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# SOCIOECONOMIC CONDITIONS IN CHILDHOOD AND MENTAL HEALTH LATER IN LIFE\*

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## **Abstract**

This chapter provides a narrative review of the literature relating socioeconomic circumstances early in life to mental health and well-being later in life. It starts by highlighting the various contributions focusing on associations, then moves on to the literature attempting to identify causal effects before discussing the potential mechanisms at play. The chapter closes with a view toward research questions that may inform a future research agenda and highlights some anchors for policy.

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## **1. Introduction**

Mental health is described as a “state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community” (WHO, 2018). However, up to 20% of the working age population in high-income countries suffers from a mental disorder at any point in time and lifetime prevalence is estimated to be up to 50% (OECD, 2018; Murray et al., 2012; Whiteford et al., 2016). While physical health problems mainly peak late in life, mental health problems have an earlier age of onset (Kessler et al., 2007). As a consequence, absenteeism, presenteeism, work disability and early retirement due to mental health problems inflict substantial productivity losses on individuals and society at large. The societal cost of mental disorders is estimated to be 3 to 4% of GDP in OECD countries (OECD, 2018).

Given the early onset and high prevalence of mental health issues, it is crucial to identify the sources of these issues as early in life as possible because early intervention can provide the highest lifetime returns (Hendren and Sprung-Keyser, 2020; Garcia et al., 2020). With the advent of Barker (1995), a large literature has evolved establishing the relationship between events early in life and health later in life. In relatively separate strands of literature, epidemiology, economics, demography, sociology and various medical disciplines have conclusively established that challenging socioeconomic conditions early in life lead to a myriad of adverse health outcomes later in life.

Nevertheless, the socioeconomic gradient of mental health and its origin in early-life conditions have received limited attention in the academic literature, as well as in policy discussions (WHO, 2018; Stewart-Brown et al., 2015; Smith, 2015). The existing literature suggests that mental illness and socioeconomic conditions are intertwined in the sense that adverse early-life conditions lead to poor mental health outcomes, which in turn lead to inferior socioeconomic outcomes (Koenen et al. 2013). Importantly, this process may spill over to the next generation as mental health problems display strong intergenerational persistence due to genetic and environmental factors (Angelini et al., 2016).

Due to this lack of a clear causal pathway, it is apparent that an association between socioeconomic conditions early in life and mental health and well-being later in life is not necessarily indicative of a causal relationship. Indeed, challenging socioeconomic conditions early in life might be driven by the same forces that drive adverse outcomes later in life. The literature approaches this endogeneity issue in several ways. The gold standard for estimating causal effects is a randomized controlled trial (RCT). RCTs are commonly used to evaluate early childhood intervention programs. Estimating long-term effects is often difficult due to attrition and lack of long-term follow-up and requires supplementation with non-experimental data (Currie and Rossin-Slater, 2016; Garcia et al., 2020). When RCTs are not available or not feasible, natural experiments are often used as exogenous shocks to the individual socioeconomic conditions. Examples of such shocks are famines, mass layoffs, and educational reforms. This approach provides clear identification, but the shocks considered are often either extreme (famines) or very specific (increases in mandatory schooling). More common circumstances affecting socioeconomic status have been studied in the stream of literature that started with the seminal contribution of van den Berg et al. (2006). The study highlighted how movements in macroeconomic aggregates can be used as exogenous indicators of individual socioeconomic conditions, thus paving the way for causal inference (van den Berg et al., 2009; 2011; van den Berg and Modin, 2013, van den Berg and Lindeboom, 2014).

Yet, as recently emphasized by Almond et al. (2018), still very little is known about the mechanisms through which adverse socioeconomic conditions around birth operate and whether it would be possible to intervene at some point between birth and old age to prevent that early-life disadvantages translate into poor health outcomes later in life. Two complementary conceptual frameworks have been proposed to explain the long shadow of adverse early-life socioeconomic conditions: the biological programming hypothesis and the life-course framework. According to the biological programming hypothesis (Barker, 1995; Case et al., 2005; Almond and Currie, 2011), certain exposures during pregnancy permanently and irreversibly alter the development of the fetus and its organs, tissues and systems, with negative long term consequences on health and especially on the occurrence of some diseases, such as cardiovascular diseases. Within this framework,

early life intervention is crucial (Heckman, 2012). The life-course framework (Kuh and Ben-Shlomo, 2004), on the other hand, rests less on the biological mechanisms and states that the impact of early life conditions on health later in life depends on the interaction of the individual with the environment. The idea is that adverse economic conditions early in life set in motion lifetime trajectories of health-related disadvantages. For example, children born under adverse socioeconomic conditions might be exposed to poor diets, parental smoking, worse educational and job opportunities, and all these factors in turn will have a negative impact on health. In the life-course framework, later life interventions could be highly effective. The biological programming and the life-course frameworks are not substitutes but rather can be seen as complements that emphasize the range of mechanisms in the transmission of early life adversity to health outcomes later in life.

Against the above backdrop, this chapter reviews the emerging literature connecting socioeconomic conditions early in life to mental health and well-being later in life, focusing specifically on high-income countries. Well-being is a general term that refers to high levels of positive functioning—primarily in the mental health domain (CDC, 2018). In its broadest sense, well-being encompasses also physical and social domains, but we focus in this chapter primarily on the mental health dimension of well-being, including life satisfaction. Moreover, even though the socioeconomic environment is just one of the many early-life conditions that may adversely affect health later in life, other forms of hardship that may, in and of themselves affect, health later in life are not the focus of this overview. Indeed, experiencing maltreatment, parental divorce, teen pregnancy, lack of sanitary services and hunger may all affect health later in life but it is beyond the scope of the current chapter to provide an exhaustive review of the role played by early-life conditions in general for mental health later in life. Despite that, such forms of hardship may, of course, act as mechanisms by which adverse socioeconomic conditions early in life translate into adverse mental health outcomes later in life.

The next section focuses specifically on the various studies reporting associations between early-life socioeconomic conditions and mental health later in life. Section 3 reviews the literature investigating causal relationships. Next, Section 4 highlights some of the mechanisms behind these relationships before Section 5 that provides some anchors for

policy. Finally, Section 6 outlines potential directions for further research and Section 7 concludes.

## **2. Associations between early-life conditions and mental health and well-being later in life**

Over the last several decades, research across several disciplines has produced overwhelming evidence that early-life conditions and adult well-being are correlated. Convincing evidence exists that adverse exposures early in life lead to increased all-cause mortality, cardiovascular mortality and cognitive decline late in life. Excellent overviews can be found in Almond and Currie (2011), Currie and Rossin-Slater (2015), and Almond et al. (2018). Yet, the evidence on mental health outcomes is less comprehensive.

### **2.1 Measuring childhood socioeconomic conditions, mental health and well-being**

Three common measures of childhood socioeconomic conditions and socioeconomic status (SES) are parental education, income, and occupation. Due to data limitations, often only one of these indicators is used. For instance, Pickles (2010), Power et al. (2007), Gilman et al. (2002; 2003) use parental occupation, Lê-Scherban et al. (2016) use household wealth while Spencer et al. (2013) consider income below the poverty line as a binary indicator. Although all of these measures are related, each of them measures a slightly different concept and is, therefore, an imperfect measure of SES. For example, while income is more transient, wealth or education are more persistent. Hence, the different measures might produce different results. Luo and Waite (2005) overcome this issue by combining the three dimensions in one indicator. Tani et al. (2016) ask the sample to self-rate their childhood SES. Although there is some debate on the ability of old-age respondents to recall past events accurately, Havari and Mazzonna (2015) confirmed the internal and external consistency of some measures of childhood socioeconomic status using data from the survey of health, aging and retirement in Europe (SHARE). They constructed a single measure of SES combining a range of childhood environment measures, such as the number of rooms in the house, facilities, books and parental occupation. This measure is used by Angelini et al. (2019) to study the relationship between childhood SES and late-life depression.

The measures of mental health and well-being used in the literature vary depending on the data source. Studies that use administrative data can analyse a limited number of relatively objective measures of mental health, such as diagnosis, hospitalizations or prescription drugs data. Although these outcome measures cannot cover all aspects of well-being, the advantages of administrative data are the large numbers of observations and often high quality of the data. Studies that use survey data often use validated mental health screening questionnaires such as EuroD (Angelini et al., 2019) or Mental Health Inventory (van den Broek and Fleischmann, 2019). Life satisfaction can be measured in surveys using a scale of 0 (completely dissatisfied) to 10 (completely satisfied). Apart from a smaller number of observations, self-reported survey data can suffer from reporting heterogeneity. Deaton (2008) explains that the evaluation of subjective well-being is relative: people compare their situation with a subjective benchmark that depends on one's past experiences. For example, Bertoni (2015) shows that the experience of childhood starvation leads people to give a higher rating to the same latent level of well-being while Stansfeld and Marmot (1992) show that people in lower employment grades tend to under-report minor psychiatric disorder relative to those in higher employment grades. Failure to address this issue can lead to underestimating the negative relationship between childhood conditions and late-life well-being.

## 2.2 Childhood conditions and mental health later in life

The Isle of Wight study (Rutter et al., 1976; Rutter 1989) was, arguably, one of the first studies highlighting the role played by so-called 'family disadvantage' for mental health problems in childhood and adolescents. It started in 1964 by surveying the entire population of 9-11 year old children living on the island, focusing on intellectual, psychiatric and physical disability. Following these children across the life-course showed that the disadvantages faced and accumulated early in life predict, for instance, literacy (Maughan et al., 2009) and suicidality in late-adulthood (Pickles et al., 2010).

Another early source of data on socioeconomic inequality and health outcomes are the Whitehall and Whitehall II studies of British civil servants, which detail evidence of strong associations between both adult SES (Marmot et al., 1978) and childhood SES (Brunner

et al., 1999), and various forms of ill health (including mental health, see Stansfeld & Marmot, 1992) at several stages in later life.

Since then, several studies have shown associations between childhood socioeconomic status and adult markers of mental health. One of the most studied mental health disorders in this context is depression. Gilman et al. (2002, 2003), Luo & Waite (2005), Power et al. (2007), Tani et al. (2016), Lê-Scherban et al. (2016), and Angelini et al. (2019) show that the socioeconomic conditions in childhood are correlated to depression in adulthood. The findings come from various geographic locations, such as the United States, Europe, and Japan, several depression measures and numerous cohorts. Nevertheless, not all studies find significant relationships. Using the Dunedin Multidisciplinary Health and Development Study, Poulton et al. (2002) present evidence that depression is not linked to childhood SES, even though some physical health outcomes do exhibit a gradient by childhood SES.

It is noteworthy that these studies control for contemporaneous socioeconomic status when estimating the association with childhood SES because adult and childhood SES are correlated. For example, those with college-educated and relatively wealthy parents are more likely to have access to educational opportunities and consequently to a higher status, well-paying careers (Cohen et al., 2010, Angelini et al., 2019). Although the results cannot be interpreted as causal, after controlling for contemporaneous SES, the studies still find the association between childhood SES and mental health later in life suggesting that the effects on later life mental health are not driven solely by contemporary SES.

In addition, some studies pay particular attention to gender-specific and age-specific estimates of the association between childhood SES and depression in late-adulthood. The literature has shown that the prevalence of depression demonstrates a substantial gender gap (Rudenstine, 2013; van de Velde et al., 2010) and an age gradient (Blanchflower and Oswald, 2008; Tani et al., 2016). In addition, men and women may react differently to their (socioeconomic) environment (Cleary, 1987; van de Velde et al., 2010). Gender-specific analyses reveal that the association is more pronounced for women (Angelini et al., 2019; Gilman et al., 2002, 2003). Age-specific analyses show that the link between childhood SES and depression is stronger among the younger old (65–74 years) than the oldest old ( $\geq 75$  years) (Tani et al., 2016).



Other mental health outcomes are less studied. Mäki et al. (2005), examining previous literature on childhood determinants of schizophrenia, show that the relationship between childhood SES and schizophrenia is not clear-cut, although Lumey et al. (2011) in their review conclude that schizophrenia is convincingly associated with early-life hunger and malnutrition. Gauffin et al. (2013) show that school failure and childhood socioeconomic status predict illicit drug abuse in youth and young adults in Sweden. Furthermore, a wide range of childhood adversities, including socioeconomic conditions, are associated with elevated risk for eating disorders during early adulthood (Johnson et al., 2002; Mitchell and Bulik, 2013). Finally, Lähdepuro et al. (2019) demonstrate that early life stress and low SES in childhood are associated with increased anxiety symptoms in late adulthood and accumulation of stress increases the levels of the symptoms as well as the risk of clinically significant anxiety.

### **3. Causal Inference**

Although the evidence on the association between early-life conditions and mental health and well-being is mounting, questions about causality remain. In particular, while the studies highlighted above control for important background characteristics, there might be confounding factors, such as family background or parental genetic predisposition to certain diseases, which have an impact on both household economic conditions early in life and late-life health outcomes (Currie and Rossin-Slater, 2016). For causal inference, one would need to randomize the socioeconomic conditions individuals face in childhood, which is not feasible due to practical and ethical considerations. Therefore, direct causal evidence on the impact of childhood SES on mental health later in life is scarce. Nevertheless, several approaches can be used to generate evidence related to this topic.

#### **3.1. Effects of conditions *in utero***

One approach to avoid endogeneity problems with the use of measures of economic conditions in the household into which the individual is born is to exploit the exogenous variation provided by contextual variables. Contextual variables in this sense are variables that affect the individual's socioeconomic conditions and stress levels but cannot be influenced by the individual him/herself. Some studies have exploited variation in the

early-life conditions provided by sudden and unexpected catastrophic events. For example, van den Broek and Fleischmann (2019) study the prenatal Dutch Hunger Winter (1944-45) exposure in a difference-in-difference setting and find that in the cities affected by famine mental health (measured with the mental health inventory questionnaire) was significantly better for the pre-famine and post-famine cohorts compared to the cohort born during the famine. Similarly, although not in a high-income country, Huang et al. (2013) use the data on Chinese famine and find that pre- and post-natal exposure to the Great Chinese famine (1959-1961) has increased the risk of mental illness for women, while for men they do not find such effects. They argue that this may be due to a stronger natural selection in utero of male versus female fetuses during a severe famine period.

In contrast to the above mentioned studies that focus on rare and extreme events, another stream of literature uses milder fluctuations in the macroeconomic indicators such as the Gross Domestic Product or unemployment levels as proxies for the early-life economic conditions. In this case, either individuals born in economic booms are compared to individuals born in recessions, or regional fluctuations in macroeconomic indicators are exploited. This approach has been used to study physical health and cognition, for instance, by van den Berg et al., (2006, 2009, and 2011), Doblhammer et al. (2013), Cutler et al. (2016), Alessie et al. (2019) and the overviews in Almond and Currie (2011) and van den Berg and Lindeboom (2014). This approach can also be used for studying mental health outcomes, although results must be interpreted with caution because fluctuations in macroeconomic conditions can affect many variables and these effects might change over time.

An important consideration in this literature is the possibility that any effect of early-life circumstances on later life health could be due to selection effects. During harsh economic times there might be changes in the type of mothers who give birth, causing a change in the composition of the birth cohort. In the event of an extreme exposure, such as a famine, this could mean that the families who suffer the most and experience the harshest conditions are also the ones who experience lower fertility because of this famine. The resulting birth cohort might then have a higher socioeconomic status on average. For

milder exposures, such as economic booms and recessions, this could mean differences in fertility decisions between SES groups. For example, using US data, Deheija and Lleras-Muney (2004) show that Black mothers with higher socioeconomic status are more likely to have children during recessions, while for White mothers they document the opposite: those with lower socioeconomic status are more likely to have children during recessions. If during harsh economic times it is especially well-off mothers who delay fertility, the long-term negative effects of early-life conditions on later-life outcomes might be driven by selective fertility (see also van den Berg and Modin, 2013).

To overcome the selection effects, some studies exploit the differences in childhood conditions between siblings. By comparing siblings born to the same parents at different times, these studies can control for any constant unobserved components of family background that are shared by the two siblings. This approach is used, for instance, by van den Berg and Modin(2013), Bharadwaj et al. (2017) Helgertz and Persson (2014), Krutikova and Lilleor (2015) to study educational, physical health and personality outcomes. However, to our knowledge, this approach has not been applied for evidence on mental health outcomes in the context of high-income countries.

### 3.2 Effects of childhood conditions

A large literature studies the effects of involuntary parental job loss on child health and economic outcomes (see Mörk et al. (2020) for a recent overview of this literature). Regarding mental health and life satisfaction, Nikolova and Nikolaev (2018) exploit company closures as exogenous parental entry into unemployment to study the long term effects on life satisfaction of parental joblessness. They show that young German adults who experience parental unemployment in childhood are more likely to report lower levels of life satisfaction in adulthood. Mörk et al. (2020) show that the mental health of children is not affected by parental job loss in Sweden. However, when these children reach the age of 20-23, they are more likely to require social assistance and be unemployed. They argue that the strong welfare state, unemployment insurance and double earner norm protects children from the immediate effects of parental job loss, but in the long-term there are still some (weak) negative effects. Brand and Thomas (2014) show that maternal job loss during childhood in the US leads to more depressive

symptoms in children at ages 25-29. Additional evidence shows more immediate effects of parental job loss on childhood mental health. Also using data from the US, Schaller and Zerpa (2019) show that paternal job loss is harmful to children's mental health, particularly among children in low SES families Page et al. (2007), Stevens and Schaller (2011), and Johnson et al. (2012), Bubonya et al. (2017) also show that parental job loss and income and employment shocks have negative impacts on children's mental health, educational attainment and behavior. Pinger (2016) studies the mechanisms linking paternal job loss and children's education. She finds that paternal job loss does not affect children's mental health but the negative effect on education is mediated by a decline in children's cognitive ability and academic performance. Since mental health in childhood and adulthood are highly correlated, the effect on childhood mental health when present is likely to persist over the lifecycle (Fichter et al., 2009; Wickrama et al., 2012).

Remarkably, while the effects of paternal job loss are mostly negative, some studies find positive or non-significant childhood mental health effects of maternal job loss. These effects depend on the age and gender of the child, SES of the family, and country (Schaller and Zerpa, 2019; Nikolova and Nikolaev, 2018, Page et al., 2019) suggesting that the cultural and policy context is crucial for interpreting the results of studies looking at involuntary job loss. Such positive effects have not been found in studies looking at longer-term effects.

#### **4. Potential Mechanisms**

The causal effect of adverse early-life conditions on poor health outcomes later in life does not allow us to draw inference on the mechanisms driving this relationship. According to the life-course framework, adverse early-life circumstances have an indirect influence on health because they set in motion lifelong trajectories of health-related disadvantages (Kuh and Ben-Shlomo, 2004). However, as Almond et al. (2018) suggest, there is comparatively little understanding of the causal pathways leading from adverse early-life conditions to health later in life. Earlier work suggests that early-life conditions and health interact with each other in complex ways – with health and the economic

environment reinforcing each other both positively and negatively. However, the literature tends to treat the pathways in an exploratory fashion, and causal evidence has not yet been established.

Adverse childhood socioeconomic conditions are thought to be detrimental to adult health because of decreases in favorable and increases in unfavorable environmental exposures associated with declining socioeconomic conditions. Moreover, because the baseline health of low-SES children is often poorer, they can be less resilient against such environmental exposures (Jans et al., 2018, Gronqvist et al., 2020). In this context, the term environment refers both to physical and psychosocial exposures associated with children's homes, schools, and neighborhoods. Physical exposures include issues such as housing quality and crowding, toxic exposures, air and water quality, noise, food options, or condition of school buildings. Psychosocial environmental exposures associated with low-SES include risky families, poor parent health habits, crime and violence in the neighborhood, or social climate and quality of education at school.

In turn, these environments are hypothesized to influence health through their effects on developmental trajectories involved in the maturation of relevant psychological and physiological processes and in the acquisition of health-related behaviors. The courses of these trajectories proceed through adulthood and affect the more proximal causes of disease and dysfunction. This review considers two frameworks for these events, the biological programming (also called fetal origins or developmental origins hypothesis) that focuses on the biological effects of negative exposures and the life-course framework that takes into account a broader spectrum of effects of socioeconomic conditions.

#### 4.1 Biological programming framework

The biological programming framework stems from the fetal origins hypothesis, which proposes that suboptimal maternal nutrition during gestation may have detrimental effects on fetal growth specifically by initiating persistent changes in metabolic, physiological, and structural parameters of the human body (Barker, 1995). Although initially it was formulated with respect to malnutrition *in utero* and its effect on cardiovascular disease, this framework has since been extended to include other sensitive periods and health outcomes. According to this framework, SES-related factors have the

greatest influence on adult health if experienced during the so called sensitive periods, that are specific developmental periods defined as age ranges (e.g., birth to three years) or more broadly as periods of development (e.g., childhood, adolescence). These sensitive periods may vary for different exposures and different outcomes of interest (Cohen et al., 2010). Nevertheless, very early life exposures have greater effects due to higher brain plasticity at early ages. For instance, Persson and Rossin-Slater (2018) show that experiencing a very stressful event *in utero* is more harmful to mental health than experiencing such an event shortly after birth. Their estimates also imply that the adverse mental health impacts of exposure to stress in utero are larger when the stress is more severe.

The biological mechanisms leading to adverse health outcomes involve a combination of factors. As summarized by Bock et al. (2015, see also Figure 1) individuals might have a genetic predisposition to stress resilience inherited from parents. The predisposition can also vary based on their gender. When these individuals are exposed to some stressor during a sensitive period, for example, prenatally, the genetic predisposition for stress vulnerability or stress resilience is enhanced or mitigated through stress-induced epigenetic modifications. The pathways affected by the epigenetic regulation can be hormones, neurotransmitters, growth factors or synaptic connectivity. This can then manifest later in life through improved or impaired cognitive functions, such as anxiety, depression, impulsivity, motivation, etc. Most social scientists do not have access to the tools necessary to study these mechanisms directly, but research on the various types and length of exposures, different sensitive periods and relevant outcomes is warranted.

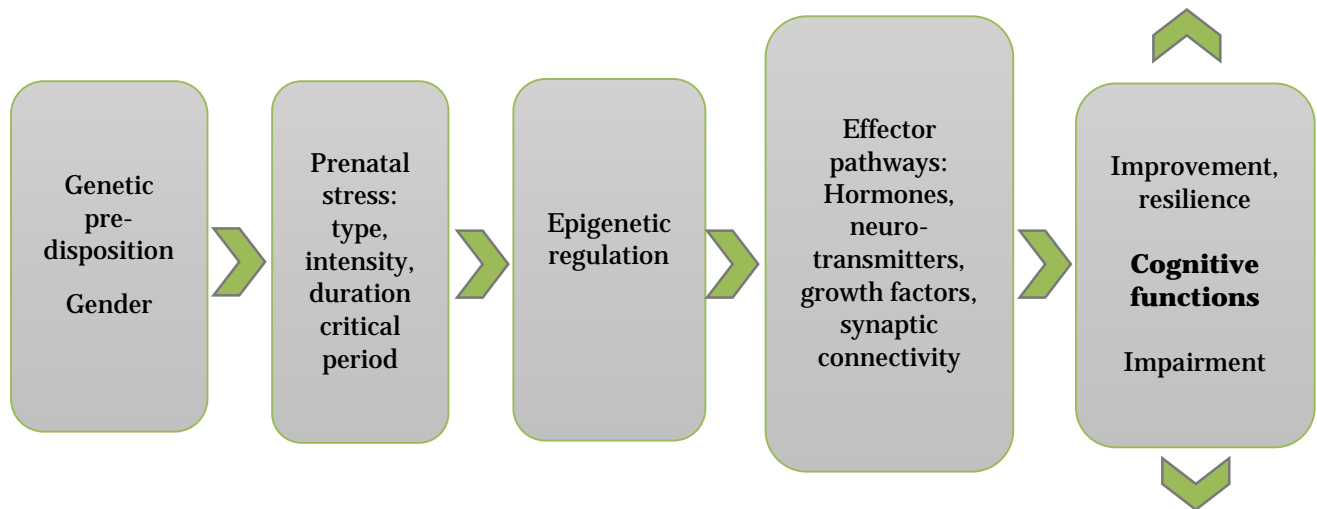


Figure 1: The biological programming framework (Bock et al., 2015).

#### 4.2 Life-course framework

Complementing the biological programming framework, the life-course framework (Ben-Shlomo & Kuh, 2002; Kuh & Ben Shlomo, 2004) starts from the premise that the impact of early life conditions on health later in life depends on the interaction of the individual with the environment. The life-course framework has been applied to a range of mental health disorders by Koenen et al., (2013), who provide an anthology of variants of the life-course perspective to understand the development of mental health problems.

Within this framework, this chapter reflects on two perspectives that elucidate the economic and psychological impacts of adverse socioeconomic conditions early in life on development and well-being later in life. First, economists Becker and Tomes (1986) propose the investment model that was later formalized by James Heckman and coauthors as the human capital model (Cunha & Heckman, 2007; Heckman & Masterov, 2007; Cunha & Heckman, 2008). This model proposes that during adverse socioeconomic circumstances, families might have diminished economic ability to invest in the necessary resources to promote children's health and well-being later in life (Heckman & Carneiro, 2003; Nikolova & Nikolaev, 2021). Such resources include education, healthcare, housing, food, toys, or books, which are critical for a safe and rich learning environment. Because brain development in early childhood requires psychosocial stimulation and energy, living in a socioeconomically disadvantaged environment can impair children's psychological development over the life course.

Moreover, lack of economic resources may lead to feelings of jealousy and deprivation, and cause social stigma which all can have direct effects on children's well-being, and affect their social interactions with peers. This in turn is associated with mental health problems and can have long-term consequences over the life course.

The second perspective considers the view that socioeconomic conditions affect parents and other family members of the child and these effects can spill over to the children. Lower socioeconomic status is associated with poor physical and mental health and lower life satisfaction (Cohen, 2010; Nikolova & Nikolaev, 2021). It has also been linked to risky behaviors such as smoking and drinking. Psychological stress associated with economic difficulties can also inhibit the emotional warmth of parents and lead to more disengaged and punitive parenting practices. As a result, children from families living in poor socioeconomic conditions may have been exposed to less healthy behaviors of their parents, have greater difficulties with social competence, resulting in behavioral problems and difficulties forming and maintaining close social relationships. The ability to form and maintain strong and diverse social ties and the access to social support are potent predictors of child and adult health.

It is also possible that these life-course effects are transferred intergenerationally. Colmer and Voorheis (2020) show that regulation-induced improvements in air quality experienced by a first generation individual *in utero* increase the educational attainment of their children, the second generation. Intergenerational transmission appears to arise from greater parental resources and investments, rather than heritable, biological channels.

Within this context, it is clear that contemporaneous socioeconomic conditions can act as an important mediator between early-life conditions and late-life health because adverse early-life conditions can influence intermediate outcomes such as educational outcomes and labor market attachment. In addition, given that men and women may react differently to their (socioeconomic) environment (Cleary, 1987; van de Velde et al., 2010), the life-course framework further anticipates that the influence of childhood socioeconomic deprivation on late-adulthood mental health outcomes may differ across genders. While not equivalent, the life-cycle perspective, often employed by economists, shares many features with the life-course perspective.



## **5. Policy Implications**

Population ageing is the most important demographic trend of this century. The combination of declining fertility rates and increasing longevity implies that the share of the population above the age of 65 is rapidly increasing in all high-income countries. Unfortunately, the rise in life expectancy has also increased the number of years that people spend in ill health or disability. From both an academic and a policy perspective, the challenge is then to let people live longer in good health. For this, it is important to recognize that healthy ageing is not a state but a lifelong process that starts even before birth. It is also important to note that with increasing welfare in many countries, children tend to be less exposed to insults to their physical health, such as malnutrition, infectious diseases, or air pollution. Instead, socioeconomic factors and mental health conditions are becoming the major threats to today's children (Currie & Rossin-Slater, 2016). As opposed to physical health where the long-term effects of early-life conditions tend to manifest later in life, the effects on mental health tend to manifest early and they persist over the life course. This offers several avenues for policy intervention.

First, since mental health issues persist over the life course, the associated costs are largely due to their accumulation over many years. The increasing longevity only exacerbates these costs. This also means that the potential benefits of successful interventions are large.

Second, there is potential for preventive interventions at the source, e.g. improving the socioeconomic conditions of children in the lowest SES families. Social safety nets, such as unemployment insurance and paid maternity leave have potentially large long-term effects on the children of the receivers of these benefits. However, since researchers measure socioeconomic conditions in very different ways, it is not yet clear on which dimension of SES it is the most effective to intervene if policy makers wish to get the highest return on their investment in early childhood.

Third, related to the first point, since mental health effects manifest already in childhood, there is potential for direct “curative” intervention for the affected individuals during

childhood. Currie and Rossin-Slater (2016) review various early-life intervention programs in the US and their effects on children's health and cognitive outcomes. Although they conclude that clear policy recommendations are not yet feasible, they show that the most promising proven policies are the ones that take a relatively holistic view of child well-being and address it in multiple ways through home visiting and center-based early childhood care and education programs.

## **6. Alleys for future research**

From the discussion above, it is clear that the socioeconomic conditions early in life are associated with a range of mental health outcomes later in life. Nevertheless, evidence on causal effects is still lacking on a range of exposures and outcomes. Several issues need to be addressed in future research.

First, the socioeconomic conditions and SES are multifactorial concepts, that have several dimensions, such as parental education, income, and occupation. Some of these dimensions may be more correlated to mental health outcomes than others. Moreover, some of the dimensions might not even be measured, such as stress, modelling of health behaviors etc. Accordingly, for any potential policy intervention to be successful, it is important to compare the different dimensions and establish causal mechanisms that link them to mental health outcomes. This observation also suggests that interdisciplinary research is vital in order to gain insights into these complex mechanisms. Although most social scientists might not have access to the tools necessary to study epigenetic and biological mechanisms directly, they can contribute to the literature by studying various types and lengths of exposures, different sensitive periods and relevant outcomes within the biological programming and life-course frameworks.

Second, a broader set of mental health disorders need evidence. For example, even though there is quite some evidence on depression, other conditions, such as anxiety or eating disorders are less well understood in relation to early-life conditions. To that end, the inclusion of mental health screening questionnaires in various cohort studies might prove useful. Another interesting source of data is administrative data on medication

prescriptions, as the prescribed medication groups can often be related to particular health conditions.

Third, later periods of childhood exposure might be more important for mental health than for physical health. While for physical health, earlier exposures tend to have greater effects, the critical periods for mental health effects might be different. For example, one might hypothesize that exposure to adverse socioeconomic conditions might be particularly harmful in adolescence. Nevertheless, such hypotheses still need rigorous testing. Similarly, intergenerational transmission of mental health effects seems plausible but lacks empirical evidence.

## **7. Summary**

Healthy ageing is a lifelong process that starts before birth. With increasing welfare, socioeconomic factors and mental health conditions are becoming the major threats to today's children (Currie and Rossin-Slater, 2016). Mounting evidence across several disciplines suggests that early-life conditions can have lasting effects on human capital formation and adult wellbeing. This chapter has provided a review of the evidence on the link between early-life socioeconomic conditions and mental health and well-being later in life. The studies on this topic show great variation in the methodology, data and setting. However, overarching conclusions cannot yet be made, as further analysis of causal relationships and mechanisms is necessary. The existing evidence suggests a close connection between children's physical and mental health outcomes. Hence, it is understandable to hypothesize that these causal relationships exist and empirical research might be fruitful. Moreover, the relationship between early-life socioeconomic conditions and mental health and wellbeing later in life is a complex problem that would benefit from insights from different disciplines.

## References

- Alessie, R., V. Angelini, G.J. van den Berg, J.O. Mierau and L. Viluma (2019). "Economic conditions at birth and cardiovascular disease risk in adulthood: evidence from new cohorts". *Social Science & Medicine* 224, 77-84.
- Almond, D. and J. Currie (2011). "Killing me softly: The fetal origins hypothesis". *Journal of Economic Perspectives* 25, 153-172.
- Almond D., J. Currie and V. Duque (2018). "Childhood circumstances and adult outcomes: Act II". *Journal of Economic Literature* 56, 1360-1446.
- Almond, D., Edlund, L., & Palme, M. (2009). "Chernobyl's subclinical legacy: prenatal exposure to radioactive fallout and school outcomes in Sweden". *The Quarterly Journal of Economics*, 124(4), 1729-1772.
- Angelini, V., Howdon, D. D., & Mierau, J. O. (2019). "Childhood socioeconomic status and late-adulthood mental health: Results from the survey on health, ageing and retirement in Europe". *The Journals of Gerontology: Series B*, 74(1), 95-104.
- Angelini, V., Klijs, B., Smidt, N., & Mierau, J. O. (2016). "Associations between childhood parental mental health difficulties and depressive symptoms in late adulthood: The influence of life-course socioeconomic, health and lifestyle factors". *PloS one*, 11(12), e0167703.
- Barker, D. J. (1995). "Fetal origins of coronary heart disease". *BMJ (Clinical Research Ed.)* 311, 171-4.
- Becker, G. S., & Tomes, N. (1986). "Human capital and the rise and fall of families". *Journal of Labor Economics*, 4(3, Part 2), S1-S39.
- Ben-Shlomo, Y., & Kuh, D. (2002). "A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives". *International Journal of Epidemiology*, 31, 285-293.
- Bertoni, M. (2015). Hungry today, unhappy tomorrow? Childhood hunger and subjective wellbeing later in life. *Journal of Health Economics*, 40, 40-53.
- Black, S. E., Bütikofer, A., Devereux, P. J., & Salvanes, K. G. (2019). "This is only a test? Long-run impacts of prenatal exposure to radioactive fallout". *Review of Economics & Statistics*, 101(3), 531-546.

Blanchflower, D. G., & Oswald, A. J. (2008). "Is well-being U-shaped over the life cycle?" *Social Science & Medicine*, 66(8), 1733-1749.

Bock, J., Wainstock, T., Braun, K. and Segal, M. (2015), "Stress in utero: prenatal programming of brain plasticity and cognition". *Biological Psychiatry* 78, 315–326.

Bharadwaj, P., Gibson, M., Zivin, J. G., & Neilson, C. (2017). "Gray matters: Fetal pollution exposure and human capital formation". *Journal of the Association of Environmental and Resource Economists*, 4(2), 505-542.

Brand, J. E., & Simon Thomas, J. (2014). Job displacement among single mothers: Effects on children's outcomes in young adulthood. *American Journal of Sociology*, 119(4), 955-1001.

Brunner, E., Shipley, M. J., Blane, D., Smith, G. D., & Marmot, M. G. (1999). "When does cardiovascular risk start? Past and present socioeconomic circumstances and risk factors in adulthood". *Journal of Epidemiology & Community Health*, 53(12), 757-764.

Case, A. A. Fertig and C. Paxson (2005). "The lasting impact of childhood health and circumstances". *Journal of Health Economics* 24, 365-389.

CDC (2018). "Well-Being Concepts". National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, <https://www.cdc.gov/hrqol/wellbeing.htm> (Last accessed Apr. 20, 2021).

Cleary, P. D. (1987). "Gender differences in stress-related disorders". *Gender and Stress*, 39-72.

Cohen, S., Janicki-Deverts, D., Chen, E., & Matthews, K. A. (2010). "Childhood socioeconomic status and adult health". *Annals of the New York Academy of Sciences*, 1186 (1), 37-55.

Currie, J., & Rossin-Slater, M. (2015). "Early-life origins of life-cycle well-being: Research and policy implications". *Journal of Policy Analysis and Management*, 34(1), 208-242.

Cunha, F., & Heckman, J. (2007). "The technology of skill formation". *American Economic Review*, 97(2), 31-47.

Cunha, F., & Heckman, J. J. (2008). "Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation". *Journal of Human Resources*, 43(4), 738-782.

Cutler, D., W. Huang and A. Lleras-Muney (2016). "Economic conditions and mortality: Evidence from 200 years of data". NBER Working Paper 22690.

Deaton, A. (2008). Income, health, and well-being around the world: Evidence from the Gallup World Poll. *Journal of Economic Perspectives*, 22(2), 53-72.

Dehejia, R., & Lleras-Muney, A. (2004). "Booms, busts, and babies' health". *The Quarterly Journal of Economics*, 119(3), 1091-1130.

Doblhammer, G., van den Berg, G. J, and T. Fritze (2013). "Economic conditions at the time of birth and cognitive abilities late in life: Evidence from ten European countries". *PLOS One* 8 (9): e74915.

Fichter, M. M., Kohlboeck, G., Quadflieg, N., Wyschkon, A., & Esser, G. (2009). "From childhood to adult age: 18-year longitudinal results and prediction of the course of mental disorders in the community". *Social Psychiatry and Psychiatric Epidemiology*, 44(9), 792-803.

García, J. L., Heckman, J. J., Leaf, D. E., & Prados, M. J. (2020). "Quantifying the life-cycle benefits of an influential early-childhood program". *Journal of Political Economy*, 128(7), 2502-2541.

Gauffin, K., Hemmingsson, T., & Hjern, A. (2013). "The effect of childhood socioeconomic position on alcohol-related disorders later in life: a Swedish national cohort study". *Journal of Epidemiology and Community Health*, 67(11), 932-938.

Gilman, S. E., Kawachi, I., Fitzmaurice, G. M., & Buka, S. L. (2002). "Socioeconomic status in childhood and the lifetime risk of major depression". *International Journal of Epidemiology*, 31(2), 359-367.

Gilman, S. E., Kawachi, I., Fitzmaurice, G. M., & Buka, S. L. (2003). "Family disruption in childhood and risk of adult depression". *American Journal of Psychiatry*, 160(5), 939-946.

Grönqvist, H., Nilsson, J. P., & Robling, P. O. (2020). Understanding How Low Levels of Early Lead Exposure Affect Children's Life Trajectories. *Journal of Political Economy*, 128(9), 3376-3433.

Havari, E., & Mazzonna, F. (2015). "Can we trust older people's statements on their childhood circumstances? Evidence from SHARELIFE". *European Journal of Population*, 31(3), 233-257.

Heckman, J.J. (2012). "The developmental origins of health". *Health Economics* 21, 24-29.

Heckman, J., & Carneiro, P. (2003). *Human capital policy* (No. w9495). National Bureau of Economic Research.

Heckman, J. J., & Masterov, D. V. (2007). "The productivity argument for investing in young children". *Applied Economic Perspectives and Policy*, 29(3), 446-493.

Helgertz, J. and M.R. Persson (2014). "Early life conditions and long-term sickness absence during adulthood—A longitudinal study of 9000 siblings in Sweden". *Social Science & Medicine* 119, 224-231.

Hendren, N., & Sprung-Keyser, B. (2020). "A unified welfare analysis of government policies". *The Quarterly Journal of Economics*, 135(3), 1209-1318.

Huang, C., Phillips, M. R., Zhang, Y., Zhang, J., Shi, Q., Song, Z., ... & Martorell, R. (2013). "Malnutrition in early life and adult mental health: evidence from a natural experiment". *Social Science & Medicine*, 97, 259-266.

Jans, J., Johansson, P., & Nilsson, J. P. (2018). Economic status, air quality, and child health: Evidence from inversion episodes. *Journal of Health Economics*, 61, 220-232.

Johnson, J.G., Cohen, P., Kasen, S. and Brook, J.S., 2002. "Childhood adversities associated with risk for eating disorders or weight problems during adolescence or early adulthood". *American Journal of Psychiatry*, 159(3), pp.394-400.

Johnson, R. C., Kalil, A., & Dunifon, R. E. (2012). "Employment patterns of less-skilled workers: Links to children's behavior and academic progress". *Demography*, 49(2), 747-772.

Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R. O. N., Demyttenaere, K., Gasquet, I., ... & Kawakami, N. (2007). "Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative". *World Psychiatry*, 6(3), 168.

Koenen, K. C., Rudenstine, S., Susser, E., & Galea, S. (2013). "Life course approaches to mental illness: the emergence of a concept". *A Life Course Approach to Mental Disorders*, 1.

Krutikova, S., & Lilleør, H. (2015). *Fetal Origins of Personality: Effects of early life circumstances on adult personality traits* (No. 2015-03). Centre for the Study of African Economies, University of Oxford.

Kuh, D., and Y. Ben-Shlomo (2004). *A life course approach to chronic disease epidemiology*. Oxford University Press, Oxford

Lähdepuro, A., Savolainen, K., Lahti-Pulkkinen, M., Eriksson, J. G., Lahti, J., Tuovinen, S., ... & Räikkönen, K. (2019). "The impact of early life stress on anxiety symptoms in late adulthood". *Scientific Reports*, 9(1), 1-13.

Lê-Scherban, F., Brenner, A. B., & Schoeni, R. F. (2016). "Childhood family wealth and mental health in a national cohort of young adults". *SSM-Population Health*, 2, 798-806.

Lumey, L. H., Stein, A. D., & Susser, E. (2011). "Prenatal famine and adult health". *Annual review of public health*, 32, 237-262.

Luo, Y., & Waite, L. J. (2005). "The impact of childhood and adult SES on physical, mental, and cognitive well-being in later life". *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 60(2), S93-S101.

Marmot, M. G., Rose, G., Shipley, M., & Hamilton, P. J. (1978). "Employment grade and coronary heart disease in British civil servants". *Journal of Epidemiology & Community Health*, 32(4), 244-249.

Marmot, M., Shipley, M., Brunner, E., & Hemingway, H. (2001). "Relative contribution of early life and adult socioeconomic factors to adult morbidity in the Whitehall II study". *Journal of Epidemiology & Community Health*, 55(5), 301-307.

Maughan, B., Messer, J., Collishaw, S., Pickles, A., Snowling, M., Yule, W., & Rutter, M. (2009). "Persistence of literacy problems: spelling in adolescence and at mid-life". *Journal of Child Psychology and Psychiatry*, 50(8), 893-901.

Mäki, P., Veijola, J., Jones, P. B., Murray, G. K., Koponen, H., Tienari, P., ... & Lauronen, E. (2005). "Predictors of schizophrenia—a review". *British Medical Bulletin*, 73(1), 1-15.

Mitchell, K. S., & Bulik, C. M. (2014). "Life course epidemiology of eating disorders". *A life course approach to mental disorders*, 148-155.

Mörk, E., Sjögren, A., & Svaleryd, H. (2020). Consequences of parental job loss on the family environment and on human capital formation—Evidence from workplace closures. *Labour Economics*, 67, 101911.

Murray, C. J., Vos, T., Lozano, R., Naghavi, M., Flaxman, A. D., Michaud, C., ... & Aboyans, V. (2012). "Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010". *The Lancet*, 380(9859), 2197-2223.



Nikolova, M. and Nikolaev, B. (2021). "Family matters: the effects of parental unemployment in early childhood and adolescence on subjective well-being later in life". *Journal of Economic Behavior & Organization*, 181, 312-331.

OECD (2018). "Health at a Glance: Europe 2018." <https://www-oecd-org.vu-nl.idm.oclc.org/health/health-systems/OECD-Factsheet-Mental-Health-Health-at-a-Glance-Europe-2018.pdf> (Last accessed Nov. 23, 2020)

Page, M., Stevens, A. H., & Lindo, J. (2007). "Parental income shocks and outcomes of disadvantaged youth in the United States". In *The problems of disadvantaged youth: An economic perspective* (pp. 213-235). University of Chicago Press.

Persson, P., & Rossin-Slater, M. (2018). Family ruptures, stress, and the mental health of the next generation. *American Economic Review*, 108(4-5), 1214-52.

Pinger, P. (2016). Understanding the mechanisms behind intergenerational effects of economic distress. Mimeo, University of Bonn.

Pickles, A., A. Aglan, S. Collishaw, J. Messer, M. Rutter and B. Maughan (2010). "Predictors of suicidality across the life span: the Isle of Wight study". *Psychological Medicine* 40, 1453-1466.

Poulton, R., Caspi, A., Milne, B. J., Thomson, W. M., Taylor, A., Sears, M. R., & Moffitt, T. E. (2002). "Association between children's experience of socioeconomic disadvantage and adult health: a life-course study". *The Lancet*, 360 (9346), 1640-1645.

Power, C., Atherton, K., Strachan, D. P., Shepherd, P., Fuller, E., Davis, A., ... & Rahi, J. (2007). "Life-course influences on health in British adults: effects of socio-economic position in childhood and adulthood". *International Journal of Epidemiology*, 36(3), 532-539.

Rudenstine, S. (2013). "Applying a life course perspective to depression". *A life course approach to mental disorders*, 88-96.

Rutter, M., J. Tizard, W. Yule, P. Graham and K. Whitmore (1976). "Isle of Wight studies, 1964–1974". *Psychological Medicine* 6, 313-332.

Rutter, M. (1989). "Pathways from childhood to adult life". *Journal of Child Psychology and Psychiatry*, 30(1), 23-51.

Schaller, J., & Zerpa, M. (2019). "Short-run effects of parental job loss on child health". *American Journal of Health Economics*, 5(1), 8-41.

Stansfeld, S. A., & Marmot, M. G. (1992). Social class and minor psychiatric disorder in British Civil Servants: a validated screening survey using the General Health Questionnaire. *Psychological medicine*, 22(3), 739-749.

Stevens, A. H., & Schaller, J. (2011). "Short-run effects of parental job loss on children's academic achievement". *Economics of Education Review*, 30(2), 289-299.

Stewart-Brown, S., Samaraweera, P. C., Taggart, F., Kandala, N. B., & Stranges, S. (2015). "Socioeconomic gradients and mental health: implications for public health". *The British Journal of Psychiatry*, 206(6), 461-465.

Smith, J. P. (2015). "Economic shocks, early life circumstances and later life outcomes: Introduction". *The Economic Journal*, 125 (588), F306-F310.

Spencer, N., Thanh, T. M., & Louise, S. (2013). "Low income/socio-economic status in early childhood and physical health in later childhood/adolescence: a systematic review". *Maternal and Child Health Journal*, 17(3), 424-431.

Tani, Y., Fujiwara, T., Kondo, N., Noma, H., Sasaki, Y., & Kondo, K. (2016). "Childhood socioeconomic status and onset of depression among Japanese older adults: the JAGES prospective cohort study". *The American Journal of Geriatric Psychiatry*, 24(9), 717-726.

van den Berg, G.J., M. Lindeboom and F. Portrait (2006). "Economic conditions early in life and individual mortality". *American Economic Review* 96, 290-302.

van den Berg, G.J., G. Doblhammer, and K. Christensen (2009). "Exogenous determinants of early-life conditions, and mortality later in life". *Social Science & Medicine* 68, 1591-1598.

van den Berg, G.J., G. Doblhammer, and K. Christensen (2011). "Being born under adverse economic conditions leads to a higher cardiovascular mortality rate later in life: Evidence based on individuals born at different stages of the business cycle". *Demography* 48, 507-30.

van den Berg, G.J., and M. Lindeboom (2014). "Aging: conditions early in life and health and mortality at advanced ages". In: T. Culyer, ed., *Encyclopedia of Health Economics*. North Holland, Amsterdam.

van den Berg, G., and B. Modin, (2013). *Economic Conditions at Birth, Birth Weight, Ability, and the Causal Path to Cardiovascular Mortality* (No. 7605). Institute of Labor Economics (IZA).

Van den Broek, T., & Fleischmann, M. (2019). "Prenatal famine exposure and mental health in later midlife". *Aging & Mental Health*, 23(2), 166-170.

Van de Velde, S., Bracke, P., & Levecque, K. (2010). "Gender differences in depression in 23 European countries. Cross-national variation in the gender gap in depression". *Social Science & Medicine*, 71(2), 305-313.

Whiteford, H., Ferrari, A., & Degenhardt, L. (2016). "Global burden of disease studies: implications for mental and substance use disorders". *Health Affairs*, 35(6), 1114-1120.

WHO (2018). "Mental health: strengthening our response", <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response> (Last accessed Nov. 23, 2020).

Wickrama, K. A. S., Conger, R. D., Lorenz, F. O., & Martin, M. (2012). "Continuity and discontinuity of depressed mood from late adolescence to young adulthood: the mediating and stabilizing roles of young adults' socioeconomic attainment". *Journal of Adolescence*, 35(3), 648-658.

## *Index*

administrative data	6, 18	interdisciplinary research	17
adolescence	13, 18, 23, 24, 25, 26, 27	intergenerational persistence	2
anxiety	8, 14, 18, 24	intergenerational transmission	18
biological programming	3, 12, 13, 14, 18	life satisfaction	4, 11
biological programming hypothesis	3	life-course framework	3, 12, 13, 14, 16
causal inference	3, 8	Mental health	2, 27
Contextual variables	9	Population ageing	16
depression	6, 7, 14, 18, 22, 25, 26, 27	recessions	9, 10
developmental trajectories	12	schizophrenia	8, 24
drug abuse	8	selection effects	10
early-life conditions	2, 4, 5, 8, 9, 10, 12, 16, 18, 26	sensitive periods	13, 14, 18
eating disorders	8, 18, 23, 24	siblings	10, 23
endogeneity	3, 9	socioeconomic gradient of mental health	2
epigenetic modifications	13	socioeconomic status	3, 5, 7, 8, 10, 15, 20, 21, 26
fertility	10, 16	The Isle of Wight study	6
fetal origins hypothesis	13, 20	unemployment	9, 11, 17, 25
gender	7, 11, 13, 27	welfare	11, 16, 18, 23
human capital model	14	Whitehall and Whitehall II studies	7