



Review article

Heterogeneity in long-term trajectories of depressive symptoms: Patterns, predictors and outcomes



Katherine L. Musliner^{a,b,*}, Trine Munk-Olsen^a, William W. Eaton^b, Peter P. Zandi^b

^a National Centre for Register-Based Research, University of Aarhus, Aarhus, Denmark

^b Johns Hopkins Bloomberg School of Public Health, Department of Mental Health, Baltimore, MD, USA

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ABSTRACT

Background: Evidence suggests that long-term trajectories of depressive symptoms vary greatly throughout the population, with some individuals experiencing few or no symptoms, some experiencing transient symptoms and others experiencing chronic depression. The goal of this paper is to review studies that examined heterogeneity in long-term trajectories of depressive symptoms and summarize the current knowledge regarding (a) the number and patterns of trajectories and (b) antecedents and outcomes associated with different trajectory patterns.

Methods: We conducted a systematic review of literature in the Medline and PsychINFO databases. Articles were included if they (a) modeled trajectories of depressive symptoms, (b) used a group-based trajectory modeling approach, (c) followed participants for 5+ years and (d) had a sample size of at least 200.

Results: We identified 25 studies from 24 separate cohorts. Most of the studies identified either 3 or 4 distinct trajectory classes. Trajectories varied in terms of severity (low, medium, high) and stability (stable, increasing, decreasing). In most studies, the majority of participants had consistently few or no depressive symptoms, but a notable minority (usually < 10%) reported persistent symptoms. Predictors of trajectories with greater symptom burden included female gender, lower income/education and non-white race. Other predictors were specific to different populations (e.g. mothers, older adults). High symptom burden trajectories were associated with poor psychiatric and social outcomes.

Limitations: Comparisons between studies were qualitative.

Conclusions: Trajectories of depression symptoms in the general population are heterogeneous, with most individuals showing minimal symptoms but a notable minority experiencing chronic high symptom burden.

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* Corresponding author at: National Centre for Register-Based Research, University of Aarhus, Fuglesangs allé 4, Building K, 8210 Aarhus V, Denmark.

E-mail address: klm@econ.au.dk (K.L. Musliner).

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1. Introduction

Evidence suggests that long-term trajectories of depressive symptoms are heterogeneous; for some, depressive symptoms are transient; for others, stable; and for still others, symptoms come and go with varying degrees of frequency (Angst, 1988; Eaton et al., 2008; Keller et al., 1992; Merikangas et al., 1994; Mueller et al., 1996; Solomon et al., 1997). These group differences have important implications for our understanding both of the underlying cause (or causes) of depression and the distribution of the burden of depression. Different trajectory patterns may be indicative of underlying differences in etiology. In addition, individuals with particular long-term trajectory patterns may contribute disproportionately to the public health burden of depression, and suffer a disproportionate amount of the negative consequences.

Statistical methodologies for analyzing trajectories have advanced significantly over the past 15 years with the development of group-based trajectory modeling. These methods allow for the identification and characterization of distinct trajectory patterns within a population, and can also be used to identify predictor and outcome variables associated with different trajectory patterns (Muthen, 2004; Nagin, 1999). To date, numerous studies have been published using these methods to examine heterogeneity in trajectories of depressive symptoms. The time is right, therefore, for a review to synthesize the findings of these studies and provide an overview of the current state of knowledge on this topic.

The goal of this paper is to critically review the existing literature on heterogeneity in long-term trajectories of depressive symptoms. For our purposes, 'long-term' is defined as 5 or more years of follow-up. Of particular interest for this review were (1) the numbers of distinct trajectory patterns, (2) the prevalence of different trajectory patterns, (3) predictors/antecedents of different trajectory patterns and (4) outcomes associated with different trajectories.

2. Method

2.1. Selection criteria

Articles were included in the review if they met the following criteria: (a) the response variable in the trajectory analysis was depressive symptoms (as opposed to internalizing problems, for example), (b) the length of follow-up was at least 5 years, (c) the sample included at least 200 individuals and (d) the study employed a group-based trajectory modeling approach.

Group-based trajectory models are a collection of statistical methods designed specifically to identify patterns of trajectories separately for different sub-groups within a population. Group-based trajectory models are latent variable models, meaning they use correlations between observed (i.e. indicator) variables to make inferences about unobserved (i.e. latent) variables, such as membership in an unobserved class (Bartholomew and Knott, 1999). Unlike other methods for analyzing trajectories, such as hierarchical linear models (Bryk and Raudenbush, 1987) and

latent growth curve models (Willett and Sayer, 1994), group-based trajectory models do not assume that the trajectory of growth within a population varies around a single mean. Rather, they assume that the population in question is in fact composed of homogenous (or at least more homogenous) sub-populations with different trajectory parameters (Wang and Bodner, 2007). Rather than modeling the trajectory of the population as a whole, these models identify groups following distinct trajectories over time and estimate trajectory parameters separately for each group. Types of group-based trajectory models include Latent Class Growth Analysis (LCGA; also known as semi-parametric group-based modeling) (Jung and Wickrama, 2008; Nagin and Land, 1993; Nagin, 1999; Roeder et al., 1999), in which within-group variation is assumed to be zero, and Growth Mixture Models (GMM; Muthen (2004)), in which within-group variation can be incorporated as a random effect. Growth mixture models can be extended to include distal outcome variables, for example, in which case they are referred to as General Growth Mixture Models (GGMM; Muthen (2004)). Parameters of group-based trajectory models include the probability of membership in a particular latent trajectory class for each individual, as well as the intercept and slope of the trajectory for each class. Models that include covariates have additional coefficients for the associations between each covariate and membership in a given trajectory class, relative to a reference class.

2.2. Identification of relevant literature

The initial search was conducted using the MEDLINE and PsychINFO databases via the Ebscohost search engine. The following search terms were used: (depression OR depressive symptoms) AND (trajectories OR latent class growth analysis OR growth mixture model OR semi-parametric group-based modeling). We restricted the search to articles published in English in peer-reviewed journals between 1999 and June 2015. This search yielded 1231 results. The titles, abstracts and, where appropriate, manuscripts of the resulting records were then reviewed by the first author to determine whether each study met criteria for inclusion in the review. Finally, the reference lists of relevant articles were reviewed to identify any papers that might have been missed in the initial search.

Because the vast majority of studies that met criteria for inclusion used self-reported measures of depressive symptoms, we chose not to include studies which used measures based on parental report (Dekker et al., 2007; Prinzie et al., 2014). We also chose not to include studies of joint trajectories (i.e. depression and anxiety) (e.g. Coté et al. (2009) and Olinio et al. (2010)), depression and substance abuse (e.g. Brook et al. (2014) and Pahl et al. (2014)) or depression and delinquent or disruptive behavior (e.g. Brook et al. (2014) and Reinke et al. (2012)). Two additional studies were excluded because they focused on depressive symptoms specifically within the context of a stressful event, either a cancer diagnosis (Burton et al., 2015) or bereavement in caregivers (Aneshensel et al., 2004).

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