

# Depression: A Mismatch between the Human Environment of Evolutionary Adaptiveness and Modern Society

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## Abstract

The prevalence of depression has been on the rise since the inception of the modernization of human society from the late 18th century to today. The present-day human lifestyle is a stark contrast to the way our hunter-gatherer ancestors lived. This contrast raises concerns of the relationship between the resulting factors of a modern-day lifestyle and the increasing rates of depression within industrialized populations. The environment of evolutionary adaptiveness (EEA) of early humans that resulted in human brain development is very different than the environment humans face in modern society. An examination of research looking into similar conditions and lifestyles human ancestors lived in may help to further the knowledge of the illness of depression today. Studies are indicating support for alternative human lifestyles, but the evidence and interpretations from these studies require careful examination.

*Keywords:* depression, evolution, psychology, urbanization, industrialization, hunter-gatherer, lifestyle

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## **Depression: A Mismatch between the Human Environment of Evolutionary Adaptiveness and Modern Society**

Evolutionary and clinical psychologists have suggested that modernization may be contributing to the depression epidemic (Ilardi et al., 1995). Modernization can be described as the urbanization, industrialization, westernization, and capitalization of human society, from the late 18<sup>th</sup> century to today. Some of the resulting factors of modernization include an increase in technology, a reduction in nutritional diets, sedentary lifestyles, a lack of sunlight, and increasing social isolation. These factors are in stark contrast to the ways our hunter-gatherer ancestors lived. Subsequently, the prevalence of depression has risen over the past century, especially in recent decades (Hidaka, 2012). A large indicator to modernization is that it has been generally associated with higher rates of depression in the population (Hidaka, 2012). The human environment of evolutionary adaptiveness (EEA) of early humans that resulted in our brain development is different than the environment we face in modern society. Therefore, an examination of research looking into similar conditions and lifestyles our ancestors lived in may help to further our knowledge of the illness of depression today. Studies are indicating support for alternative human lifestyles, but the evidence and interpretations from these studies require careful examination. The strengths and weaknesses from various studies will be discussed and challenged in relation with their findings and application to the human EEA and depression.

Our ancestors were constantly active in the outdoors: hunting, gathering, and walking long distances. In modern day society, humans are increasingly inactive, spending more time indoors at their jobs, schools, and inside their homes. A systematic, qualitative search was conducted including seven observational and four intervention studies on associations between sedentary behaviour (SB) and depression in adults (Teychenne et al., 2010). Figure 1 shows the process used by the authors to determine which studies to include in the review. Teychenne and colleagues found positive correlations between SB and risk of depression in all seven observational studies, although the methodological weaknesses within most of the studies seem to limit their evidence for the relationship between SB and risk of depression. The weaknesses include small sample sizes, insensitive measures, and self-report measures of sedentary behavior. Thus, findings are limited by generalizability, test-reliability, recall difficulties, socially desirable answers, and errors in judgment (Teychenne et al., 2010). In addition, the

majority of studies included were cross-sectional, meaning that causality and direction of relationships cannot be determined. Therefore, the studies in the review conclude suggestive positive associations between SB and depression, but no causal link.

Further literature on the hunter-gatherer lifestyle suggests that humans are currently living in an emotionally-stressed twenty-first century world. A review, using a qualitative method, suggests that in comparison with the millennial pace of genetic evolution, human technological and social evolution has occurred at light speed (O'Keefe et al., 2011). This has left humans with an incongruence between our genetic adaptation for life as a forager in the wild versus current modern-day lifestyles (O'Keefe et al., 2011). The review continues onwards to claim that the human genome remains adapted to the physical regimen of hunter-gathers which included foraging, hunting for food, social interaction, confrontation with or flight from predators, and making and maintaining shelters (O'Keefe et al., 2011). All of these activities required large expenditures of energy, which the human body is still capable of. In addition, the authors logically suggest that the onset of the agricultural revolution, industrial revolution, and the digital age have resulted in a dramatic and consequential reduction in physical work demands (O'Keefe et al., 2011). The review provides sufficient logical reasoning on the mismatch of the human EEA and modern human lifestyle.

In addition, modern agriculture has changed animal feeds, placing a greater emphasis on production. This has decreased the omega-3 fatty acid content in many foods, such as animal meats, eggs, and fish (Simopoulos, 2016). Furthermore, foods made from edible wild plants contain a good balance of omega-6 and omega-3 fatty acids (Simopoulos, 2016). Our rapid dietary changes within the past 150 years have resulted in much less consumption of brain healthy fats. Figure 2 by Simopoulos highlights a hypothetical scheme of fat and intake of fatty acids as a percent of calories from fat. The data were derived from cross-sectional analyses of contemporary hunter-gatherer populations and from longitudinal observations and their changes during the preceding hundred years. Furthermore, meta-analysis research using forty-seven studies has provided evidence for using omega-3 fatty acids to treat patients with a diagnosis of major depressive disorder (MDD) and on depressive patients without a diagnosis of MDD (Grosso et al., 2014). The evidence is weakened due to the exclusion of three quantitative analysis studies that could affect the overall effect of the omega-3 supplement (Grosso et al., 2014). Also, it should be noted that the meta-analysis could not control for all

potential sources of heterogeneity, meaning the control of variation outcomes between the multiple studies (Grosso et al., 2014).

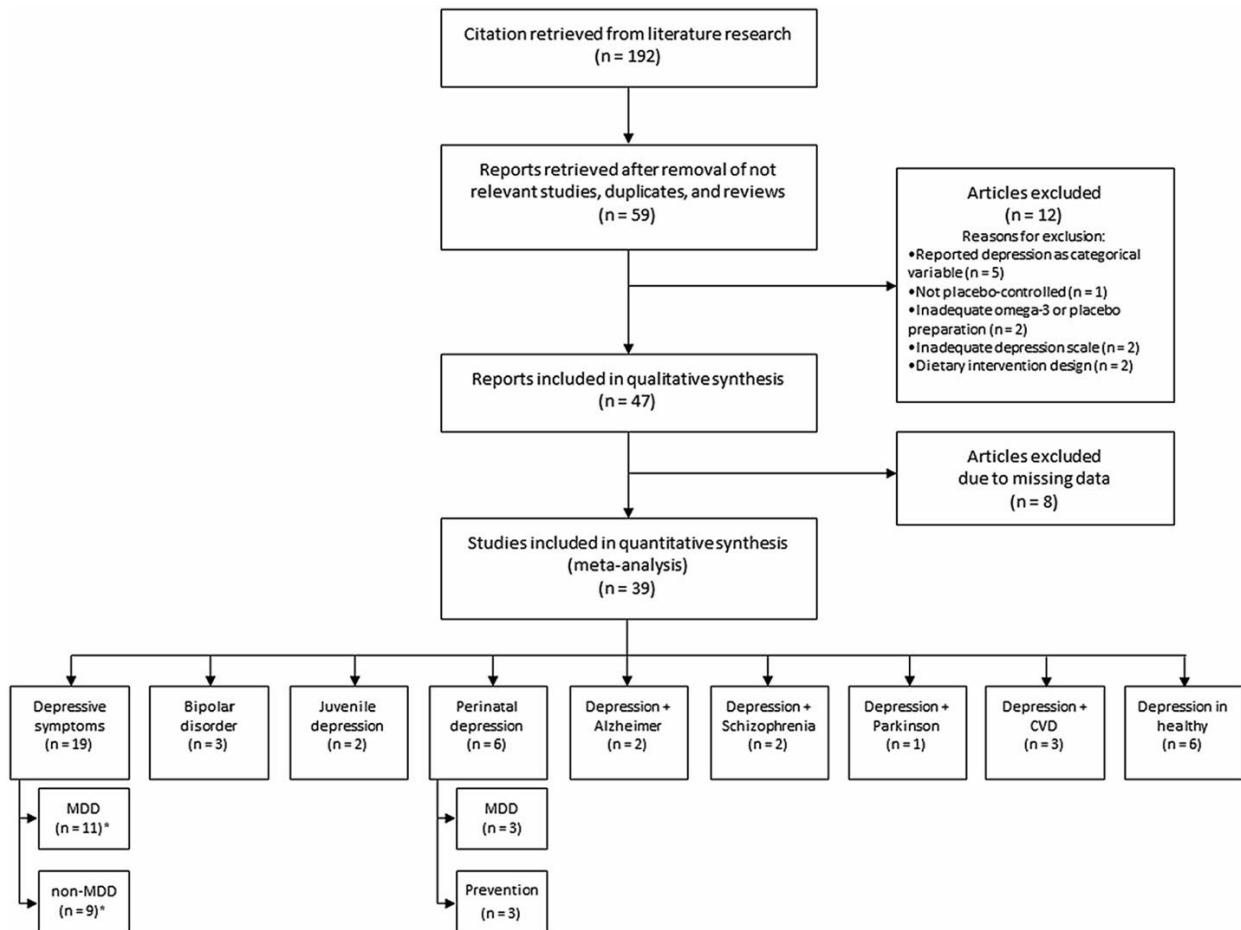
A qualitative, cross-cultural research study examined depression and modernization in women living in developing and developed (modern) parts of the world (Colla et al., 2006). The prevalence of depression was lowest among rural Nigerians and highest among urban residents in the United States (Colla et al., 2006). Rural-living Nigerians have lifestyles that are closer in similarity to those of hunter-gatherers. In contrast, urban-living Americans have lifestyles influenced by modernization. The research findings indicate that lifetime depression rates increased from a low of 10% in rural Nigeria to a high of 32% in urban North America (Colla et al., 2006). Figure 3 by Colla and colleagues show the prevalence rates of depression in women in their study. The weaknesses of this study include a small sampling procedure and a sample limited to women only. The strengths of this study are that the researchers applied consistent methods across sites. All parts of the data are accounted for and are represented precisely in five tables. The logic of the study emphasizes an awareness of levels of modernization and to give attention to the nature of the social environments in which people live (Colla et al., 2006).

Humans living in urban areas have been found to have higher levels of depression compared to those living in rural areas (Montgomery, 2018), which may suggest a mismatch in the living environments between today's urban living humans and our rural living ancestors. For instance, a study done on American Amish women found that they had fewer symptoms of depression in comparison to women in the general Western population (Miller et al., 2007). The Amish live in a society with many pre-industrial features, and they value community and social connection. This qualitative study used population-based surveys. The weaknesses of the study include potential self-report errors, non-generalizability, cultural barriers in the survey design and questionable validity of the measures (Miller et al., 2007). For example, scores on specific values such as self-esteem do not take into account the Amish cultural values. However, a major strength of this study is that it was the first systematic, population-based survey done on women living in Amish culture (Miller et al., 2007). Overall, a correlation does appear to exist between levels of industrialization, and depressive symptoms.

This paper has focused on the mismatch between the early human evolutionary adaptiveness and modern-day human lifestyle which could be contributing to a rise in

depression. Research literature has suggested that humans are better adapted to the lifestyles of our hunter-gatherer ancestors. The Western, industrialized, modern day environment has resulted in the opposite of our ancestors' lifestyle, including sedentary behaviour, a lack of omega-3 intake, a lack of community, and less social connection. It is suggested that the rising rates of depression could be a possible consequence of modernity. The various strengths and weaknesses from various studies and literature that has been addressed further opens up the dialogue on evolutionary factors that could be linked with rising rates of depression in the past decades.

## Figures



\*one study included MDD and non-MDD patients

*Figure 1.* The process of inclusion of trials for systematic review and meta-analysis of studies on omega-3 fatty acids and depressive symptoms. MDD = Major Depressive Disorder, CVD = Cardiovascular Disease, and n = sample size. Reprinted from “Role of omega-3 fatty acids in the treatment of depressive disorders: A comprehensive meta-analysis of randomized clinical trials” by G. Grosso, A. Pajak, S. Marventano, S. Castellano, F. Galvano, C. Bucolo, et al., 2014, *PloS One*, 9(5), p. 3. Copyright 2014 by Grosso et al.

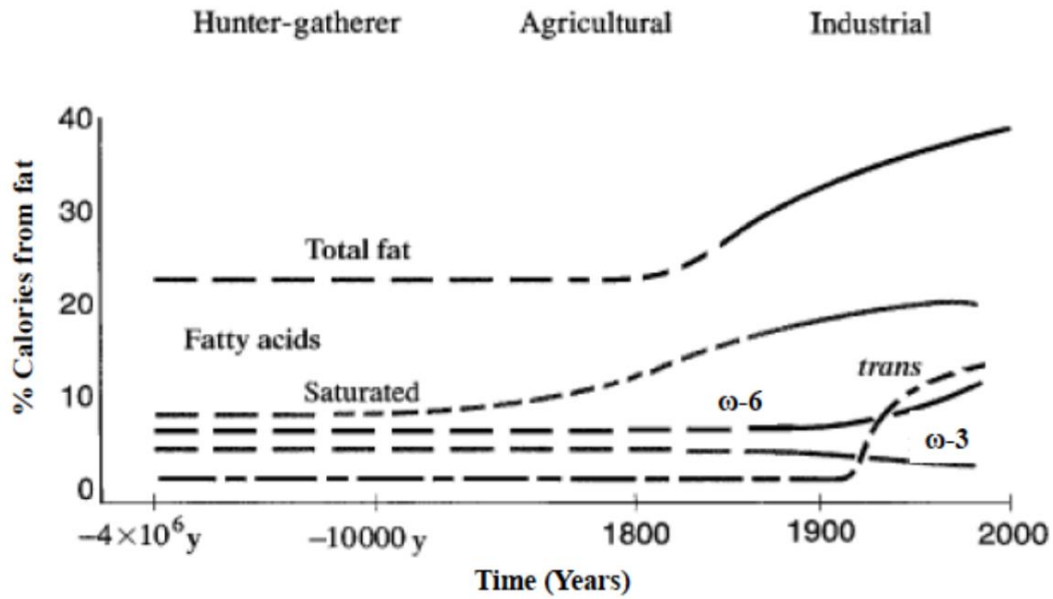
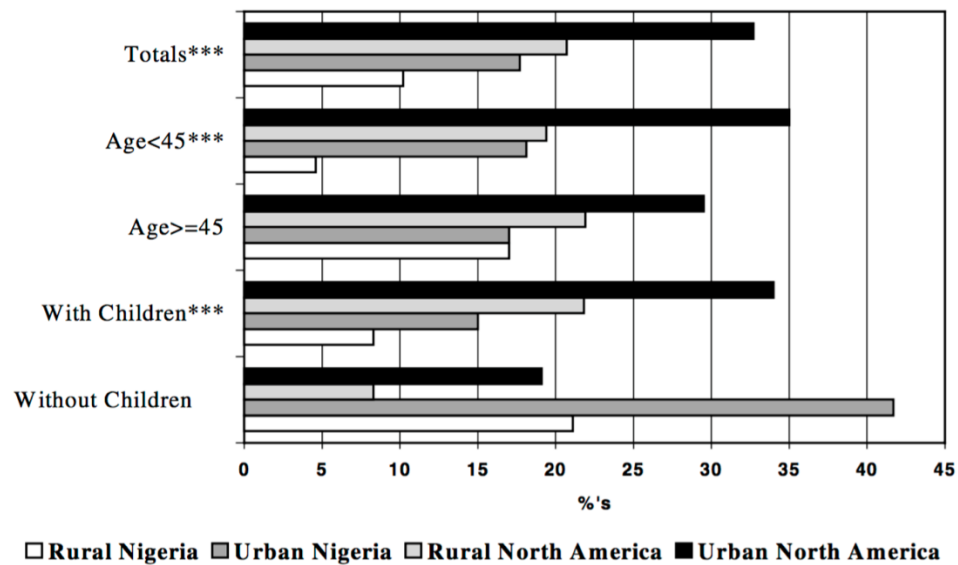


Figure 2. Hypothetical graph showing an increase in total fat consumption and a decrease in omega-3 consumption by humans approaching modern day times. Reprinted from ‘An Increase in the Omega-6/Omega-3 Fatty Acid Ratio Increases the Risk for Obesity’ by A. P. Simopoulos, 2016, *Nutrients*, 8(3), p. 128. Copyright 2016 by A. P. Simopoulos.



*Figure 3.* Prevalence of depression by location, age status, and child status. Reprinted from ‘Depression and modernization: A cross-cultural study of women’ by J. Colla, S. Buka, D. Harrington, & J. M. Murphy, 2006, *Social Psychiatry and Psychiatric Epidemiology: The International Journal for Research in Social and Genetic Epidemiology and Mental Health Services*, 41(4), p. 277. Copyright 2006 by Social Psychiatry and Psychiatric Epidemiology.



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