen any depression patients may experience

### Limitations

- Higher income and education than general population
- May not be generalizable to other patient populations

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Thank you to Angioma Alliance and our participants!



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