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Editorial

Establishing a theoretical basis for research in musculoskeletal epidemiology: a proposal for the use of biopsychosocial theory in investigations of back pain and smoking

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Abstract

Objective: This article discusses the need for theoretical foundations in epidemiological research of musculoskeletal conditions and suggests the use of biopsychosocial theory when designing epidemiological studies. The association between smoking and back pain is used as an example.

Discussion: Theory-driven musculoskeletal epidemiologic research is not common. In the epidemiological study of musculoskeletal conditions, there are multiple potential causes of a disease or disorder. Classic biomedical theory is not well suited to explain such phenomena. Biopsychosocial theory is a means through which investigators might formulate hypotheses for testing relationships between smoking, back pain, and other variables. Various types of conceptual frameworks and analytical models can be informed by biopsychosocial theory.

Conclusion: Biopsychosocial theory is well suited for public health and epidemiological studies on musculoskeletal conditions, such as the relation between back pain and smoking, and may be useful to address the multivariable inputs for this association. Although it is not a perfect model, it provides theoretical guidance to inform the research question, an element of research design that is lacking in modern-day epidemiologic reports.

Introduction

Theory is essential to sound research. Theory helps scientists recognize interactions between social and biological factors that may affect population health [1] and provides explanations for what is observed. [2]

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Although traditional research uses theory-driven methods, little attention seems to be paid to theoretical foundations and conceptual frameworks for epidemiological research, especially those of musculoskeletal conditions. Given that scientific research is inherently driven by theories and hypotheses,[3] we believe this is an essential component to furthering research in musculoskeletal public health research. There are many models to select from when planning public health interventions, such as the theory of planned behavior[4] or the theory of reasoned action.[5] However, when planning to conduct secondary data analyses for epidemiologic studies on musculoskeletal conditions and associated behaviors, existing models are rare.

When reviewing the musculoskeletal epidemiologic literature, it is not clear why some researchers select the variables that they do to create their statistical models. Few studies provide explanations for variable selection, and far fewer studies are directed by a clear theoretical framework. Historically, early authors observed apparent interactions of variables of interest and designed observational studies to quantify the magnitude of the association between the variables. More recent studies identify shortcomings in the multivariable analyses of previous publications and design studies to control for such problems. Another tactic is to identify a unique association that has not previously been studied and design an epidemiological study to investigate the relationship. Such studies are grounded in fixing a problem identified in previous research or describing a "first" rather than in a theory that works toward a testable hypothesis.

Limited theoretical guidance is a widespread issue in epidemiologic research. Krieger[6] states, "… graduate students in epidemiology are far more likely to be taught about study design and data analysis than they are about how to generate epidemiologic hypotheses about the societal dynamics of health and disease." Weed[2] also recognizes the heavy emphasis on epidemiologic practice, rather than on theory, "No one should consider contemporary epidemiology a theoretically-rich nor even a theoretically-inclined discipline. Methods and practice far outweigh theory in nearly all professional activities, including education and training, professional publications, and the culture of the discipline."

In short, much of epidemiologic thought in the past few decades has focused on methods for conducting research and interpreting results, but not on epidemiologic thinking.[3] A coherent theoretical background that guides hypothesis development and leads to the selection of variables is greatly needed in the area of musculoskeletal epidemiology. Therefore, if we are going to progress in the fields of epidemiology and musculoskeletal research, greater attention needs to be given to theoretically driven designs.

The purpose of this article is to discuss the need for theoretical foundations in epidemiologic research of musculoskeletal conditions, to provide a brief synopsis of the biopsychosocial (BPS) model of Engel, and to use BPS theory to select variables for an epidemiologic study of the association between smoking and back pain as an example.

Discussion

Back pain, a chronic disease epidemic, represents the most common chronic painful condition in Americans.[7] The 3-month prevalence of back pain in the adult population of the United States is estimated to be 17%,[8] affecting 34 million adults; and the prevalence is increasing.[9] The lifetime prevalence of back pain exceeds 70%,[10] mainly because back pain is highly recurrent.[11] From a financial perspective, back problems rank as the sixth most costly consumer health condition and the fourth most costly health condition for employers in the United States, with direct costs of back pain estimated to be between $12.2 and $90.6 billion annually for the United States alone, representing approximately $45 to $335 per person each year.[12] People with back pain are high users of the health care system; back pain is the second most frequent reason for physician visits, the fifth most common reason for hospitalization, and the third most common reason for surgery.[13] There are compelling data to demonstrate that back pain is a significant public health burden and is not well controlled in the population.

As back pain is complicated, there are many possible causes. If we are to reduce the morbidity and suffering from back pain and possibly devise effective back pain prevention strategies, having a clear understanding of the various causative factors is important. Some studies have suggested that smoking may be associated with back pain; however, it is not clear what may be the associated factors that theoretically link these 2 entities.

During the 1970s, scientists began to suspect a deleterious relationship between smoking and back pain.[14] Since then, more than 80 epidemiological studies have reported on the association between smoking and back pain.[15] However, the magnitude of association between smoking and back pain varies among studies,[15] suggesting the potential influence of confounders and/or effect modifiers.[16] Covariates that have been studied in previous research are vast and include variables related to