Universidade NOVA de Lisboa
Faculdade de Ciências Médicas

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and Substance Abuse

Income and Mental Health

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Maria Manuela Correia Vieira da Silva

Supervisor: Professor Benedetto Saraceno

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Dedicated to the memory of Alexandre

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ABSTRACT

The enormous burden and suffering from mental disorders worldwide makes it imperative to better understand its determinants. Tackling health inequalities has become a public health priority, but it is necessary to establish their causal pathways in order to implement effective interventions and policies.

Scientific literature has suggested the importance of social determinants in the aetiology and course of major mental disorders and suicide, with special emphasis on the role of social disadvantage. Nevertheless, the role of psychosocial factors on mental health, and specifically the role of income and its distribution, has not been researched in my home country, Portugal.

In my research project I propose to study whether in Portugal there is an association between mental disorders and absolute and relative income. I intend to use data from the first Portuguese Mental Health Survey, a national cross-sectional household survey that was conducted in 2009, integrated in the WHO World Mental Health Survey Consortium.

In this masters thesis I present the results of my literature review on the relation between socioeconomic status and mental health and outline a research proposal to further investigate this topic.

The body of evidence that I present shows that exposure to a wide range of psychosocial risks, such as low income, limited education, and low occupational status, increases the likelihood of mental health problems. Differences in health follow a social gradient, with worsening health as the position in the social ladder decreases.

I also summarize the literature on the role of context in producing health inequalities beyond individual characteristics. Of special interest is the potential health effect of relative income and the importance of income distribution as a health determinant.

Finally, I outline the various possible mechanisms for health disparities associated with socioeconomic status.

Key-words: income, income distribution, socioeconomic status, social determinants, neighbourhood, mental health

RESUMO

A enorme carga e o sofrimento provocado pelas doenças mentais no mundo tornam imperioso conhecer melhor os seus determinantes. Combater as desigualdades em saúde tornou-se uma prioridadade de saúde pública, mas é necessário estabelecer as suas vias causais para ser possível implementar intervenções e políticas efetivas.

A literatura científica tem sugerido a importância dos determinantes sociais na etiologia e evolução das principais doenças mentais e do suicídio, com especial ênfase no papel da desvantagem social. Ainda assim, o papel dos fatores psicossociais na saúde mental, e especificamente o papel do rendimento e da sua distribuição, não tem sido investigado no meu país, Portugal.

No meu projeto de investigação proponho-me a estudar se em Portugal existe uma associação entre as doenças mentais e o rendimento absoluto e relativo. Pretendo usar os dados do primeiro inquérito epidemiológico sobre saúde mental realizado em Portugal, um inquérito nacional transversal no domicílio que foi conduzido em 2009, integrado no WHO World Mental Health Survey Consortium.

Nesta tese de mestrado apresento os resultados da minha revisão da literatura sobre a relação entre o estatuto socio-económico e a saúde mental e esboço uma proposta de pesquisa para continuar a investigar este tema.

A evidência que apresento mostra que a exposição a um vasto leque de riscos psicossociais, como o baixo rendimento, a educação limitada e o estatuto ocupacional baixo, aumenta a probabilidade de desenvolver problemas de saúde mental. As diferenças em saúde seguem um gradiente social, com piores resultados de saúde à medida que a posição na hierarquia social diminui.

Também sumarizo a literatura sobre o papel do contexto na produção de desigualdades em saúde para além das características individuais. Tem especial interesse o potencial efeito na saúde do rendimento relativo e a importância da distribuição dos rendimentos como determinante de saúde.

Finalmente, delineio os possíveis mecanismos através dos quais o estatuto socio-económico contribui para as disparidades em saúde.

Palavras-chave: rendimento, distribuição do rendimento, estatuto socio-económico, determinantes sociais, vizinhança, saúde mental

RESUMEN

La enorme carga que representan y el gran sufrimiento que causan las enfermedades mentales en el mundo nos obligan a tratar de entender mejor sus determinantes. Corregir las inequidades sanitarias se ha convertido en una prioridad de salud pública, pero es necesario establecer las vias causales para implementar políticas e intervenciones efectivas.

La lietratura científica ha sugerido la importancia de los determinantes sociales en la etiología y curso de los trastornos mentales severos y del suicidio, dando especial peso al rol de las desventajas sociales. Sin embargo, el rol de los factores psicosociales sobre la salud mental, y específicamente el rol de los ingresos y su distribución no se ha investigado en mi país, Portugal.

En el proyecto de investigación me propongo estudiar si existe una asociación entre trastorno mental y nivel absoluto y relativo de ingresos. Usare datos de la primera Encuesta Portuguesa de Salud Mental, un estudio tranversal nacional de hogares que se llevó a cabo en 2009, y que está integrado al Consorcio de la encuesta mundial de salud mental de la Organización Mundial de la Salud. En esta tesis de aestría present los resultados de mi revisión de la literatura sobre la relación entre estatus socioeconomic y salud mental y bosquejo una propuesta de investigación para investigar este tema con mayor profundidad.

La evidencia que present muestra que la exposición a un amplio rango de factores de riesgo psicosocial tales como ingresos bajos, educación limitada y estatus laboral inferior incrementa la probabilidad de sufrir problemas de salud mental. Las diferencias del estado de salud siguen una gradiente social, observándose que la salud se deteriora a medida que se avanza hacia los peldaños inferiores de la escala social.

Asimismo, resumo la literatura sobre el rol del contexto en la genesis de inequidades de salud más allá de las características individuales. De especial interés es el efecto potencial sobre la salud del ingreso relativo y la importancia de la distribución de los ingresos como determinante de la salud.

Finalmente, delineo los varios posibles mecanismos de las disparidades sanitarias que se asocian con el estatus socioeconómico.

Palabras-clave: ingresos, distribución de los ingresos, estatus socio económico, determinantes sociales vecindario, salud mental.

TABLE OF CONTENTS

INTRODUCTION

Mental disorders are highly prevalent and burdensome worldwide. About 450 million people have a mental and behavioural disorder worldwide, with a huge cost in terms of suffering, disability and economic loss[1]. Mental and behavioural disorders are estimated to account for 12% of the global burden of disease and for 30.8% of years lived with disability (YLDs)[1] and further increases are likely, in view of the ageing of the population, worsening social problems and civil unrest.

Mental disorders have multiple determinants. Health is the complex outcome of numerous biological, psychological and social factors[2], involving contextual factors beyond the individual. The determinants of the population rates of disease are likely to be different from the causes of individual risks of disease, where genetic factors will play a bigger role[3].

There is a large body of scientific literature focusing on the role of social determinants in the aetiology and course of major mental disorders. Research has shown that higher rates of mental disorders are associated with social disadvantage, especially with low income[4], limited education[5], occupational status[6] and financial strain[7]. Lack of social support[8], high-demand or low control over work[9], critical life events[10], unemployment[11], adverse neighbourhood characteristics[12] and income inequality[13] have also been identified as psychosocial risks that increase the chances of poor mental health. Understanding the relation between socioeconomic status (SES) and mental health depends on distinguishing its various measures and identifying independent associations with mental health.

Inequality and inequity are two distinct concepts: inequality is a dimensional concept, simply referring to measurable quantities, and inequity is a political concept, expressing

a moral commitment to social justice[14]. According to the World Health Organization, health inequalities can be defined as "differences in health status or in the distribution of health determinants between different population groups"[15]. Most inequalities are not biologically inevitable but reflect population differences in circumstances and behaviour that are, in the broadest sense, socially determined. Health inequities are avoidable inequalities in health considered unfair and unjust[14].

Tackling health inequalities has become a public health priority, but their causal pathways are not well established. In rich countries, the nature of poverty has changed, but there is an association between SES and health at the individual level: the lower the social position, the worse the health. Thus, differences in health follow a social gradient, which was labelled "the status syndrome"[16]. The existence of these gradients suggests that causal processes do not operate only below a certain threshold through an impact of poverty, instead it points to a generic effect of SES on the health of all people[17].

There is a growing interest in documenting the role of context (defined as neighbourhoods, workplaces, regions, states) in producing health inequalities and in helping us understanding how the social environment shared by individuals could influence mental health beyond individual characteristics.

Research has been conducted, mainly in developed countries, on the potential health effect of relative income, as separate from the effect of absolute income, and on the importance of income distribution as a health determinant. The relative income hypothesis asserts that an individual's health status depends on his rank within the income distribution[14]. An indirect way of testing the relative income hypothesis is provided by the examination of the association between income distribution in society and individual health.

These findings have deepened my interest in studying the social determinants of mental health, and specifically the associations between income and mental health. My interest in studying this theme is due to the increasing international focus on the effects of income and income distribution on health, the growing income and wealth inequality among citizens in many developed countries, and the evidence that public health is increasingly retreating into an increasing reliance upon lifestyle and biomedical approaches to understanding and promoting health[18]. To my knowledge, the health effects of income and its distribution have not been researched in my home country, Portugal, one of the most unequal countries in Europe[19].

Therefore, the goals of the research I propose to perform are to assess whether in Portugal there is an association between mental disorders and a) individual absolute income, b) individual relative income, c) neighbourhood median household income, and d) income inequality.

My project work plan will consist of two phases. First, I will perform a literature review to systematize and update the knowledge regarding the associations between socioeconomic status or income and mental health. Afterwards, I will analyse individual-level data from the first Portuguese Mental Health Survey, a national cross-sectional household survey conducted in 2009 and integrated in the WHO World Mental Health Survey Consortium, to answer the above research questions. In the scope of my master thesis I propose to perform the literature review, laying the groundwork for the second part of my research project in the near future.

The work I am now presenting is structured in two parts. In part A, I will present the results of the literature review. In the first chapter I will describe how the literature search was conducted, and in the second chapter I will outline the concepts of my research. In the next four chapters I will present the evidence on the association between socioeconomic status, income, neighbourhood, and income inequality and

mental health. In the seventh chapter I will summarize the results of studies on the association between socioeconomic status and mental health in some special populations (children and adolescents, older people, and ethnic minorities). In the eighth chapter I will report the possible pathways linking socioeconomic status and health. Finally, in part B I will describe the project work plan that I propose to perform afterwards.

PART A:

LITERATURE REVIEW

CHAPTER 1:

METHODS

A document search strategy was conducted utilizing the biomedical database PubMed on the topic of income and income inequality as determinants of mental health. Search was opened to studies developed in any region of the world, written in English, French, Portuguese or Spanish and published between January 1991 and September 2011, as well as some older studies that are frequently cited in the literature. The following keywords were used: “income”, “income distribution”, “poverty”, “inequality”, “Gini”, “socioeconomic status”, “social class”, “socioeconomic factors”, “environment”, “neighbourhood”, “psychiatric disorder”, and “mental health”. The reference sections of papers were searched to identify published studies. A total of 719 documents was extracted.

A review of the abstracts of these documents was performed and articles were reviewed in full when criteria within the abstract did not provide enough detail to make a decision. Studies were included or excluded according to the following criteria:

Studies included:

- Studies dealing with inequalities in the prevalence and incidence of mental disorders related to income, socioeconomic position and income distribution. Disorders were selected on the basis of their prevalence in the population (depression, anxiety and alcohol disorders) or their centrality to the literature on SES (schizophrenia and depression).

- Studies dealing with inequalities in the prevalence and incidence of mental disorders related to a neighbourhood effect.

- Studies assessing the association between suicide and income, socioeconomic position, a neighbourhood effect, or income distribution.

- Theoretical and empirical studies on the pathways through which income, neighbourhood and income distribution could influence mental health.

Studies excluded:

- Opinion papers, letters to the editor, editorials, comments.

- Studies dealing only with physical health issues.

- Studies dealing with social capital measures only.

- Studies dealing with the role of the health system as a potential mediator of the relationship between income and mental health.

- Studies dealing with mental health issues among some specific populations (participants with medical conditions, with mental retardation or dementia, in post-disaster situations, veterans, homeless…).

- Studies using symptom-screening instruments insufficiently specific and not allowing a mental disorder diagnosis to be made.

337 documents were excluded and 382 were accepted.

CHAPTER 2:

CONCEPTUALIZING SOCIOECONOMIC STATUS

The terms "socioeconomic status", "socioeconomic position" and "social class" are widely used in health research [20], often interchangeably (despite their different theoretical bases and interpretations), reflecting widespread recognition of the importance of socioeconomic factors for diverse health outcomes[21]. "Socioeconomic status" (SES) has been defined as "the relative position of a family or individual in a hierarchical social structure, based on their access to or control over wealth, prestige and power"[22] or as "an aggregate concept defined according to one's level of resources or prestige in relation to others"[23]. It is a concept that has been borrowed by medical researchers from sociology[24] and it is assessed using resource-based measures (access to material and social assets, including income, wealth, and educational attainment) and prestige-based measures (access to and consumption of goods, services, and knowledge, as linked to occupational prestige and education)[23]. Yet, some argue that SES essentially represents class (or economic position) while others argue that SES represents social status (or prestige)[25]. SES can be assessed at the level of the individual, household unit, or community[23], and at different times in the life-course[20], since some indicators of SES are quite dynamic.

Income, material possessions (or standard of living), occupational status, and education are the domains most commonly studied[23,24,26,27,28]. These indicators are related, but not fully overlapping, and they may impact health through disparate pathways and have different meanings in different cultures[24]. On the other hand, these variables are correlated with each other, making it difficult to estimate the independent relationship

of each one with health and limiting the scientific value and policy applicability of the research.

There are different reasons why there might be interest in measuring SES in health research, and so it is important to tailor the choice of SES indicators to the specific research questions and populations of interest. The most obvious purpose is to describe and monitor the social distribution of a disease in order to inform health policy and to monitor changes over time or across different geographical regions or social groups[21]. The second purpose relates to explaining the causal mechanisms through which SES generates health differences and how the multiple levels of SES interrelate and affect health. An incorporation of time in assessing SES offers considerable opportunity to explore causal pathways. The third purpose of measuring SES is to statistically adjust for socioeconomic circumstances when another exposure is the main focus of interest.

INDICATORS OF SOCIOECONOMIC STATUS

Indicators of socioeconomic status focus on the socioeconomic and behavioural characteristics of individuals and their associated health outcomes. Each indicator will emphasize a particular aspect of social stratification and may be correlated with other measures, but cannot be assumed to be interchangeable. It is not useful or theoretically compelling to search for a single "best" indicator of SES[21].

Education, income and occupation as measures of SES have been extraordinarily useful for health researchers, despite some methodological challenges they present[28]. Other measures of SES may be of equal or greater predictive value in some populations, such as indices of family wealth; subjective social status; economic mobility across generations; community-level measures of SES; SES during childhood; the use of trading or bartering for goods or services; material possessions such as cattle, lard, and housing

structures in some countries; and, for cross-national studies, national income distribution[28].

Two basic approaches can be described in the study of the influence of SES on health: the compositional approach and the contextual approach. Compositional measures of SES refer to characteristics of the individual, while contextual measures of SES refer to characteristics of the individual's environment[29]. However, Cummins criticizes "the false dualism of context and composition by recognising that there is a mutually reinforcing and reciprocal relationship between people and place"[30] and argues that it is crucial to recognize that "individuals can become relationally embedded in multiple health damaging and health promoting environments, across time and space, and at multiple scales"[30].

Multilevel analysis (or hierarchical modelling) is an analytical strategy that represents a possible reconciliation between these two divergent epidemiological paradigms, individual risk factor epidemiology and an ecological approach[31]. This statistical method allows the simultaneous examination of the effects of group-level and individual-level variables on individual-level outcomes while accounting for the non-independence of observations within groups[32]. This analytical approach is appropriate for data with nested sources of variability, that is, involving units at a lower level or micro units (for example, individuals) nested within units at a higher level or macro units (for example, groups such as schools or neighbourhoods)[33]. Multilevel models can be used to draw inferences regarding the causes of inter-individual variation (or the relation of group and individual level variables to individual level outcomes) and also regarding inter-group variation, whether it exists in the data, and to what extent it is accounted for by group and individual level characteristics[33].

Individual-Level Indicators

Education

Educational attainment is perhaps the most widely used indicator of SES[29]. Education can influence the aetiology of many health outcomes through pathways involving material resources and the knowledge-related assets of an individual[20]. Education has been called the most basic component of SES because of its influence on future occupational opportunities and earning potential[29]. Persons with higher education may have developed better information processing and critical thinking skills, skills in navigating bureaucracies and institutions, abilities required to interact effectively with healthcare providers, and influence over others and one's own life. They may also be more likely to be socialized to health-promoting behaviour and lifestyles, and have better work and economic conditions and psychological resources.

The main advantages of using this indicator are that it is relatively easy to measure in self-administered questionnaires, response rates to educational questions tend to be high, and it is fairly stable beyond early adulthood[21]. Education can be measured as the number of years of education completed (continuous variable), the highest educational level completed (categorical variable), and the credentials earned (e.g., high-school diploma, Bachelors degree, graduate degrees). Another advantage of using education as measure of SES for adults is that the likelihood of reverse causation (where the disease determines the exposure) is reduced, as education is usually complete before detrimental health effects occur[21,29,34]. Education may be the most appropriate assessment of SES for women because their own income or occupation may underrepresent the SES of the household. This is explained by the fact that a high proportion of women does not work outside the home[23].

Limitations of this indicator may be that it has different social meanings and consequences in different periods and cultures. SES and economic returns may also not rise consistently with increases in years of education and may differ significantly across ethnic and gender groups. The lack of knowledge of cognitive, material, social and psychological resources gained through education over the life-course makes it difficult to understand the educational link to health and to effectively design appropriate interventions. It is possible that education is a proxy for something else: in particular, people who are more patient, more forward looking, and have more ability to delay gratification, are likely to be both better educated and healthier, even if the education itself plays no direct role.

Income

Income is an indicator that directly measures material circumstances[20,21].

Higher income allows access to better quality material resources such as food and shelter, and better, easier or faster access to services, some of which have a direct (health services, leisure activities) or indirect (education) effect on health. Higher income can also provide social standing and self-esteem and facilitate participation in society. On the other hand, higher income (holding education and other variables constant) may signal longer hours of work, more stress, or participation in dangerous occupations, thus offsetting possible favourable effects of higher income on health[21,23].

Income is the SES indicator that can change most over time, although this dynamic aspect is rarely taken into account in epidemiological studies, and its effect on health may accumulate over the life-course. Some researchers find that it is permanent income that affects health; other models assume that transitory changes are very important[34]. Thus, some authors draw attention to the fact that studies with data at only one stage of life, not measuring lifetime income trajectories and socioeconomic experiences during

earlier life stages, may be inadequate for fully elucidating income's contribution to health[20].

When measuring income, information should be collected on disposable income, as this reflects what individuals or households can actually spend, including money received from jobs, social security, retirement annuities, unemployment benefits, public assistance, interest dividends, income from rental properties, child support and informal income. In addition, the amount of debt should also be taken into account, because it will affect the level of disposable income. Most health studies use nominal income measures, but significant differences in cost-of-living across the locations where individuals live can exist, suggesting that nominal income is an imperfect measure of real income. Whenever possible, nominal income should be deflated by a cross-location cost-of-living index[34]. Also, household rather than individual income might be more relevant to estimate health-relevant disposable income for the individuals of that household, assuming that there is an even distribution of income according to needs within the household. For income to be comparable across households, family size or the number of people dependent on the reported income should be collected.

Income can be measured as an absolute or relative indicator. Research has demonstrated long ago that low absolute level of income, or absolute poverty, is associated with worse health outcomes. Absolute poverty is defined as the inability to meet basic human needs, such as food, shelter and medical care, and it is operationalized in terms of a threshold—a poverty line—deemed necessary to meet minimal human needs[14]. However, the socioeconomic gradient in health clearly extends beyond individuals living below this official threshold. Therefore, considerable attention has been given to relative income, or relative poverty, which defines poverty in terms of its relation to the standards that exist elsewhere in society. This change in focus of relative income draws attention to the fact that those at the bottom of the income distribution

have worse health than their more affluent peers regardless of the average level of income[34], but also to the fact that there are health inequalities even among those who have attained relatively high levels of socioeconomic position. This means that it is not just the material conditions associated with severe disadvantage that explain health inequalities, but also living in a disadvantaged position.

Income has some limitations as SES indicator: there is evidence that personal income is a sensitive issue and prone to missing and distorted responses[21] and, in the association between income and health outcomes, reverse causality can not be ruled out[23].

Wealth

Wealth is another indicator that specifically measures material resources. Wealth generally refers to an individual's or a household's total financial resources amassed over his or her lifetime[35]. Measures of wealth include assets and net worth[35]. Assets are the accumulated cash value of all sources that can be quickly converted into cash (e.g., disposable income and savings), as well as those that are less readily converted (e.g., stocks, bonds, inheritance, and real estate). Net worth is defined as one's assets minus outstanding debts. As with income, the main effects of wealth on health are likely to be indirect, through its conversion into consumption[20]. Income captures the resources that are available at particular periods of time, whereas wealth measures the accumulation of these resources.

Several authors argue that there are strong conceptual and empirical grounds for measuring wealth in health studies, concluding that income is not a proxy for wealth, and even that it could be more important than income in relation to health[20,35]. Wealth may be a better measure of the financial resources available and is a more accurate barometer of access to opportunities. Wealth can reflect power or influence over others and is more strongly linked to social class than income. Wealth may signal the

experience of material well-being, predictability and control in one's life, characteristics which are associated with better mental health. Assets are an indication of the ability to meet emergencies or to buffer the effects of lost or temporarily low income[20]. The relative importance of wealth versus income changes over the life-course (wealth being more important at older age owing to the accumulation of assets over time and the impact of retirement on income) or in population subgroups (wealth has been shown to vary dramatically among people of different ethnic groups, even among those with similar income levels)[4,35].

Nevertheless, wealth is generally more difficult to measure than income because of the multiple factors that contribute to its assessment and higher error rates because of sensitivity in reporting[29].

In order to determine whether health research should more frequently include measures of wealth, Pollack conducted a systematic review to assess the relationship between wealth and health[35]. In most studies, greater wealth was associated with better health, even after adjusting for other SES measures. The findings appeared most consistent when using detailed wealth measures on specific assets and debts, rather than a single question. He concluded that health studies should include wealth as an important SES indicator and that failure to measure wealth may result in under-estimating the contribution of SES to health.

Financial Strain

Financial strain (or economic hardship) is a subjective measure of SES, indicator of self-reported current economic difficulties[36]. It is viewed as a proxy for income, and also as a possible mediator between low income and mental disorders. Individuals in higher income groups can also experience financial strain, because of overspending or

inappropriately raised standard of living, and financial strain can be considered as a stressor accompanied by the perception of lowered social status.

Occupation

Occupational categories position individuals within the social structure, thus defining access to resources, lifestyle and exposure to psychological and physical risks[20]. Occupation is a measure less volatile than income.

Employment status (e.g., employed/unemployed/retired) is one of the basic aspects measured in research studies. It has been studied that unemployment, threat of unemployment and job insecurity can affect health[21,29,37]. Among the employed, occupations differ in their prestige, qualifications, privileges, and job characteristics (such as job strain and control over work), and each of these indicators of occupational status is linked to physical and psychosocial hazards. Therefore, this indicator provides a measure of environmental and working conditions, latitude in decision-making, and psychological demands of the job.

The difficulty in classifying individuals who are not working (for reasons of retirement, unemployment, homemaking, or caretaking) or students and people working in unpaid, informal or illegal jobs is a limitation of occupation-based measures[21,23]. Another limitation is its lack of measurement precision and the fact that it does not account for ethnic and gender differences in benefits arising from the same occupation[29].

Subjective Social Status

Subjective social status (SSS) refers to "the individual's perception of his own position in the social hierarchy". In research, it is most commonly measured by variants of a single-item, self-anchoring scale presented to respondents as a visual "ladder" of ordered rungs of socioeconomic ranking, the MacArthur Scale of Subjective Social Status[17,38].

SSS has only recently begun to be studied as a potential mediator of the associations between objective indicators of SES (education, occupational class, and wealth) and health[17]. Current research has suggested that SSS "reflects the cognitive averaging of standard markers of socioeconomic situation" [39] and includes constructs which traditional measures do not capture that could plausibly influence health through psychophysiological pathways not explicitly reflected in standard SES measures. These additional dimensions include an individual's valuation of i) current, prior, and anticipated financial security; ii) qualitative dimensions of educational and occupational histories; iii) comparative standards of living and housing; and iv) possibly social prestige or influence[38,39]. It is noteworthy that the extent to which subjective and objective indicators of SES correlate with one another may vary appreciably among individuals, ethnic populations, cultures, and countries. It has been suggested that subjective social status may be an important correlate of health in old age, possibly because of its ability to summarize life-time achievement and socioeconomic status[17].

In line with prior speculations on subjective social status and health, lower social ladder rankings have been associated with adverse physical and mental health outcomes in both cross-sectional[39,40,41] and prospective[42] studies.

Area-Level Indicators

A quite different approach to measuring inequalities in health is to analyse the SES of a geographical area.

Area-level indicators of SES may be used to characterize populations living in a specific geographic area, such as neighbourhoods, counties, regions or states, by aggregating individual-level measures of SES. Several measures can be used, such as average house value, median monthly rental value of housing, percentage of single-parent families, percentage of unemployed persons, or per capita income, aggregated to the appropriate

area level. It is also possible to create composite SES measures using aggregates of several individual-level indicators[29]. Composite SES measures can be divided into two basic categories: those that measure material and social deprivation, such as the Townsend Index (comprises the proportion of unemployed, households with no car, households that are not owner occupied and the degree of household crowding) and Carstairs Index, and those that measure social standing or prestige, such as the Hollingshead Index of Social Prestige or Position and Duncan's Socioeconomic Index[3,29]. However, such composite measures, while potentially useful for classification in some studies, do not permit study of how particular SES factors influence health[20].

Research that conceptualizes place as the unit of analysis may also evaluate health policies, social and public support programmes, access to goods and services, the built environment, and social norms[14], all factors that will ultimately shape health.

Area-level indicators of SES have also been used to specifically determine the effect that area socioeconomic circumstances have on a health outcome beyond individual SES. These contextual approaches to SES examine the social and economic conditions that affect all individuals who share a particular social environment[29].

Finally, area-level SES indicators can be used as proxies for individual-level SES when individual measures are not available. When area-level measures of SES are used as proxies for individual-level indicators, the estimate of the association between SES and the health outcomes is likely to be an underestimate of the true individual-level effect, because of measurement error arising from giving all individuals in an area the same score[21]. In addition, if area characteristics have an independent effect on health outcomes, and area measures are used as proxy for the individual-based measures, the association of individual SES with the health outcome may be overestimated because it incorporates the area-level effect.

Social Capital

Social capital is defined as the resources available to individuals and to society through social relationships[14]. Although there are still varying definitions of the term and what it encompasses, most social capital conceptualizations refer to it as networks of people deriving benefit from common interaction with each other[43], as "the features of social organization, such as civic participation, norms of reciprocity, and trust in others, that facilitate cooperation for mutual benefit"[44]. Putnam states that "social capital consists of five principal characteristics, namely: (1) networks (community, voluntary, state, personal) and density; (2) civic engagement, participation, and use of civic networks; (3) local civic identity (sense of belonging, solidarity, and equality with other members); (4) reciprocity and norms of cooperation, a sense of obligation to help others, and confidence in return of assistance; (5) trust in the community"[45]. Kawachi argues that "social capital has sometimes been erroneously identified as a purely psychosocial variable (…). It should be obvious, however, that the resources available through social relationships can sometimes also take the form of tangible factors (such as cash loans, labour in kind, access to information)"[14].

The theory of social capital states that there is a relationship between mental health and social capital elements of a community. Social capital may have both positive aspects (trust and reciprocity that facilitate coordination and cooperation for mutual benefit) and negative aspects (exclusion, unequal power distribution and excessive demand on members)[43].

Life-Course Socioeconomic Status

Researchers have increasingly sought to understand the emergence of health inequality across the dimension of time. Life-course effects refer to how health status at any given

age, for a given birth cohort, reflects not only contemporary conditions but embodiment of prior living circumstances, in utero onwards[14].

There are several theoretical models that help conceptualize how life-course exposures influence disease risk[21]. The "critical period model" argues that an exposure during a particular time window has lasting effects that result in higher disease risk. In addition to critical periods, there may be "sensitive periods" when an exposure has a particularly marked but not unique effect. Other life-course models state that effects "accumulate over the life-course". Under this model, likelihood of poorer health increases with the patterning, duration or number of times somebody is exposed to adverse SES over the life-course. Understanding the specific life-course model that affects a particular disease outcome may be important, because this indicates the appropriate timing of any preventive intervention.

CHAPTER 3:

SOCIOECONOMIC STATUS AND MENTAL HEALTH

In 1885, Edward Jarvis, a Massachusetts epidemiologist, reported the results of his classic study of the prevalence of psychiatric disorders[46]. His most striking finding was that "the pauper class furnishes, in ratio of its numbers, sixty-four times as many cases of insanity as the independent class"[46].

Despite changes in concepts and methods used to define cases and measure socioeconomic status, recent research continues to demonstrate an association between SES and diverse health outcomes[23,26,47,48]. The association between SES and health can be summarized as monotonic, so that as individuals or groups move up in the SES continuum, mortality and morbidity rates decrease, with the gradient steepest at the lowest levels[23]. The gradient extends to mortality from all causes[49] and to the prevalence of diverse common non-communicable conditions, including cardiovascular disease, renal disease, mental disorders, diabetes, cancer, arthritis, obesity, and infant mortality[23].

An inverse relationship has also been demonstrated between SES and schizophrenia, depression (at least in women), and disorders involving antisocial behaviours and substance use (at least in men)[50,51,52]. There is a paucity of research on the topic of risk factors for bipolar disorder[53], but scattered findings show no relation between risk of bipolar disorder and socioeconomic disadvantage[54]. A review of 15 studies found the median ratio for overall prevalence of mental disorders between the lowest and the highest socioeconomic categories was 2.1:1 for one year and 1.4:1 for lifetime prevalence[55]. Similar results have been reported from recent studies carried out in North America, Latin America and Europe[56].

There is also evidence that the course of disorders is determined by the socioeconomic status of the individual[50,51]. This may be a result of service-related variables, including barriers to accessing care.

SOCIAL CAUSATION AND SOCIAL SELECTION THEORIES

Two main mechanisms have been posited in understanding the link between mental illness and poor social circumstances: social causation and social selection[57,58].

According to the social causation hypothesis, socioeconomic standing has a causal role in determining health or emotional problems. Social selection hypothesis posits that genetically predisposed individuals with worse physical or emotional health may "drift down" the socioeconomic hierarchy or fail to rise in socioeconomic standing as would be expected on the basis of familial origins or changes in societal affluence. That is, the social drift model views health problems as exerting a causal influence on social status. Eaton[59] describes an additional possible process, the "chronicity interpretation", in which lower socioeconomic status prolongs the duration of episodes of mental disorders through an aetiologic process possibly unrelated to causation. All processes can work simultaneously to produce the prevalence result.

These directional hypotheses have been the subject of considerable research and discussion in the literature. The classic study by Dohrenwend et al.[57] of a sample of Israel-born adults of European and North African background (n=4,914) indicated that social selection might be more important to explain the inverse relationship between SES and schizophrenia and that social causation might be more important for depression in women and for antisocial personality and substance use disorders in men.

The social causation hypothesis of depression is supported by most but not all surveys[60], and by most longitudinal analyses. One of the first longitudinal studies to support social causation was the analysis by Wheaton[61]. Recent longitudinal studies using standard methodologies that include analyses of data from Britain[62], New Zealand[63], and the United States[64] continue to support the causation interpretation. The associations are probably dynamic and reciprocal, and social drift may, in part, maintain the adverse effects of SES.

DEPRESSIVE DISORDERS AND SOCIOECONOMIC STATUS

Unipolar depressive disorders place an enormous burden on society and are ranked as the fourth leading cause of burden among all diseases, accounting for 4.4% of the total DALYs, and the leading cause of YLDs, accounting for 11.9% of total YLDs[1]. By the year 2020 the burden of depression is projected to increase to 5.7% of the total burden of disease, becoming the second leading cause of DALYs lost[1]. In epidemiological studies in the community, non-psychotic depression and anxiety are very often referred to as common mental disorders. As the common mental disorders contribute substantially to all morbidity, clarifying the socioeconomic distribution of these disorders is an important step in providing an evidence base for efforts to reduce inequalities.

Studies on the association between socioeconomic status and depression have given conflicting results, probably reflecting the use of different measures, an oversimplification of what is meant by social class and not controlling for important confounders[65].

It has been suggested that social class might have an influence on the psychopathological pattern of depressive symptoms[66], with somatisation and anxiety

symptoms more frequent in patients from the lower social classes, and cognitive symptoms more common among patients from the upper classes.

Systematic Reviews

Kohn et al.[55] reviewed 47 prevalence studies of socioeconomic status and major depression, and found that 28 of the studies had a result that was not statistically significant, and 19 showed a significant tendency for depressive disorder to have higher prevalence in the lower socioeconomic status group.

Lorant et al.[52] carried out a meta-analysis to evaluate the magnitude, shape, and modifiers of the association between socioeconomic status and depression. The search found 51 prevalence studies, five incidence studies, and four persistence studies meeting the criteria. Results indicated that low-SES individuals had higher odds of being depressed (OR=1.81, $p<0.001$), but the odds of a new episode (OR=1.24, $p=0.004$) were lower than the odds of persisting depression (OR=2.06, $p<0.001$). A dose-response relation was observed for education and income. The authors concluded that there is compelling evidence for socioeconomic inequality, but that it is heterogeneous, and varies according to the way psychiatric disorder is measured, to the definition and measurement of SES, and to contextual features such as region and time.

Gallo & Matthews[23] reviewed the association between the prevalence of depressive disorders and SES. Seven of the reviewed studies examined SES and the prevalence of depressive disorders. 50% of these cross-sectional studies identified an inverse association between SES and prevalence of depressive disorders, whereas 17% showed mixed evidence and 33% showed null evidence. The authors drew attention to the fact that three of the four null associations derived from the same study (Epidemiologic Catchment Area survey) and involved dichotomized assessments of education, income, and occupation. Seven studies examined the association between SES and depression

using prospective methods. Four (57%) of theses prospective studies found evidence of an inverse association between various indicators of SES and incident depression. The remaining three studies (43%) identified mixed findings. They concluded that the majority of the evidence suggests that individuals with low SES have higher levels of depressive disorders and that the evidence seems most consistent for comparisons involving income or composite measures of SES, as opposed to education measures. They also pointed out that several studies suggest that higher SES is associated with decreasing rates of depressive disorders only up to a high affluence level, at which point the effect appears to reverse[23].

Fryers et al.[67] also reviewed the published evidence on the links between socioeconomic status and common mental disorders in developed countries. Of nine studies, eight provided evidence of an association between one or more markers of less privileged social position and higher prevalence of common mental disorders. For some individual indicators in particular studies, no clear trend was evident, but no study showed a contrary trend for any indicator. The more consistent associations were with unemployment, lower education and low income or material standard of living. Occupational social class was the least consistent marker.

In another study, Fryers at al.[68] reviewed the major European population surveys from the last 25 years, looking for evidence of associations between the prevalence of the common mental disorders and markers of socioeconomic disadvantage. They found that people of lower socioeconomic status, however measured (with poor education, material disadvantage and unemployment), showed higher frequencies of the common mental disorders.

Studies have also been conducted in developing countries.

Patel & Kleinman[69] identified 11 community studies on the association between poverty and common mental disorders in six low and middle income countries. Most studies showed an association between indicators of poverty and the risk of mental disorders, the most consistent association being with low levels of education.

Ortiz-Hernández et al.[70] reviewed the scientific output in Latin America concerning the impact of socioeconomic status on mental disorders and drug use or addiction. According to the majority of the studies, adults and adolescents with low SES showed increased risk of mental disorders. In the majority of studies with adults there was an association between low socioeconomic status and a higher risk of suicidal attempts, depressive symptoms and common mental disorders.

Lund[71] carried out a systematic review of the epidemiological literature in low and middle income countries on the same subject. Most of the 115 studies that were reviewed reported positive associations between a range of poverty indicators and common mental disorders. In community-based studies and using bivariate and multivariate analyses, 73% and 79% of studies, respectively, reported positive associations between a variety of poverty measures and common mental disorders, 19% and 15% reported null associations and 8% and 6% reported negative associations. However, closer examination of specific poverty dimensions revealed a complex picture, in which there was substantial variation between these dimensions in the strength of the association. While variables such as education, food insecurity, housing, social class, socioeconomic status and financial stress exhibited a relatively consistent and strong association with common mental disorders, others such as income, employment and particularly consumption were more equivocal.

Cross-Sectional Studies

Several cross-sectional studies assessed the association between socioeconomic status and depressive disorders.

The National Comorbidity Survey[50] identified an inverse association between education and income and the prevalence of depressive disorders (n=8,098) in the USA.

In the UK, Lewis et al.[72] examined the association between the prevalence of neurotic disorder (depression and anxiety) and socioeconomic status, by identifying the separate contributions made by the Registrar General's Social Class, educational qualifications, car access, and housing tenure (n=9,570). They found an independent association between low standard of living and the prevalence of neurotic psychiatric disorder. Both men and women who owned their own homes had a lower prevalence of neurotic disorder than those who rented homes. The same result was found in an analysis that combined men and women after adjustment for the other variables, including the interaction between sex and social class (OR=1.29, 95% CI 1.13 to 1.48). There was a linear relation between frequency of neurotic disorder and car access: the frequency was highest among people with no access to a car, intermediate in those with access to one car, and lowest in those with access to two or more cars; this relation was independent of the other variables, including housing tenure and the interaction between sex and social class (OR=1.38, 95% CI 1.12 to 1.70 for no car access versus access to two or more cars).

In a national survey (n=7,076) on the prevalence of psychiatric disorders in the adult Dutch population[73], mood disorders (major depression, dysthymia, and bipolar disorder) were higher by about 50% among those in the lower income and education levels.

Another study, in Ontario (Canada)[74], evaluated the relationship between lifetime and 12-month depression and several socio-demographic factors (n=12,376). The odds of living with lifetime depression among individuals with any kind of post-secondary education was 1.54 times compared to individuals with less than secondary education (95% CI 1.22 to 1.93). For 12-month depression this odds was not statistically significant. Income showed a significant inverse association with both lifetime and 12-month depression. For the income level of up to $30,000 the odds ratio of lifetime depression for each $10,000 increase in income was 0.82 (95% CI 0.74 to 0.90). Similarly, for 12-month depression the odds ratio was 0.71 (95% CI 0.63 to 0.79).

Data from cross-national surveys in Brazil, Chile, India and Zimbabwe[75] show that common mental disorders are about twice as frequent among the poor as among the rich.

Ludermir & Lewis[65] investigated the intermediaries between social class and common mental disorder in Olinda, a deprived area of Northeast Brazil (n=683). Poor education (OR=2.5, 95% CI 1.2 to 5-2; <5 years vs. ≥11 years education) and low income (OR=2.4, 95% CI 1.0 to 5.6; ≤1/4 minimum wage vs. >1 minimum wage) were independently associated with the prevalence of common mental disorder.

A survey in Santiago (Chile)[24] assessed which indicators of socioeconomic status were associated with an increased prevalence of common mental disorders (n=3,870). Lower education (OR=2.44, 95% CI 1.50 to 3.97), a recent decrease in income (OR=2.14, 1.70 to 2.70), and poor housing (OR=1.53, 1.05 to 2.23), were the only socioeconomic status variables that remained significantly associated with an increased prevalence of common mental disorders after adjustments. The prevalence of common mental disorders was also higher among people with manual unskilled occupations, overcrowded housing, and lower per capita income, but these associations disappeared after adjustment for other explanatory and confounding variables. The authors

concluded that there is a strong, inverse, and independent association between education and common mental disorders, but that income was not associated with the prevalence of common mental disorders, after adjusting for other socioeconomic variables. They claimed that similar results have been found in other Latin American studies, but that British studies tend to find the opposite, with income, but not education, associated with common mental disorders.

Longitudinal Studies

Cross-sectional studies cannot distinguish whether low socioeconomic position is associated with the development of new episodes of mental disorders, with increased duration of episodes, or both. Measurement of incidence eliminates the chronicity, selection, and drift interpretation, allowing focus on aetiology, but only a few longitudinal studies are available on this issue.

In USA, the Alameda County study[76] found a prospective relationship between SES and the onset of depression (n=6,928). For individuals who were not depressed at baseline, low and medium levels of education were associated with a greater risk of depression after a 9-year follow-up period compared with rates associated with high levels of education. Inadequate income also predicted a higher risk of depression at follow-up.

Also in the USA, the Epidemiologic Catchment Area Study assessed the incidence of mental disorders. A prospective analysis of the New Haven, Connecticut[77], sample (n=3,495) showed that individuals reporting poverty-level income and no history of depression at baseline had higher rates of incident major depression across a 6-month follow-up period (OR=2.06, $p< 0.05$). In another 1-year follow-up of older individuals (>40 years old) enrolled in the ECA (n=7,737)[78], lower education predicted higher risk of first-time major depression after controlling for other factors (although this was statistically significant for women only). Using data from the New Haven site of the

Epidemiologic Catchment Area study (n=3,170), Bruce & Hoff[79] assessed the effects of social status, physical health status, and social isolation on first-onset depression in a 1-year period, controlling for demographic characteristics and baseline psychiatric factors. Among the assessed potential risk factors, poverty status (OR=2.034, $p<0.05$) and confinement to a bed or chair (OR=4.015, $P<0.05$) were independently associated with an increased risk for a first-onset depressive episode. The effects of poverty, and to a lesser degree homebound status, were substantially reduced when controlling for degree of isolation from friends and family, suggesting that social isolation mediated some of the relationships between social and physical statuses and major depression.

Data from the prospective epidemiologic study (n=593) based in Stirling County, in Canada[80], showed that persons with low SES had a higher incidence of depression across the 16-years follow-up. A trend for depression to predict downward social drift also emerged, but given the close association between depression and SES at baseline, the power to evaluate this effect was quite low.

Wang J et al.[36] conducted a longitudinal study in Canada to estimate the risk of major depressive episode over 6 years by socioeconomic status levels (n=9,589). Low education level (OR=1.86, 95% CI 1.28 to 2.69) and financial strain (OR=1.65, 95% CI 1.19 to 2.28) were associated with an increased risk of a major depressive episode in participants who had worked in the previous 12 months. In those who did not work in the previous 12 months, participants with low education were at a lower risk of major depressive episode (OR=0.43, 95% CI 0.25 to 0.76), compared with those with high education. Financial strain was not associated with major depressive episodes in participants who did not work. Low household income appeared to be associated with a high risk of major depressive episode in working men (OR=2.04), but the association was not statistically significant. Most of the differences in the incidence of major

depressive episode by baseline SES levels disappeared after cases of major depressive episode in the past (from 1994 to 2001) were excluded.

In a cohort study using the annual Belgian Household Panel Survey (n=11,909)[81], it was assessed whether longitudinal change in socioeconomic factors (material standard of living, education, employment status and social relationships) affected change of depression level. It was found that a lowering in material standard of living was associated with increases in depressive symptoms and in major depression.

Patel et al.[82] conducted a longitudinal study in India to assess the determinants of common mental disorders in women (n=2,494). Low income (OR=0.37, 95% CI 0.1 to 1.1 for the highest quartile compared with the lowest) and the experience of difficulties making ends meet (OR=2.82, 95% CI 1.4 to 5.6) were two of the baseline factors found to be independently associated with the risk for common mental disorder.

Kurtz et al.[83] examined women (n=1,000) who had uncomplicated vaginal births at four hospitals in Ontario, Canada, stratified them into socioeconomically disadvantaged and socioeconomically advantaged groups and compared their postpartum health. When compared to the socioeconomically advantaged women, the socioeconomically disadvantaged women had higher rates of symptoms of postpartum depression (OR=2.7, 95% CI 1.64 to 4.4).

Another study[84], in India, investigated the effect of risk factors on the occurrence and outcome of depression in mothers (n=270) who recently gave birth. At 6-months follow-up, economic deprivation and poor marital relationships were important risk factors for the occurrence and chronicity of depression.

Life-Course Studies

For implementation of timely intervention it is also of interest to establish whether the higher rates of adult depression observed in the lower social strata reflect influences that took place earlier in the life-course, or whether they reflect contemporaneous influences. Available evidence indicates that the association of socioeconomic status with adult depression reflects both short-term influences operating in adulthood and long-term influences rooted in previous life stages.

Gilman et al.[85] addressed this question studying a cohort of 1,132 adult offspring of mothers enrolled in the US National Collaborative Perinatal Project, whose childhood SES, indexed by parental occupation, had been assessed at birth and at the seventh year. Participants from lower SES backgrounds had nearly a twofold increase in risk for major depression compared to those from the highest SES background independent of childhood socio-demographic factors, family history of mental illness, and adult SES.

Another study[62] used the 1958 British birth cohort survey, which collected information on more than 10,000 subjects at birth and at ages 7, 11, 16, 23, and 33 years. Using these data, Power et al. showed that factors measured at age 7 years reduced the association of SES with depressive symptoms at age 33 years by as much as 25%. These factors included the child's academic ability and parental interest in the child's education. At the same time, the study found that the association of SES with adult depression also reflected adult-specific factors such as financial hardship and job insecurity.

Subjective Social Status Studies

An increasing body of research indicates that subjective social status relates over and above objective SES markers to mental health[42,86].

A cross-sectional study (n=7,433) in the UK[17] examined the link between subjective social status and health in old age and investigated whether subjective social status mediated the associations between objective indicators of socioeconomic status and health. It was found that, independently of a range of covariates, subjective social status was significantly related to self-rated health, depression, and long-standing illness or disability in both men and women. Further analysis suggested that subjective social status mediated fully or partially the associations between education, occupational class and self-reported and clinical health measures. On the contrary, subjective social status did not mediate wealth's associations with the outcome measures, except those with self-reported health measures.

One postal survey (n=6,500) in Scotland [87] examined whether negative social comparisons of the worth of two common assets (homes and cars) were related to psychosocial health (depression, anxiety, self-esteem, and mastery). It was found that having adjusted for socio-demographic variables, rating one's house/flat as worth less than others was associated with lower self-esteem ($P<0.001$) and mastery ($P<0.001$) and higher depression ($P<0.007$) and anxiety ($P<0.012$). Rating one's car as worth less than others was not significantly associated with these psychosocial variables.

Skapinakis et al.[88] investigated the longitudinal association between socioeconomic position and common mental disorders in a general population sample in the UK (n=2,406). None of the socioeconomic indicators studied was significantly associated with an episode of common mental disorder at follow-up after adjusting for baseline psychiatric morbidity. The analysis of separate diagnostic categories showed that subjective financial difficulties at baseline were independently associated with depression at follow-up. These findings supported the view that, apart from objective measures of socioeconomic position, more subjective measures might be equally important from an aetiological or clinical perspective.

The amount of depression associated with economic hardship among adults may depend on age: Mirowsky & Ross[89] found that the amount of depression associated with economic hardship decreases with older age, both cross-sectionally and over time.

ANXIETY DISORDERS AND SOCIOECONOMIC STATUS

Evidence on the relation between anxiety disorders and SES is more limited because the diagnostic concepts have been subject to more fluctuation than those for depression, bipolar disorder, or schizophrenia. As a result, few studies are available[54].

Gallo & Matthews[23] reviewed eight studies that examined the association between the prevalence of anxiety disorders and SES, four derived from the National Comorbidity Survey and three derived from the Epidemiologic Catchment Area Study. They concluded that the majority of the comparisons (53.3%) identified inverse associations between indicators of SES and prevalent anxiety disorders, 13.3% identified mixed findings, and 33.3% identified null findings. Two of four studies that included an assessment of education (both from the National Comorbidity Survey) identified an inverse association with prevalent panic[90] and phobic disorders[91]. The Epidemiologic Catchment Area Study identified mixed evidence for an association between education and prevalent panic and phobic disorders[92] and null evidence for education and generalized anxiety disorder[93]. Three of five studies, each from the National Comorbidity Survey, identified an inverse, linear association between income and prevalence of various anxiety disorders[50,91,94]; studies from the Epidemiologic Catchment Area Study identified mixed findings[93] and null findings for the income and anxiety disorder association[92].

In the same review[23], Gallo & Matthews examined five studies assessing whether SES predicts incident anxiety disorders. Only one of six comparisons (17%) suggested that

lower SES leads to a higher incidence of anxiety disorders, 50% showed mixed findings, and 33% showed null findings. In a 6-month longitudinal study of the New Haven ECA sample, poverty did not significantly predict incident panic or phobic disorders[77]. However, few new cases were observed in this brief follow-up period, suggesting that low power might have contributed to the null results. Eaton & Keyl[95] examined the associations between occupation and education and 1-year incidence of agoraphobia in the Epidemiologic Catchment Area Study. Lower SES tended to predict a higher incidence of agoraphobia, but this was statistically significant only for "classic" agoraphobia, which is the most debilitating type. Keyl & Eaton[96] also found a prospective inverse association between occupational prestige and 1-year incidence of panic disorder but not other types of panic attacks. Another study[97] found that lower education was associated with higher incidence rates of social phobia over a 1-year follow-up of the Epidemiologic Catchment Area Study participants.

SCHIZOPHRENIA AND SOCIOECONOMIC STATUS

Schizophrenia is a severe disorder that causes a high degree of disability. In a 14-country study on disability associated with physical and mental conditions, active psychosis was ranked the third most disabling condition by the general population[1]. In the global burden of disease study, schizophrenia accounted for 1.1% of the total DALYs and 2.8% of YLDs[1].

Early work of Faris and Dunham[98] in 1939 showed first admissions for schizophrenia to concentrate in the inner city, lower socioeconomic areas of Chicago. Since then, epidemiologic studies have shown that schizophrenia is unequally distributed by social position, with the highest prevalence rates in both men and women found in the most disadvantaged socioeconomic groups. A summary of findings of several studies[55] noted

that the ratio between the 12-months prevalence of the disorder among low-SES and high-SES people was 3.4, whereas the ratio for lifetime prevalence was 2.4. People with the lowest socioeconomic status have 8 times more relative risk for schizophrenia than those of the highest SES[99]. Schizophrenic people, in comparison with people without mental disorders, are 4 times more likely to be unemployed or partly employed[100], one-third more likely not to have graduated from high school, and 3 times more likely to be divorced[101].

It is commonly accepted that a range of psychosocial and environmental factors interact with genetic vulnerability in the genesis of psychotic illness. In fact, we do not know with certainty of a specific organic defect that is critical in the development of schizophrenia, but we do know of specific stressors that increase the susceptibility to the illness and that may provoke its appearance and subsequent course. However, debate continues on whether the poor social performance and lower social class of patients with schizophrenia are consequences of the illness, consequences of changes in individuals predisposed to develop schizophrenia, or due to the adverse social conditions that lead to schizophrenia[66]. There is evidence that the origins of the disorder lie in early life, and various conditions of environmental adversity more common among people in lower social classes have been shown to be associated with an increased risk of later schizophrenia (such as obstetric complications[102], prenatal infections[103], nutritional deprivation[104], discrimination[105], disadvantage[106] and stress). However, it remains unclear whether people born into lower social classes are at increased risk of schizophrenia[107].

Social Causation versus Social Drift

The theory of social causation of schizophrenia was challenged by Goldberg & Morrison[108] in a study showing that the social class distribution of the fathers and other relatives of persons of low SES with schizophrenia did not deviate from that of the

general population. The excess of low socioeconomic status among people with schizophrenia was mainly attributable to individuals who had drifted down the occupational and social scale.

Findings supporting the drift hypothesis were confirmed in several other studies.

A case-control study[107] (n=629) examined if low parental social class at birth increased children's risk of subsequently developing schizophrenia. The authors found that the risk of schizophrenia was not increased in people from lower social classes and that there was a slight excess risk among people in highest social classes (OR=0.59, 95% CI 0.40 to 0.85). They also found that the mean age at presentation was 24.8 years for patients whose parents were in the highest social class compared with 33.1 years for those in the lowest social class at birth. They concluded that although social class of origin did not seem to be an important risk factor for schizophrenia, it partially determined the age at which patients received treatment, and this treatment delay might, at least partially, explain why people from lower social class have a less favourable outcome.

These data were similar to the results found in a study of a northern Finland 1966 birth cohort[109], in which 11,017 people alive at the age of 16 years were followed up.

A longitudinal study (n=5,341) from the Danish registry[110] found that as many as 19 years prior to treatment, the odds of lower SES were greater for those who eventually were diagnosed as schizophrenic than for a control population.

On the contrary, Croudace and colleagues[111] reported an increased risk of schizophrenia among people from lower social classes.

Werner et al.[112] conducted a longitudinal population-based study (n=71,165) testing if socioeconomic deprivation at birth, as measured at the individual level and community

level, was associated with an increased risk of developing schizophrenia. Results suggested that social deprivation of parents and neighbourhoods at the time of birth were risk factors for schizophrenia, namely years of education of fathers and mothers, respectively, (0–8 vs. +13, OR=1.17, P<0.0001; OR=1.14, P<0.001) lower occupational status of fathers (OR=1.29, P=0.036), and poorer residential area SES (OR=1.26,P=0.012).

A matched case-control study[113] (n=168) showed a higher risk for those whose parents were in a disadvantaged position, and that risk increased with increasing levels of deprivation at birth. Subjects whose fathers were social class IV-V or who were born in deprived areas were at increased risk of schizophrenia (OR=2.1; 95% CI 0.8 to 5.5). Risk was greater in those with both of these indicators (OR=8.1; 95% CI=2.7 to 23.9).

Social causation is the leading hypothesis for explaining the increased risk of schizophrenia found among second-generation immigrants in contemporary European studies.

A meta-analysis[114] of 18 independent population-based incidence studies yielded a mean weighted relative risk of schizophrenia of 4.5 (95% CI 1.5 to 13.1) for second-generation immigrants, higher than that observed for the original immigrants, 2.7 (95% CI 2.3 to 3.2).

Several studies have shown a higher risk for deprived ethnic groups in England[115] and the Netherlands[116], with odds ratios comparing them with the general population ranging from 1.7 to 13.2.

Rates of schizophrenia are low in the countries of origin in which these rates have been studied, suggesting that a genetic explanation is unlikely. Unlike socioeconomic indicators such as education, occupation, or income, there is no possibility that ethnic status could be determined by schizophrenia or its insidious onset, and pathways

considered include low social class and adversity, discrimination, and the challenge of acculturation. It thus appears that something connected to the disadvantaged placement of the group in the society of destination increases the risk of schizophrenia[54]. It has been suggested that the cognitive challenge of formulating a life plan is more difficult for those of a disadvantaged ethnic status, and the difficulty of this task interacts with genetic vulnerability to schizophrenia in some persons. This view is consistent with the evidence that persons belonging to deprived ethnic groups are at a greater risk of schizophrenia if they live in neighbourhoods with proportionately fewer persons of the same ethnic group[117].

Corcoran et al.[118] studied the incidence of schizophrenia in relation to parental immigrant status in a population-based cohort of offspring born in Jerusalem (n=88,829). Incidence of schizophrenia was not increased among second-generation immigrants in this birth cohort, neither overall nor by specific group. The difference in risk of schizophrenia among second-generation immigrants in Europe and in this Israeli birth cohort suggests that the nature of the immigration experience may be relevant to risk, including reasons for migration, the nature of entry, and subsequent position in the host country for immigrants and their offspring. Minority status may be of importance, as later studies showed that immigrants to Israel from Ethiopia had increased risk of schizophrenia. The authors suggested that, given the circumstances and experiences of mass immigration following the establishment of Israel, immigrants and their children may not be perceived as ‘‘outsiders” and an ‘‘ethnic density’’ may have been maintained and may have been protective.

A matched case-control study[119] (n=100) investigated whether negative ethnic identity is related to schizophrenia risk in non-Western immigrants. Patients had a negative ethnic identity more often than general hospital controls (64% and 35%, respectively, $P<0.001$). After adjustment for marital status, level of education, unemployment, self-

esteem, social support, and cannabis use, negative ethnic identity was associated with schizophrenia (OR=3.29; 95% CI 1.36 to 7.92). Patients significantly more often had an assimilated or a marginalized identity and less often had a separated identity. The authors concluded that those who live in low–ethnic density neighbourhoods must contend with the triple burden of increased exposure to prejudice, reduced social support, and fewer possibilities for positive ethnic identification, factors that are likely to increase the social stress of minority status.

Thus, the social causation-selection debate is still not entirely resolved for schizophrenia. Results overall tend to favour selection as the dominant explanation, that is, people with schizophrenia either drift into or are selected into lower social classes because of disability or discrimination. However, this does not exclude the possibility that low socioeconomic status increases the risk of later schizophrenia.

Socioeconomic Status and Prognosis

Another important issue is the association between SES and course and outcome of schizophrenia. Recovery from psychosis is worse in the lower SES groups[120], the time spent in hospital and the number of admissions is significantly higher in lower-class patients[120], and these patients have a worse work record and are more socially isolated and stigmatized than those from a higher class.

Brown et al.[121] studied the relationship between social class of origin and cardinal symptoms of schizophrenic disorders over the course of early illness (n=153). At 6-month follow-up, patients whose origin was upper or middle social class, as compared to those from the lower social class, had lower symptom levels of hallucinations and delusions. They hypothesised that factors associated with low social class of origin, and aetiologically relevant to schizophrenia, can result in a distinct, symptom-specific type of the illness, characterized by less improvement in positive symptoms. This may be due

either to differences in the natural progression of the illness, to a higher risk of early neurodevelopmental insults, or to differences in treatment response.

Several studies have shown that people suffering from psychosis in developing countries have a better outcome than their counterparts in developed countries[51]. In a review, two-thirds of patients in developing countries but only one-third in developed countries had full remission at follow-up[51]. Saraceno raised the possibility that not only material but also cultural and service-delivery poverty could represent determinants of outcome of mental illness[51]. Cultural poverty in this context revolves around employment, community involvement, and lack of stigma.

SUBSTANCE USE DISORDERS

AND SOCIOECONOMIC STATUS

Mental and behavioural disorders resulting from psychoactive substance use include disorders caused by the use of alcohol, opioids such as opium or heroin, cannabinoids such as marijuana, sedatives and hypnotics, cocaine, other stimulants, hallucinogens, tobacco and volatile solvents[1]. Alcohol use disorders (abuse and dependence) ranks high as a cause of disease burden. The global burden of disease project estimated alcohol to be responsible for 1.5% of all deaths and 3.5% of the total DALYs, including physical disorders (such as cirrhosis), and injuries (for example, motor vehicle crash injuries) attributable to alcohol[1]. The burden attributable to illicit drugs (heroin and cocaine) was estimated at 0.4% of the total disease burden[1].

Several studies have shown that the rate of DSM-IV-diagnosed alcohol dependence is higher in lower SES groups[122]. In contrast, evidence is emerging that DSM-IV-diagnosed alcohol abuse is associated positively with higher SES, e.g. higher income in adults and

educational achievement in college-aged young adults. The reasons for this different relationship between SES and alcohol dependence and abuse have not been investigated previously. This is an important issue to address; if alcohol abuse and dependence have validly opposite relationships with SES, it implies different competing risk factors for the development of each disorder.

A survey conducted in the United States[122] (n=43,093) found that prevalence of lifetime and 12-month alcohol abuse was 17.8% and 4.7% and prevalence of lifetime and 12-month alcohol dependence was 12.5% and 3.8%. 12-month and lifetime alcohol dependence was significantly more prevalent among those with lower incomes. The odds of lifetime alcohol abuse were lower among those with lower income.

Ortiz-Hernández et al.[70] reviewed the scientific output in Latin America concerning the impact of socioeconomic status on mental disorders and drug use or addiction. According to the majority of the studies, alcohol consumption was higher among individuals with high SES, while low SES was associated with alcohol abuse and addiction, although the evidence was less conclusive. Illicit drug use was more frequent among adults (but not adolescents) with low SES.

Subramanian et al. [123] investigated the independent contribution of individual socioeconomic markers and state prohibition policy on alcohol consumption among men and women in India (n=301,984). Men and women living in households at the lowest standard-of-living quintile were more likely to consume alcohol (OR=1.92; 95% CI 1.81 to 2.03, and OR=2.72, 95% CI 2.18 to 3.39), respectively, than those classified as living in the top quintile. They concluded that caste, education and standard of living independently influence alcohol use in India.

Among those with a diagnosis of alcohol abuse, the most prevalent criterion is hazardous use, which commonly requires sufficient resources to own or access a car.

Keys & Hasin [124] investigated whether the association between income and the prevalence of current alcohol abuse (n=38,317) is accounted for by the hazardous use criterion; specifically, the drinking and driving symptoms of the hazardous use criterion. They found that among the alcohol abuse criteria, hazardous use is the most prevalent and the only criterion to have a significant positive relationship with income ($F=20.3$, $df=3$, $P<0.0001$). Among the hazardous use symptoms, driving after drinking ($F=13.0$, $df=3$, $P<0.0001$) and driving while drinking ($F=9.2$, $df=3$, $P<0.0001$) were related positively to income.

Social class is a risk factor for alcohol-related mortality, which is also linked to social structural factors such as poverty and disadvantage[125]. Alcohol-related mortality rates are higher for men in the manual occupations than in the non-manual occupations, but the relative magnitude depends on age. Men aged 25–39 years in the unskilled manual class are 10–20 times more likely to die from alcohol-related causes than those in the professional class, whereas men aged 55–64 years in the unskilled manual class are only about 2.5–4 times more likely to die than their professional counterparts. For women, younger women in the manual classes are more likely to die from alcohol-related causes, but among older women it is those in the professional class who have the greater mortality.

A survey conducted in the United States[126] (n=43,093) found that prevalence of 12-month and lifetime drug abuse (1.4% and 7.7%, respectively) exceeded rates of drug dependence (0.6% and 2.6%, respectively). Rates of abuse and dependence were greater among those of lower socioeconomic status, namely those in the lowest income category ($P<0.05$).

Hans [127] studied the demographic and psychosocial characteristics of substance-misusing pregnant women, and found that demographic features were related only to type of substance used, with Black women and poorer women more likely to use illicit

substances, particularly cocaine, and White women and better-educated women more likely to use alcohol.

SUICIDE AND SOCIOECONOMIC STATUS

Suicide "is the result of an act deliberately initiated and performed by a person in the full knowledge or expectation of its fatal outcome"[1]. Suicide is an important public health problem, with a complex, multi-dimensional aetiology. Taken as an average for 53 countries for which complete data is available, the age-standardized suicide rate for 1996 was 15.1 per 100,000 (24.0 per 100,000 for males and 6.8 per 100,000 for females)[1].

Durkheim is generally regarded as the founder of the scientific study of the influence of the socioeconomic environment on suicidal behaviour[128]. Suicide rates change over time, and much of the literature focuses on the determinants of suicide mortality at the macro level. The study of the characteristics of individuals who have killed themselves has also contributed greatly to our knowledge of risk factors for suicide. A minor number of studies has tried to assess the association between social and economic characteristics of geographic areas and their suicide rates.

Studies of the Impact of Socioeconomic Status on Suicide

Individual-Level Evidence

A large body of research has documented the detrimental effects of unemployment[129], low income[130], and socioeconomic disadvantage[131] on suicide at the individual level.

Lorant et al.[131] presented a prospective follow-up of censuses matched with vital statistics in ten European populations and showed that in most countries, the greater

the socioeconomic disadvantage, the higher is the risk of suicide. In men, a low level of educational attainment was a risk factor for suicide in eight out of ten countries, and suicide inequalities were smaller and less consistent in women.

Agerbo at al.[132] conducted a nested case-control study in Denmark to estimate the family and individual psychiatric and socioeconomic factors associated with suicide in young people. The strongest risk factor was mental illness in the young people. They found that parental unemployment, low income, and poor schooling were factors associated with an increased risk of suicide in young people, as well as short duration of schooling in the young people themselves. However, the effect of the parents' socioeconomic factors decreased after adjustment for a family history of mental illness and a family history of suicide.

In another study[130], also in Denmark, suicide risk was addressed in relation to factors regarding family structure, socioeconomics, demographics, mental illness, and family history of suicide and mental illness. A history of hospitalization for psychiatric disorder was associated with the highest odds ratio and the highest attributable risk for suicide. Cohabiting or single marital status, unemployment, low income, retirement, disability, sickness-related absence from work, and a family history of suicide and/or psychiatric disorders were also significant risk factors for suicide. The effect of most risk factors differed significantly by gender. A psychiatric disorder was more likely to increase suicide risk in female than in male subjects. Unemployment and low income had stronger effects on suicide in male subjects. Living in an urban area was associated with higher suicide risk in female subjects and a lower risk in male subjects.

Taylor et al.[133] investigated the relationship between suicide rates and prevalence of mental disorder and suicide attempts across socioeconomic status groups, in Australia. They found significant increasing gradients from high to low SES groups for prevalences of affective disorders, anxiety disorders (females only), and substance use disorders

(males only); sub-threshold drug and alcohol problems and depression; and suicide attempts and suicide (males only). For male suicide the relative risk in the lowest SES group compared to the highest was 1.40 for all ages (95% CI 1.29 to 1.52, p<0.001), and 1.46 for male youth between 20 and 34 years (95% CI 1.27 to 1.67, p<0.001). SES remained significantly associated with suicide after controlling for the prevalence of mental disorders and other psychiatric symptomatology, suggesting that an independent relationship between suicide and SES exists.

The overall importance of a risk factor for suicide in a population is determined not only by the relative risk of suicide but also the prevalence of the risk factor in the population, which can be combined with the relative risk to calculate the population attributable risk.

A systematic review and meta-analysis[134] of individual-level, population-based studies was conducted to estimate relative risk and population attributable risk of suicide associated with socioeconomic deprivation (relatively low relative risk, but high population prevalence) and mental disorders (relatively high relative risk, but low population prevalence). Population attributable risk in males for low educational achievement (41%, range 19–47%) and low occupational status (33%, range 21–42%) was of a similar magnitude to affective disorders (26%, range 7–45%) and substance use disorders (9%, range 5–24%). Similarly in females the population attributable risk for low educational achievement (20%, range 19–22%) was of a similar magnitude to affective disorders (32%, range 19–67%), substance use disorder (25%, range 5–32%) and anxiety disorder (12%, range 6–22%). The findings of this study suggest that prevention strategies which focus on more distal risk factors (lower socioeconomic strata) have the potential to have similar population-level effects as strategies which target more proximal psychiatric risk factors in the prevention and control of suicide.

A study[135] in Finland analysed the association of three socioeconomic indicators – education, occupation-based social class and income – on non-alcohol and alcohol-associated suicide mortality among women. There was a strong and inverse effect of age-adjusted social class and income on non-alcohol suicide, while the effect of education was modest. The effect of social class was partly mediated by income, and social class explained income differences to some extent. The associations between these socioeconomic indicators and alcohol-associated suicide were stronger, and following adjustment for each other large effects were left for education, social class and income.

Andrés et al.[136] investigated the impact of sex on the association between socioeconomic status and suicide in Denmark (n=15,648 suicide deaths). The results showed that suicide risk was associated with a range of SES proxies but the strength and/or direction of the association differed by sex. SES, proxied by low income, unskilled blue-collar work, non-specific wage work and unemployment, increased suicide risk more prominently for men than for women. Living in a large city raised suicide risk for women but reduced it for men; residents with a foreign citizenship in Denmark had a lower risk of suicide compared with Danish citizens, but this protection was confined to male immigrants.

Shahid & Hyder[137] conducted a systematic review to identify risk factors and causes of deliberate self-harm and suicide in Pakistan, a low income country. Risk factors for deliberate self-harm included young age (less than 35 years), being female, occupation (housewives), being married and low socioeconomic status; while reported risk factors for suicide were young age (less than 35 years), male gender, being married and low socioeconomic status.

Another study[138] examined SES trends in Australian suicide from 1979 to 2003 to determine how socioeconomic status differentials in suicide changed. This period

comprised the (male) ''youth suicide epidemic'' from the 1970s into the 1990s, and a decline in suicide in the late 1990s into the 21st century. It was found that the decline in male suicide from 1998 was limited to middle and high SES groups, while the low SES group displayed a continued increase in suicide rates.

Trying to understand the unprecedented increase in suicides over the last decade in South Korea, Kim et al.[139] sought to document socioeconomic inequalities in self-destructive behaviours. They examined variation in self-destructive behaviours according to level of educational attainment (at the individual level), as well as area-level characteristics, including level of deprivation and degree of urbanicity. Lower education, rural residence, and area deprivation was each associated with higher suicide rates. Both absolute as well as relative inequalities in suicide by socioeconomic position widened over time, and they concluded that the suicide epidemic in Korea had social origins.

Socioeconomic status may also differentially affect ethnic groups. Taylor et al.[140] examined the variation of suicide with socioeconomic status in urban New South Wales (Australia) during 1985-1994, by sex and country or region of birth. Suicide risk was lower in males from southern Europe, Middle East and Asia, and higher in northern and eastern European males, compared to the Australian-born. Risks for suicide increased significantly with decreasing SES in males, but not in females. Analysis of SES differentials in male suicide according to country of birth indicated a significant inverse suicide gradient in relation to SES for the Australian-born and those born in New Zealand and the United Kingdom or Eire, but not in non-English speaking country of birth groups, except for Asia. These findings indicate that SES plays an important role in male suicide rates among the Australian-born and migrants from English-speaking countries and Asia; but not in female suicide, nor in most non-English speaking migrant groups.

Agerbo[141] conducted a population-based cohort study in Denmark of all first-ever psychiatric patients (96,369 patients, 256,619 admissions, and 2,727 suicides) to estimate the association between suicide risk, socioeconomic position, and marital status. He found that risk of suicide was higher in former psychiatric patients with a higher income and higher educational achievement and in patients who were fully employed or married. However, patients who experienced loss of income, job, or marriage experienced a higher risk of suicide. Therefore, this study suggested that among psychiatric patients the association between suicide risk and socioeconomic factors has an opposite direction to that found among general population.

Aggregate-Level Evidence

Country or state level ecological research focuses on the relationship of macroeconomic indicators and suicide.

Otsu et al.[142] investigated the relationships between male or female age-adjusted suicide mortality and economic factors for all 47 Japanese prefectures in 1980, 1985 and 1990. During this period, Japan experienced the second economic crisis (the so-called secondary oil crisis) in 1980–1983 and economic prosperity (bubble economy) in 1986–1990. Male suicide mortality was significantly and inversely related to the urbanization and economic development factor. No factor significantly related to female mortality was found.

Ferretti & Coluccia[143] analysed data collected from a Eurostat publication concerning 25 European Union countries in order to determine the relationship between suicide rates and socioeconomic factors. They found that countries with high suicide rate levels are marked by high levels of at-risk-of-poverty rates, high annual growth rates for industry and low healthcare expenditures.

Andrés & Halicioglu[144] examined the determinants of suicides in Denmark over the period 1970–2006. They found that a rise in real per capita income and fertility rate, and a fall in unemployment rates decreased suicides for males and females.

Zhang et al.[145] analysed the trend of suicide rate changes during the past three decades in China and tried to identify its social and economic correlates. They found a significant increase of economic development and a decrease of suicide rates.

Economic changes can be powerful determinants of health. Falagas et al.[146] conducted a review of the literature to evaluate whether economic crises confer increase in mortality. The eleven studies that were included referred to economic crisis that occurred in Russia, South Korea, as well as South or Central American, African or European countries. Periods of economic crises were associated with the increase in all-cause mortality in seven out of eight studies that reported specific relevant data. All of the six studies that reported specific relevant data found that suicide-related mortality increased in temporal association with the economic crisis period.

Suicide rates rose markedly in Russia[147] and Latvia[148] when these former Soviet Union countries experienced major transitions in socioeconomic structures and suffered from recessions in the early 1990s. In Russia[147], mortality from violent causes started to increase rapidly in 1992 and reached its maximum values in 1994. The age-adjusted suicide mortality rate was 1.6 times higher for males and 1.2 times higher for females in 1994 compared to 1991. In Latvia[148], a rapid increase in the total suicide rate started in 1989 and reached a maximum of 42.5 per 100,000 inhabitants in 1993, an 80% increase compared to the suicide rate for 1988. During the next 5 years the suicide rate remained very high, but with a continuous decline to a rate of 34.0 in 1998. In contrast, suicide mortality fell in Finland when the country experienced a recession during the same period[149].

The Asian economic crisis in the late 1990s also provided an opportunity to examine the impact of economic recession on suicide. Chang et al.[150] investigated the impact of the Asian economic crisis (1997–1998) on suicide in Japan, Hong Kong, South Korea, Taiwan, Singapore and Thailand. Trends for the sex-specific age-standardised suicide rates for people aged 15 years or above were analysed. Suicide mortality decreased in the late 1980s and early 1990s but subsequently increased markedly in all countries except Singapore, which had steadily declining suicide rates throughout the study period. Compared to 1997, male rates in 1998 rose by 39% in Japan, 44% in Hong Kong and 45% in Korea; rises in female rates were less marked. Male rates also rose in Thailand, but accurate data were incomplete. The economic crisis was associated with 10,400 more suicides in 1998 compared to 1997 in Japan, Hong Kong and Korea. Similar increases in suicide rates were not seen in Taiwan and Singapore, the two countries where the economic crisis had a smaller impact on gross domestic product and unemployment. Time-series analyses indicated that some of the crisis's impact on male suicides was attributable to increases in unemployment.

Kwon et al.[151] examined suicides in South Korea using almost the same (1986–2005) study period as Chang et al.[150] The analyses carried out by Kwon et al. included not only trends for the sex and age-specific total mortality rate but also the sex and age-specific suicide rate and the sex and age-specific proportional suicide rate. Age-standardized suicide rates in South Korea increased by 98% in men (from 15.3 to 30.3 per 100,000) and by 124% in women (from 5.8 to 13.0 per 100,000). In both genders, the proportional increase in suicide rates was more prominent among persons aged less than 45, despite the fact that the absolute increase could mostly be attributed to the older group. Increasing suicide rates in South Korea consisted of a greater absolute increase in the older group and a greater proportional increase in the younger group.

Khang et al.[152] also examined the impact of the massive economic changes in South Korea on all-cause and cause-specific mortality. They found that short-term all-cause mortality continued to decrease in both sexes and all age groups during the crisis, and that cerebrovascular accidents, stomach cancer, liver disease, and transport accident mortality rates contributed most to this decline. The most salient increase in mortality was suicidal death. Finally, Kim et al.[153] compared mortality in South Korea after the economic crisis with mortality which would have occurred if the trends before the crisis had continued. They found that all cause mortality began to increase about 1 year after the crisis, while cardiovascular increased immediately. Transport accidents decreased significantly during the year following the crisis and then regressed towards the pre-economic crisis level. Suicides increased rapidly and maintained an upward trend but subsequently reduced towards the pre-economic crisis level.

Studies of the Impact of Unemployment on Suicide

Studies show that suicide rates increase during times of high unemployment, mainly due to increases in suicide among young males[130]. A cohort study[129] of 2.04 million respondents to the New Zealand 1991 census determined that being unemployed was associated with a twofold to threefold increased relative risk of death by suicide, compared with being employed; about half of this association might be attributable to confounding by mental illness.

A longitudinal study[154] in England and Wales study investigated the association between suicide and socioeconomic status, unemployment, and chronic illness. There was a strong independent association between suicide and unemployment (OR=2.6; 95% CI 2.0 to 3.4) and permanently sick (2.5; 1.6 to 4.0). There was little or no association between suicide and measures of socioeconomic status such as social class and housing tenure once the association with unemployment had been taken into account.

Stuckler et al.[155] investigated how economic changes have affected mortality rates in Europe over the past three decades, correcting for population ageing, past mortality and employment trends, and country-specific differences in health-care infrastructure. They noted that every 1% increase in unemployment was associated with a 0.79% rise in suicides at ages younger than 65 years (95% CI 0.16 to 1.42; 60–550 potential excess deaths [mean 310] EU-wide), although the effect size was non-significant at all ages (0.49%, –0.04 to 1.02), and with a 0.79% rise in homicides (95% CI 0.06 to 1.52; 3–80 potential excess deaths [mean 40] EU-wide). By contrast, road-traffic deaths decreased by 1.39% (0.64 to 2.14; 290–980 potential fewer deaths [mean 630] EU-wide). A more than 3% increase in unemployment had a greater effect on suicides at ages younger than 65 years (4.45%, 95% CI 0.65 to 8.24; 250–3220 potential excess deaths [mean 1740] EU-wide) and deaths from alcohol abuse (28.0%, 12.30 to 43.70; 1550–5490 potential excess deaths [mean 3500] EU-wide). Every US$10 per person increased investment in active labour market programmes reduced the effect of unemployment on suicides by 0.038% (95% CI –0.004 to –0.071).

Ceccherini-Nelli & Priebe[156] applied time series analytical techniques to test the associations over time between economic factors (unemployment, real gross domestic product per capita and the consumer price index) and death rates by suicide as collected by national agencies in the UK (1901–2006), US (1900–1997), France (1970–2004) and Italy (1970–2001). Co-integration and correlation tests showed a long-run association between economic factors and suicide rates. Increase/decrease of unemployment predicted an increase/decrease of suicide rates over long historical periods and in different nations. Real gross domestic product per capita and the consumer price index were also linked with suicide rates, but this was not consistently so and the direction of the association varied.

Studies of the Impact of Social and Economic Characteristics of Geographic Areas on Suicide

Several published studies have tried to assess the association between social and economic characteristics of geographic areas and their suicide rates.

Rehkopf & Buka[157] performed a systematic review of the literature dating from 1897 to 2004 regarding the direction of the association between area socioeconomic characteristics and area suicide rates. They concluded that analyses at the community level are significantly more likely to demonstrate lower rates of suicide among higher socioeconomic areas than studies using larger areas of aggregation. Measures of area poverty and deprivation are most likely to be inversely associated with suicide rates and median income is least likely to be inversely associated with suicide rates. Analyses using measures of unemployment and education and occupation were equally likely to demonstrate inverse associations. Study results did not vary significantly by gender or by study design.

An ecological study[158] in Great Britain showed that mortality from suicide and all other causes increased with increasing Townsend deprivation score, social fragmentation score, and abstention from voting in all age and sex groups. Suicide mortality was most strongly related to social fragmentation, whereas deaths from other causes were more closely associated with Townsend score. Constituencies with absolute increases in social fragmentation and Townsend scores between 1981 and 1991 tended to have greater increases in suicide rates over the same period. The relation between change in social fragmentation and suicide was largely independent of Townsend score, whereas the association with Townsend score was generally reduced after adjustment for social fragmentation.

Rezaeian et al.[159] examined data on all deaths for which suicide or an open verdict was returned during 1996–1998 in England. The results showed that, in England as a whole, the rates of suicide in young and middle-aged males were strongly associated with the indices of deprivation. The rates of suicide in females and in older age groups were less influenced by the indices of deprivation.

A case-control study[160] in Denmark assessed the association between individual and area (municipality) socioeconomic measures and suicide (1982-1997). The authors found no consistent evidence that associations with individual-level risk factors differed depending on the areas' characteristics, suggesting the ecological associations to be attributed to characteristics of the residents rather than area influences on risk.

Another study[161] examined individual measures of material and social disadvantage in relation to suicide mortality in Canada and determined whether these relationships were modified by area deprivation. After accounting for individual and area characteristics, individual social and material disadvantage was associated with higher suicide mortality, particularly for males. Associations between social and material area deprivation and suicide mortality largely disappeared upon adjustment for individual-level disadvantage. With some exceptions, there was little evidence that area deprivation modified the influence of individual disadvantage on suicide risk.

Suicide rates are generally higher in urban than in rural areas in most countries, although there are noteworthy exceptions.

Yip and colleagues[162] re-examined gender, urban and rural differentials in suicide in Australia and Beijing (China). The rural suicide rate in Beijing for both genders was higher than for their urban counterparts. Also, the male to female suicide ratio in China was less than one. In Australia, the rural male suicide rate was higher than the urban whereas the urban female suicide rate was higher than the rural. The male to female

suicide ratio was 4 to 1. The differences in rural to urban and male to female ratios between Australia and Beijing were statistically significant.

A study[163] in Denmark confirmed that people living in more urbanized areas were at a higher risk of suicide than their counterparts in less urbanized areas. However, this excess risk was largely eliminated when adjusted for personal marital, income, and ethnic differences; it was even reversed when further adjusted for psychiatric status. Moreover, the impact of urbanicity on suicide risk differed significantly by sex and across age and recent years have seen a decline in the urban–rural disparities among men.

CHAPTER 4:

INCOME AND MENTAL HEALTH

There has long been an interest in understanding the link between mental illness and income, and a substantial body of evidence has shown the impact of low income as a risk factor for mental disorders[51,60,69,71]. On the other hand, once the basic needs are met, higher levels of income have not been shown to be strongly associated with happiness or decreased risk of mental health problems[164,165].

The definition of poverty is central to examine its association with mental health. Definitions of poverty have varied from "insufficient total earnings to obtain the minimum necessities for the maintenance of mere physical efficiency"[166] to "relative deprivation" [167, 168]. Whereas in the past poverty or material deprivation meant inadequate housing, undernutrition, inadequate clothing, and risky work places, now it also means inability to entertain children's friends, buy children new clothes, go on holiday, and pursue a hobby or leisure activity. In other words, material deprivation in a modern context may mean inability to participate fully in society and to control one's life[169].

Many studies on income and mental health have been limited by the use of cross-sectional data that do not allow for examination of temporal relationships between income and mental disorders, small samples, or by the use of self-report screening instruments that are not meant for diagnosis of mental disorders[58].

SYSTEMATIC REVIEW

In a systematic review of the epidemiological literature in low and middle income countries, Lund[71] found that community-based studies that employed bivariate analyses showed a relatively consistent positive association between low income and common mental disorders (77% of studies). However, when other variables were controlled for in multivariate analyses, the positive association dropped to 62% of studies. Most of the community-based studies demonstrated a positive association between financial stress and common mental disorders. In facility-based studies, 3 of the 4 studies with bivariate analyses, and both of the studies with multivariate analyses reported a positive association between financial stress and common mental disorders.

CROSS-SECTIONAL STUDIES

In the US National Comorbidity Survey[50] (n=8,098), rates of almost all disorders declined monotonically with income. The odds ratios comparing the lowest with highest income groups were significant in all equations, and the odds ratios comparing the middle vs. highest income groups were significant in predicting anxiety disorders, antisocial personality disorder, and comorbidity. The significant odds ratios for income were consistently larger in predicting 12-month than lifetime prevalence, which means that SES was associated not only with the onset, but also with course of disorder.

In another study in the USA[170], using data from the National Survey of Families and Households, the Survey of Income and Program Participation, and the National Health Interview Survey (n=59,916), increases in income significantly improved mental and physical health but also the prevalence of alcohol consumption. Among individuals in

the bottom 20% of the income distribution, the prevalence of depressive disorders was almost 3 times as high as among individuals in the top 20% of the income distribution.

In the 1996 Netherlands national survey[68] (n=7,147), odds ratios of 1.56 (1.20 to 2.03) for mood disorders, and 1.77 (1.43 to 2.21) for anxiety disorders, were reported for the lowest income quartile compared to the highest income quartile.

In Ontario, Canada[74] (n=12,376) there was an inverse relation between income and the prevalence of depression ($p<0.0001$). The highest prevalence rate of lifetime depression (18.4%) was seen in households with an income level of less than $10,000 per year. The prevalence of lifetime depression then decreased as the income increased. The same pattern was observed for 12-month depression with the highest rate of 11.3% in households with the income of less than $10,000 per year. However, there seemed to be a threshold effect as the prevalence rate decreased much faster for income level of up to $30,000 than for $30,000 and over.

In Santiago, Chile[171] (n=3,870), only recent income decrease (OR=2.14, 95% CI 1.70 to 2.70), lower level of education (OR=2.44, 95% CI 1.50 to 3.97) and poorer housing quality (OR=1.53, 95% CI 1.05 to 2.23) showed independent and statistically significant associations with an increased prevalence of common mental disorders after adjusting for other explanatory variables. Income was not associated with common mental disorders after adjusting for age, sex, physical disease, working status, social support, education, income decrease and quality of housing. On the other hand, poor living conditions such as poor housing, which is associated with low income, remained significantly associated with common mental disorders after adjustment for other confounding variables.

In a study in South Korea[172] (n=6,275), higher income was a risk factor for both lifetime major depressive disorder and alcohol use disorder, when comparing between 2nd and

4th highest income quartiles of $500-1490 and >$3000 (OR=1.7, 95% CI 1.1 to 2.7), after controlling for gender, age, and education.

The EU contribution to the World Mental Health Surveys Initiative consortium[173] analysed data collected in health surveys of the general adult population (n=37,289 individuals) of 10 EU-countries (i.e., Belgium, Bulgaria, France, Germany, Italy, the Netherlands, Northern Ireland, Portugal, Romania and Spain). The consortium did not find an association between income and the presence of any mental disorder. Drawing attention to the fact that the income measure used was per capita income, the authors considered that a possible explanation for not having found an association between income and mental disorders could have been not having considered income inequalities within societies or among countries.

In Canada, a study[174] compared rates of psychological distress and mental disorders between low-income and non-low-income populations (n=36,984). Rates of reported mental disorders and substance abuse were much higher in low-income populations, and these differences were statistically consistent in most of the socio-demographic strata (prevalence ratios ranging from 1.3 to 2.2).

Mangalore et al.[175] aimed to measure income-related inequality in the distribution of psychiatric disorders in Britain and to compare with inequality in other health domains. They found marked inequality in mental health disorders unfavourable to lower income groups. The extent of inequality increased with the severity of problems, with the greatest inequality observed for psychosis. They concluded that income-related inequality for psychiatric disorders is higher than for general health in the UK.

LONGITUDINAL STUDIES

In the USA, Bruce et al.[77] assessed the effect of poverty on psychiatric status using two waves of New Haven Epidemiologic Catchment Area data (n=3,495). When examining the course of healthy respondents at the first interview, respondents in poverty had a twofold-increased risk (controlling for demographic factors) for an episode of at least one DIS/DSM-III Axis I psychiatric disorder. Rates of most specific psychiatric disorders were comparably higher for respondents meeting poverty criteria compared with those not in poverty, although these differences were not always statistically significant.

In a prospective cohort study[176] of consecutive primary care attenders in South London (n=426), the estimated prevalence of non-psychotic psychiatric disorder was 45.6% and the estimated 12-month incidence rate was 15.7%. Socioeconomic variables, especially low household income and not having a partner, were associated with a worse outcome among prevalent cases at baseline, but such variables were only weakly associated with the incidence of psychiatric disorder after adjusting for potential confounders.

Dearing et al.[177] examined within-person associations between changes in family income and women's depressive symptoms during the first 3 years after childbirth (n=1,351). Changes in income and poverty status were significantly associated with changes in depressive symptoms. Effects were greatest for chronically poor women and for women who perceived fewer costs associated with their employment.

A community-based cohort study in India[82] (n=2,494) reported a positive association between low income and common mental disorders over a 12-month period, but the strength of the association was reduced from OR=0.23 (95% CI 0.1 to 0.7) to OR=0.41 (95% CI 0.1 to 1.3) (the latter significant for trend: p=0.04) when adjusting for socioeconomic, reproductive and physical health risk factors. Financial stress (having

difficulty making ends meet) also showed a significant association with common mental disorders at 12-months follow-up (OR=2.39, 95% CI 1.2 to 4.9), after adjusting for socioeconomic, reproductive and health risk factors.

A longitudinal study using the annual Belgian Household Panel Survey[81] (n=11,909), assessing the impact of socioeconomic factors on depression, revealed that 1-year increases in material hardship, such as financial strain, deprivation and poverty, led to an increase in risk of depressive symptoms and often of major depression.

A longitudinal study was conducted in the US[58] to examine the relationship between income, mental disorders, and suicide attempts (n=34,653). After adjusting for potential confounders, the presence of most of the lifetime Axis I and Axis II mental disorders was associated with lower levels of income. Participants with household income of less than $20,000 per year were at increased risk of incident mood disorders during the 3-year follow-up period, in comparison with those with income of $70 000 or more per year. A decrease in household income during the 2 time points was also associated with an increased risk of incident mood, anxiety, or substance use disorders (adjusted OR=1.30; 99% CI 1.06 to 1.60) in comparison with respondents with no change in income.

Repeated exposure over time to poorer socioeconomic circumstances leads to significantly worse health outcomes. Lynch et al.[178] looked at the relationship between the number of times Alameda County Study respondents were less than 200% of the federal poverty line in the first three waves of data collection and their physical and mental health status at the fourth wave of data collection. After adjustment for age and sex, there were significant graded associations between the number of life episodes where income was less than 200% of the poverty level and all measures of functioning that were examined, except social isolation. As compared with subjects without economic hardship, those with economic hardship in 1965, 1974, and 1983 were much more likely to have clinical depression (OR=3.24; 95% CI 1.32 to 7.89) in 1994.

Moreover, results were maintained when analyses were limited to the subset of respondents who were < 50 years of age and in good or excellent health at the start of the study, thereby refuting the possibility that initial poor health led to poverty.

DEBT, FINANCIAL STRAIN AND MENTAL HEALTH

Debt and financial strain are factors associated with poverty, and there is growing awareness of their associations with mental health. However, few population-based epidemiological studies have examined this association.

A cross-sectional survey of private households in England, Scotland and Wales[7] (n=8,580) tested the hypothesis that the association between low income and mental disorder is mediated by debt and its attendant financial hardship. Those with low income were more likely to have mental disorder (OR=2.09, 95% CI 1.68 to 2.59), but this relationship was attenuated after adjustment for debt (OR=1.58, 95% CI 1.25 to 1.97) and vanished when other socio-demographic variables were also controlled (OR=1.07, 95% CI 0.77 to 1.48). The more debts people had, the more likely they were to have some form of mental disorder, even after adjustment for income and other socio-demographic variables. People with six or more separate debts had a six-fold increase in mental disorder after adjustment for income (OR=6.0, 95% CI 3.5 to 10.3). The authors concluded that both low income and debt were associated with mental illness, and that the effect of income appeared to be mediated largely by debt.

Zimmerman & Katon[179] used data from the US National Longitudinal Survey of Youth cohort to test several hypotheses about the robustness of the depression–income relationship among adults. In regressions of depression symptoms on income and socio-demographic variables, income was significantly associated with depression. However, when controls for other economic variables (education, job-type, insurance status,

current employment status, and the debt-to-asset ratio) were included, the effect of income was considerably reduced, and generally not significant. Fixed-effects estimates suggested that employment status and financial strain were causally related to depression, but income was not. The authors concluded that as a marker for a variety of economic outcomes, income was valuable as strong correlate of depression outcomes. On its own, however, when other variables were controlled, income lost much of its relationship to depression. Other variables, such as current employment status and financial strain, were more robust predictors of depression.

CHAPTER 5:

NEIGHBOURHOOD AND MENTAL HEALTH

The study of the associations between contextual SES and mental health is a growing area of social epidemiology. The social environment varies widely across neighbourhoods, along the dimensions of deprivation, residential stability (e.g., tenured housing and migration), family structure (e.g., living alone), and ethnic composition. Empiric evidence has suggested that certain characteristics of the environment may influence individual mental health beyond individual characteristics, i.e. the neighbourhood/place effect[20,180]. During the last decade, multilevel analyses have made it possible to separate the individual effect from the neighbourhood effect on health.

Durkheim's studies of suicide began a long tradition of exploring the association between social environment and individual well-being[128]. Faris and Dunham[98], in a study of neighbourhoods in Chicago, suggested that social cohesion and disorganization were associated with schizophrenia and substance abuse. Leighton[181], in another seminal study, explored the link between neighbourhood disintegration and mental health.

Some studies reported that living in socially and economically deprived neighbourhoods (variously defined as higher concentrations of poverty, proportions of mother-only families, male unemployment rates, and families receiving public assistance) did not contribute to mental illness independent of individual covariates. Conversely, a number of reports indicated increased risk for mental illness in poorer neighbourhoods, even after accounting for individual covariates.

NEIGHBOURHOOD AND

COMMON MENTAL DISORDERS

Systematic Reviews

Mair et al.[182] performed a review of published observational studies of neighbourhoods and depression, and analysed forty-five English-language cross-sectional and longitudinal studies. Of the 45 studies, 37 reported associations of at least one neighbourhood characteristic with depression. Seven of the 10 longitudinal studies reported associations of at least one neighbourhood characteristic with incident depression. Socioeconomic composition was the most common neighbourhood characteristic investigated. The associations of depression with structural features (socioeconomic and racial composition, stability and built environment) were less consistent than with social processes (disorder, social interactions, violence). Among the structural features, measures of the built environment were the most consistently associated with depression but the number of studies was small.

Paczkowski & Galea [183] also reviewed the literature on the relation between neighbourhood socio-demographic characteristics and depressive symptoms. The majority of recent studies found that deprivation, residential segregation, and residential instability were associated with increased depressive symptoms or depression independent of individual level characteristics, whereas a minority of studies suggested that individual level characteristics explained away that association.

Egan et al.[184] conducted a meta-review exploring the health associations of psychosocial risk factors in community settings. Studies explored a variety of psychosocial factors, including social support and networks, social capital, social cohesion, collective efficacy, participation in local organisations, and less favourable psychosocial risk factors, such

as demands, exposure to community violence or anti-social behaviour, exposure to discrimination, and stress related to acculturation to western society. They identified some evidence of favourable psychosocial environments associated with better health and that poor psychosocial environments may be health damaging and contribute to health inequalities.

Cross-Sectional Studies

A study in Glasgow, Scotland[185], examined whether housing tenure (a measure of material circumstances) was associated with housing stressors (e.g. overcrowding, dampness, hazards, difficulty with heating the home) and with assessment of the local environment (e.g. amenities, problems, crime, neighbourliness, area reputation and satisfaction), and whether this might help to explain tenure differences in long-standing illness, limiting long-standing illness, anxiety and depression. Controlling for income, age and sex, housing stressors independently predicted limiting long-standing illness; assessment of the area and housing type independently contributed to anxiety; and housing stressors, housing type and assessment of the area independently contributed to depression.

Ross[186] analysed data from the Community, Crime and Health survey (n=2,482) in Illinois and information about the respondents' census tract. She found that residents of poor, mother-only neighbourhoods had higher levels of depression than residents of more advantaged neighbourhoods. More than half of apparent contextual effect disappeared after adjustment for individual-level race, ethnicity, sex, age, education, employment, income, household structure, and urban residence, thus indicating to be really compositional; however, a significant contextual effect survived.

Using data from the multisite Epidemiologic Catchment Area survey (n=11,686), Silver et al.[187] examined the relationship between neighbourhood structural characteristics

and mental disorder. They found that, after controlling for individual-level characteristics, neighbourhood disadvantage was associated with higher rates of major depression and substance abuse disorder, and that neighbourhood residential mobility was associated with higher rates of schizophrenia, major depression, and substance abuse disorder.

Walters et al.[188] sought to determine the association of depression and anxiety with neighbourhood socioeconomic deprivation and with population density among people older than 75 years in Britain (n=13,349). Living in the most socioeconomically deprived areas was associated with depression (OR=1.4), but this relation disappeared after adjusting for individual deprivation characteristics. There was no association with anxiety. Living in the highest density and intermediate low-density areas was associated with depression (OR=1.6 and 1.5) and anxiety (OR=1.5 and 1.3) compared with the lowest density areas.

Wainwright & Surtees[189] analysed cross-sectional data from the European Prospective Investigation into Cancer and Nutrition in Norfolk (n=19,687) to investigate the relative strength of association between individual and area-level demographic and socioeconomic factors and mood disorder prevalence in the UK. Area deprivation was associated with current (12-month) mood disorders after adjusting for individual-level socioeconomic status (OR for top vs. bottom quartile of deprivation scores 1.29, 95% CI 1.1 to 1.5, $p<0.001$). However, this association was small relative to those observed for individual marital and employment status.

Another study[190] examined the relation between neighbourhood context and risk of depressive symptoms, using data from the New Haven component of the Established Populations for Epidemiologic Studies of the Elderly, New Haven, Connecticut (n=1,884). Living in a poor neighbourhood was associated with higher levels of depressive symptoms in older adults, above and beyond individual vulnerabilities. In addition, the

presence of more elderly people in the neighbourhood was associated with better mental health among older adults.

Studies have also suggested that the ethnic composition of a neighbourhood and depressive symptoms are related. Ostir et al.[191] investigated the association between neighbourhood poverty and neighbourhood percentage of Mexican American and depressive symptoms for older Mexican Americans in the south western United States (n=3,050). There was a strong correlation between the percentage of neighbourhood residents living in poverty and the percentage who were Mexican American (r=0.62; p<0.001). Percentage neighbourhood poverty and percentage Mexican American had significant and opposite effects on level of depressive symptoms among older Mexican Americans. After adjusting for demographic and other individual level factors, each 10% increase in neighbourhood population in poverty was associated with a 0.763 (95% CI 0.06 to 1.47) increase in depressive symptoms, while each 10% increase in Mexican American neighbourhood population was associated with a -0.548 (95% CI -0.96 to -0.13) unit decrease in depressive symptoms. These findings suggested that high density Mexican American communities moderate the adverse consequences of poverty on the psychological well-being of its residents.

A cross-sectional US study [192] investigated the relation between neighbourhood socioeconomic and ethnic characteristics with depressive symptoms in a population based sample (n=3,437). Neither neighbourhood socioeconomic characteristics nor ethnic density were consistently related to depressive symptoms once individual socioeconomic characteristics were taken into account.

In recent years, several cross-sectional population-based studies assessed urban–rural and intra-urban differences in prevalence of mental health problems.

The initial results of the Netherlands Mental Health Survey and Incidence Study[73] (NEMESIS) (n=7,076) showed that people living in rural regions had lower prevalence of mood and substance use disorders, overall morbidity and comorbidity. For anxiety disorders there were no significant differences between rural and urban areas. The prevalence of psychiatric disorders and comorbidity rates gradually increased over five levels of urbanization, even after adjustment for a range of confounders[193].

Dekker et al.[194] examined the link between levels of urbanization and 12-month prevalence rates of psychiatric disorders in a nationwide German population study (n=4,181). Higher levels of urbanization were linked to higher 12-month prevalence rates for almost all major psychiatric disorders (with the exception of substance abuse and psychotic disorders).

Weich et al.[195] conducted a cross-sectional survey (n=1,887) in London to test the hypothesis that the prevalence of depression is associated with independently rated measures of the built environment. After adjusting for socioeconomic status, floor of residence and structural housing problems, statistically significant associations were found between the prevalence of depression and living in housing areas characterised by properties with predominantly deck access (OR=1.28, 95% CI 1.03 to 1.58; p=0.02) and of recent (post-1969) construction (OR=1.43, 95% CI 1.06 to 1.91; p=0.02).

Araya and colleagues[196] estimated the variation in the prevalence of common mental disorders attributable to the quality of the built environment in a cross-sectional survey in Santiago, Chile (n=3,870). There was a significant association between the quality of the built environment of small geographical sectors and the presence of common mental disorders among its residents. The better the quality of the built environment, the lower the scores for psychiatric symptoms; however, only a small proportion of the variation in common mental disorder existed at sector level, after adjusting for individual factors.

Galea et al.[197] conducted a cross-sectional survey in New York City to assess the relations between characteristics of the neighbourhood internal and external built environment and 6-month and lifetime depression (n=1,355). Residence in neighbourhoods characterised by a poor quality built environment was associated with greater individual likelihood of past six month (29%–58% more likely) and lifetime depression (36%–64% more likely) in multilevel models adjusting for individual age, ethnicity, sex, and income and for neighbourhood level income.

Longitudinal Studies

Driessen et al.[198], in the Netherlands, examined the associations between shared social environment at the neighbourhood level and treated incidence of non-psychotic, non-organic disorders and subsequent level of service-consumption (n=4,732). There were significant linear trends in the association between level of deprivation and treated incidence (adjusted RR=1.12, 95% CI 1.07 to 1.17). The increase in risk conferred by neighbourhood deprivation remained after adjustment for the individual-level equivalent, suggesting that elements in the shared social environment influenced incidence and severity of disorders over and above any individual-level effect.

Data from the Alameda County Study, in California, USA[199], was used to examine the effect of poverty area residence on risk for developing depressive symptoms (n=1,737). Age- and sex-adjusted risk for incident high levels of depressive symptoms in 1974 was higher for poverty area residents (OR=2.14, CI 1.49 to 3.06). Independent of individual income, education, smoking status, body mass index, and alcohol consumption, poverty area residence remained associated with change in outcome variables.

A multilevel study followed 4.5 million Swedish women and men[180] in order to investigate the association between neighbourhood income (defined as proportions of individuals with low income) and psychiatric hospital admissions. Individuals living in

the poorest neighbourhoods exhibited a statistically significantly higher risk of being hospitalised for mental disorder than individuals living in the richest neighbourhoods, after adjustment for individual demographic and socioeconomic characteristics.

Galea et al.[200] assessed the relation between urban neighbourhood poverty and incident depression in a population-based prospective cohort study (n=1,120) in New York City. They found that in low-socioeconomic status neighbourhoods, the cumulative incidence of depression was 19.4 per hundred persons (95% CI 13.5 to 25.3), which was greater than that in high-SES neighbourhoods (10.5, 95% CI 5.9 to 15.2). After adjusting for individual covariates (socio-demographics, individual SES, social support, stressors, traumas, and history of post-traumatic stress disorder), the relative odds of incident depression were 2.19 (95% CI 1.04 to 4.59) for participants living in low-SES compared with high-SES neighbourhoods.

NEIGHBOURHOOD AND SCHIZOPHRENIA

Rates of schizophrenia differ significantly between groups defined at the social level, e.g., urban/rural comparisons, neighbourhoods, and ethnic minority status[201]. The majority of the studies so far have not differentiated between compositional effects (aggregations of persons each with increased individual risk) and contextual explanations (the features of the environment of the neighbourhood influence the health of those exposed to it). To date, there are few examples of multilevel analyses in schizophrenia research; however, the small number of studies suggests that there may be a neighbourhood social contextual effect that influences rates of schizophrenia and other psychotic disorders.

Deprivation

Ecological studies have consistently found a relationship between deprivation and incidence of psychosis, first admission rates for schizophrenia, prevalence of schizophrenia, and admission rates for schizophrenia[201]. The first study[202] to examine both individual and neighbourhood deprivation data on prevalence rates of schizophrenia showed that both individual characteristics and area-level deprivation were independently and significantly related to rates of schizophrenia. However, further analyses of the same data set including a specific measure of individual-level deprivation attenuated and rendered the neighbourhood deprivation effect nonsignificant[187]. Further studies have shown a similar attenuation in the neighbourhood effect of deprivation after adjustment of individual-level risk factors, and other neighbourhood measures[117].

Neighbourhood Disorganization

The level of neighbourhood disorganization has also been studied as possibly having impact on prevalence rates of psychosis. Most studies have used objective measures of disorganization, generated from single or composite (Social Fragmentation Index) aggregates of the census variables. Two studies have shown that area measures of Social Fragmentation Index have a strong influence on rates of psychosis and schizophrenia independent of area-level deprivation and ethnic composition[203,204].These studies had no individual-level data and, therefore, could not examine whether this is a contextual effect of the neighbourhood.

Other studies used multilevel analyses to explore organizational structure of neighbourhoods. In Maastricht[205], single people were at greatest risk of schizophrenia in neighbourhoods with smaller proportions of single people, i.e., individual risk was conditioned on the neighbourhood organization. A study in the US[187] found that

residential mobility (population turnover and rented accommodation) predicted prevalence of schizophrenia independent of area deprivation, ethnic composition, and individual socioeconomic status. It is possible that important individual risk factors, e.g., family histories, which were not controlled for, confound these results and the direction of this association was not assessed: social disorganization might increase the risk of schizophrenia or the social behaviour of people with schizophrenia might increase the social disorganization in the areas where they live.

Ethnic Composition

Studies examining the effects of neighbourhood characteristics have reported what has been called a "group density" effect on health, such that members of low status minority communities living in an area with a higher proportion of their own racial or ethnic group tend to have better health than those who live in areas with a lower proportion[206]. The relationship between the ethnic density and the prevalence of schizophrenia has also been studied. There is a strong ecological relationship between proportion of people from an ethnic minority in an area and its rate of service use which is attenuated when individual-level ethnicity is adjusted for[201]. When people with a particular characteristic live in an area where this characteristic is less common, we observe higher rate of mental illness. Boydell et al.[117] examined this with regard to ethnicity and found incidence rates of schizophrenia to increase in ethnic minority groups as the proportion of ethnic minorities in the locality fell.

Geographic Variation

Ecological studies have shown clear intra-urban patterns in rates of admissions for schizophrenia in several cities, with the highest rates in inner-city areas[98]. These patterns are remarkably stable over time, and are to some extent independent of the ethnic, housing or age composition of the local population[37]. There is evidence that

urban settings are associated with higher rates of schizophrenia[207]. Several studies have reported that being born in an urban versus rural region was associated with an increased risk of developing schizophrenia[208]. In addition, there is evidence from a Danish study[209] that the number of years spent in an urban area during childhood increased the risk of developing schizophrenia. March et al.[210] conducted a systematic review of evidence regarding spatial variation in the incidence of psychosis in developed countries since 1950. Evidence from 20 urbanicity and 24 neighbourhood studies supports a possible aetiologic role for social context. Urbanicity studies point to early life as a period of elevated risk, and neighborhood investigations indicate that both risk and protective social factors at the group and individual levels may be aetiologically relevant.

NEIGHBOURHOOD STRESSORS AND RESOURCES

Neighbourhood effects research has focused on demonstrating how neighbourhood disadvantage contributes to risk for mental problems[186, 211]. Neighbourhood disadvantage operates through its effects on neighbourhood stressors and stress-buffering mechanisms, and shape perceptions of residents regarding sources of stress and social supports in their neighbourhoods. However, neighbourhoods can also provide resources to support routine activity and facilitate social support, lowering risk for mental disorders[212].

Stockdale et al.[213] examined the relationship among neighbourhood stressors, stress-buffering mechanisms, and likelihood of alcohol, drug, and mental health disorders in US (n=12,716). They found a lower likelihood of disorders in neighbourhoods with a greater presence of stress-buffering mechanisms, such as neighbourhood average household occupancy and churches per capita. Individuals with low social support in

neighbourhoods with high social isolation (i.e., low average household occupancy) and exposed to violence in high crime neighbourhoods had a higher likelihood of disorders.

Elliot et al.[214] studied the relation between socioeconomic position and health within a stress-process framework. They analysed the relative impact of stressors and resources on mental and physical health, tested separately for lower- and higher-SES neighbourhoods. The results indicated that social support is only protective of mental and physical health among residents of higher-SES neighbourhoods.

CHAPTER 6:

INCOME INEQUALITY AND MENTAL HEALTH

While the importance of individual and neighbourhood-level income for health is well documented, several recent studies suggest that, especially in countries with high per capita income, the relative distribution of income within society is also an important determinant of health. The relative income hypothesis asserts that health depends not just on one's own level of income, but also on the incomes of others in society[14]. According to this hypothesis, at any given level of income, an individual's health status depends on his rank within the income distribution, and/or the distance between his income and the average income (or some other benchmark of social comparison). Relative deprivation, embodied by psychosocial stress, leads to health disparities by influencing an individual's sense of well-being and subsequent health[215]. This hypothesis differs from the absolute income hypothesis, which states that an individual's health depends on their own (and only their own) level of income, and results primarily from exposure to poverty, low education, limited health services, and nutritional deprivation[215].

An indirect test of the relative income hypothesis is provided by examining the association between income distribution and individual health[14]: if relative income matters for health in addition to absolute income, then an individual's health status would be better in societies with a more equal distribution of incomes. Various measures are available to quantify the extent of income inequality within a given community or society[216]. Several studies have used the Gini coefficient or its close variants as a summary measure of income distribution[217]. Algebraically, the Gini coefficient is defined as half of the arithmetic average of the absolute differences

between all pairs of incomes in a population, the total then being normalized on mean income. If incomes in a population are distributed completely equally, the Gini value is 0, and in the condition of maximum inequality, the Gini is 1.0. The Gini coefficient can also be illustrated through the use of a Lorenz curve.

This research theme has coincided with concerns over the extent of income inequality within and among countries[218] and also with the long-standing epidemiological interest in whether social environmental characteristics can affect the health of individuals.

There is still substantial ongoing debate regarding the presence, the strength and the explanation for this inequality effect[219,216]. Initial support for the income inequality hypothesis came from aggregate or ecological data. Some epidemiologists caution about the serious conceptual difficulties in inferring individual outcomes from group data ("the ecological fallacy")[220], others defend these findings are statistical artefacts[221]. On the other hand, some authors argue that there may be an underestimation of the inequality effect on health due to the practice of adjusting inequality effects for individual-level income[222]. Improved statistical software has made easier the separation of compositional from contextual effects through the use of multilevel modelling.

STUDIES ON INCOME INEQUALITY AND MENTAL HEALTH

To date, studies of income inequality and health outcomes have yielded mixed results, with some studies indicating a modest effect of income inequality on individual mortality[223], self rated health[224], depressive symptoms[219] and health behaviours[222]. Other studies have found no such effects after controlling for individual income[225,226,227], while some have revealed a differential effect of income inequality on different income

groups[228]. There is little research on the effects of income inequality on mental health outcomes.

Wilkinson et al.[229] reviewed the evidence about income distribution and population health. They identified 168 analyses and found a large majority (70%) suggesting that health is less good in societies where income differences are bigger. The authors suggested three explanations for the unsupportive findings reported by a minority of studies. First, many studies measured inequality in areas too small to reflect the scale of social class differences in a society; second, a number of studies controlled for factors which, rather than being genuine confounders, are likely either to mediate between class and health or to be other reflections of the scale of social stratification; and third, the international relationship was temporarily lost (in all but the youngest age groups) during the decade from the mid-1980s when income differences were widening particularly rapidly in a number of countries.

The World Health Organization's world mental health survey initiative has recently provided comparable cross-national estimates of the prevalence of mental disorders. In an exploratory study, Pickett K et al.[13] estimated the relations between living standards and income inequality to mental illness in developed countries. This preliminary analysis suggests that higher national levels of income inequality are linked to a higher prevalence of mental illness and, in contrast with studies of physical morbidity and mortality, as countries get richer rates of mental illness increase. They found strong, positive linear associations of gross national income per capita with any mental illness ($r=0.80$, $p=0.02$), and with serious mental illness ($r=0.89$, $p<0.01$). They also found a strong ($r=0.73$) and significant ($p=0.04$) linear correlation between the prevalence of any mental illness and income inequality and between serious mental illness and income inequality ($r=0.74$, $p=0.03$).

Kahn et al.[219], in a cross-sectional study, examined the association of US state income inequality and individual household income with the mental and physical health of women with young children (n=8,060). An independent association was found between depression and low income or living in unequal income states. Compared with women in the highest fifth of distribution of household income, women in the lowest fifth were more likely to report depressive symptoms (33% vs. 9%, P<0.001) and fair or poor health (15% vs. 2%, P<0.001). Compared with low income women in states with low income inequality, low income women in states with high income inequality had a higher risk of depressive symptoms (OR 1.6, 95% CI 1.0 to 2.6) and fair or poor health (1.8, 0.9 to 3.5).

A longitudinal, multilevel study[230], using data from the National Health and Nutrition Examination Survey and Epidemiologic Follow-up Study (n=14,407), examined the pathways between income inequality, self-rated health, depressive symptoms, and mortality in the United States. After adjustment for age and sex, income inequality had a statistically significant independent association with the level of depressive symptoms and with baseline and follow-up self-rated health. Inequality exhibited no relationship with baseline biomedical morbidity or follow-up mortality. The authors concluded that these findings confirmed previous reports that the relationship between income inequality and self-rated health is in part mediated by depressive symptoms or psychological distress.

Sturm and Gresenz[231] analysed the relation between income inequalities and the prevalence of common chronic medical conditions and mental health disorders in the US (n=9,585). No relation was found between income inequality and the prevalence of chronic medical problems or depressive disorders and anxiety disorders, either across the whole population or among poorer people. Only self reported overall health was

significantly correlated with inequality at the population level, but this correlation disappeared after adjustment for individual characteristics.

In a cross-sectional US study (n=42,862), Henderson et al.[232] investigated the effect of within-state income inequality and alcohol tax policy on symptoms of current depression and alcohol dependence. Controlling for individual-level variables and state median income, the odds of depressive symptoms were not positively associated with state income inequality. Controlling for individual-level variables, state median income, and alcohol distribution method, a weak negative association between Gini and alcohol dependence was observed in women, but this association disappeared after additional adjustment for beer tax.

Zimmerman & Bell[233] tested associations between individual health outcomes and ecological variables proposed in causal models of relations between income inequality and health in the US population (n=4,817). They found that the measure of income inequality was a significant risk factor for reporting poor general health (OR 1.98, CI 1.08 to 3.62), although not depression, controlling for all ecological and individual covariates. The inequality measure was significantly associated with reporting poor general health among white people (OR 2.60, CI 1.22 to 5.56) but not black people and Hispanics.

One study[234] examined the association between income inequality and the incidence of schizophrenia (n=222). This ecological study looked at incidence rates of schizophrenia over a 10-year period across electoral wards in South London and correlated these rates with measures of ward deprivation and income inequality. The authors found no significant effect of inequality overall, but they demonstrated that in the most deprived wards the incidence of schizophrenia increased with increasing inequality (IRR 3.79, 95% CI 1.25 to 11.49, p=0.019), after controlling for individual ethnic minority status

and area deprivation. However, individual socioeconomic status was not measured, so the contextual effect may have been overestimated.

Burns & Esterhuizen [235] investigated whether measures of poverty and income inequality impacted upon the treated one-year incidence of first-episode psychosis (n=160), in South Africa. There was a significant positive relationship between treated incidence and Inequality Index (Partial correlation coefficient 0.840; P=0.036) and a non-significant negative relationship between treated incidence and Poverty Measure per municipality (Partial correlation coefficient –0.660; P=0.154). Thus, interestingly, there was an inverse relationship between measures of inequality (Inequality Index) and measures of poverty (Poverty Measure) for a municipality.

Eibner et al.[2] hypothesized that low income and perceptions of low social status relative to a reference group (group of individuals with similar demographic and geographic characteristics) might be associated with a higher probability of depressive or anxiety disorders. It was found that even after controlling for an individual's absolute income status, those with low relative income were at higher risk of experiencing a mental health disorder (depressive disorder and anxiety/panic disorder). These findings suggested that relative deprivation is associated with an increased likelihood of probable depression and anxiety or panic disorders. Simulations suggested that a 25% decrease in relative deprivation could decrease the probability of any likely mental health disorder by as much as 9.5%.

Further empirical studies, as well as theoretical work, are needed to make sense of these inconsistent research findings and to figure out whether the strengths, nature, and underlying mechanisms of income inequality on health depend on dimensions of health, units of geographical aggregation (e.g., country, state, or community), or the population of focus. It is also of critical importance to understand the pathways through which income inequality could operate. The "social cohesion" or "psychosocial" hypothesis

argues that inequality damages individual health by creating status hierarchies which impact on psychosocial health at the individual level and social cohesion at the societal level[236]. On the other hand, the "neo-materialist" hypothesis explains the association via the systematic underinvestment in social infrastructure and services in more unequal societies.

CHAPTER 7:

SOCIOECONOMIC STATUS AND MENTAL HEALTH IN SPECIAL POPULATIONS

CHILDHOOD, ADOLESCENCE AND SOCIOECONOMIC STATUS

Mental and behavioural disorders during childhood and adolescence form a major public health problem because they are common, are associated with considerable impairment, and form the basis for later mental disorders[237]. Though the prevalence figures vary considerably between studies, it seems that 10–20% of all children have one or more mental or behavioural problems[1].

Psychobiological, environmental and social factors, including family socioeconomic position, contribute to mental health differences. Children and adolescents haven't yet established their own individual SES, and their status is best measured by the SES of their parents or caregivers.

Research has shown that SES is associated with a wide array of health, cognitive, and socio-emotional outcomes in children and adolescents, with effects beginning prior to birth and continuing into adulthood. These effects are likely to account, at least in part, for the persistence of poverty across generations: individuals of low childhood SES face various social and economic barriers to success and well-being, and do so with the added disadvantage of worse health, reduced emotional resilience and impaired cognitive skills.

First of all, SES has impact on physical health[238]. Low SES in pregnant women increases the likelihood of premature birth, impaired fetal growth and growth stunting, which are predictive of increased rates of childhood mental illness and poor school performance[239,240,241,242].

Children and adolescents living in poverty often display dysfunction and delay in their cognitive and language development. It has been shown that children living below the poverty threshold are 1.3 times as likely as non-poor children to experience learning disabilities and developmental delays[25,238]. The effects of poverty on children's cognitive development occur early, the duration of poverty is an important factor, and these developmental problems contribute to limited school achievement. In general, the studies suggest that a 10% increase in family income is associated with a 0.2% to 2% increase in the number of school years completed[238]. Compared with middle-class and more affluent children, children growing up poor display fewer positive social behaviours and lower levels of competence in their relationships with peers and adults[243]. These developmental problems also contribute to involvement in crime, teenage out-of-wedlock childbearing, and reduced earnings across the life span.

Although the link between SES and children's social and emotional well-being is not as consistent as the link with cognitive attainment, there is substantial evidence that low-SES children more often manifest symptoms of psychiatric disturbance and maladaptive social functioning than children from more affluent circumstances[25]. Emotional outcomes are often grouped along two dimensions: externalizing problems, including aggression, destructive behaviour, acting out, and hyperactivity, and internalizing problems, such as anxiety, social withdrawal, and depression[238]. According to the observations of parents, teachers, and youth themselves, low-SES children are more likely than middle-class children to display socio–emotional problems in these two broad areas, mainly externalising problems[244]. For very young children, there is little

evidence of a relation between SES and socio-emotional well-being[25]. However, the relation emerges in early childhood and becomes reasonably consistent in middle childhood[25]. Among adolescents, low SES is often associated with poor adaptive functioning, an increased likelihood of depression, delinquent behaviour, lower levels of academic achievement, and an earlier onset of sexual activity and drug and alcohol use[245,246]. The strength of the relationship between SES and mental disorders varies by type of disorder. Children and adolescents from low-SES backgrounds show higher rates of attention-deficit and hyperactivity disorder, depression, anxiety, and oppositional defiant and conduct disorders, all of which increase with the duration of impoverishment[246].

Early Childhood Studies

Several studies analysed data in early childhood.

Davis et al.[247] investigated in Australia the extent to which parent- and teacher-reported mental health problems of 4–5-year-old children (n=4,983) varied by socioeconomic status. All of the SES indicators independently predicted child mental health problems, although odds ratios were generally small to moderate (1.2 to 2.4), and not all reached statistical significance. Low income and parent education showed larger associations with mental health problems than sole parenthood or unemployment. Behavioural problems showed stronger associations with social disadvantage than emotional problems.

A study in Munich[248] found that, even in a prosperous city with high quality of life and coverage of children mental health specialists, preschool children with a low socioeconomic position were more affected by mental difficulties as compared to children with a higher socioeconomic position. Low parental education and household

income were the strongest independent variables associated with mental difficulties among children (OR=2.7, CI 1.6 to 4.4 and OR=2.8, CI 1.4 to 5.6, respectively).

Two different studies using the US National Longitudinal Survey of Youth found persistent poverty to be a significant predictor of some behavioural problems. One study[249] used data from the 1986 National Longitudinal Survey of Youth (n=1,733) and found that for four- to eight-year-olds persistent poverty (defined as a specific percentage of years of life during which the child lived below the poverty level) was positively related to the presence of internalizing symptoms even after controlling for current poverty status, mother's age, education, and marital status. In contrast, current poverty (defined by current family income below the poverty line) but not persistent poverty was associated with more externalizing problems. The second study[250] used National Longitudinal Survey of Youth data from 1978–1991 and analysed children aged 3 to 11. On average children living in long-term poverty (defined by the ratio of family income to the poverty level averaged over 13 years) ranked three to seven percentile points higher (indicating more problems) on a behaviour problem index than children with incomes above the poverty line. After controlling for a range of factors including mother's characteristics, nutrition, and infant health behaviours, the difference remained though it dropped in magnitude. This study also found that children who experienced one year of poverty had more behavioural problems than children who had lived in long-term poverty.

A study[251] (n=21,255) examined family income and material hardship along with parent mediators of stress, positive parenting, and investment as predictors of 6-year-old children's cognitive skills and socio–emotional competence. The authors identified a model of parent-mediated paths from income to cognitive skills and from income and material hardship to socio–emotional competence. Therefore, the authors concluded that it is essential to include material hardship in family income models.

Adolescence Studies

Few studies have examined the link between poverty and emotional outcomes for adolescents. Goodman[252] draws attention to the fact that much of the research on adolescent health focus on risk behaviours, assumed as property of the individual and thus perpetuating a "blame the victim" mentality, when in fact behavioural choices are constrained and determined by socially and biologically mediated processes.

Lemstra et al.[253] performed a systematic literature review to clarify if socioeconomic status is a risk indicator of depressed mood or anxiety in youth between the ages of 10 to 15 years old. They found that the prevalence of depressed mood or anxiety was 2.49 times higher (95% CI 2.33 to 2.67) in youth with low SES in comparison to youth with higher SES.

Using a cross-sectional design, Amone-P'Olak K et al.[237] investigated the differential effects of family SES on multiple mental health dimensions in preadolescents (n=2,230) using reports from multiple informants (parent, self, and teachers). SES was inversely associated with all dimensions. Compared to high SES, the odds ratios for externalizing problems were 3.88 (95% CI 2.56 to 5.90) and 2.05 (CI 1.34 to 3.14) for low and intermediate SES, respectively. For internalizing problems, they were 1.86 (CI 1.28 to 2.70) and 1.37 (CI 0.94 to 2.00), respectively. When adjusted for externalizing problems, SES effects on internalizing problems materially attenuated (OR=1.47, CI 0.78 to 1.68 and OR=1.34, CI 0.91 to 1.96) while the converse was less pronounced (OR=3.39, CI 2.24 to 5.15) and (OR=1.91, CI 1.25 to 2.94).

Goodman et al.[252] examined the public health impact of the socioeconomic status gradient on adolescents' physical and mental health. Population attributable risk (PAR) for household income and parental education were calculated relative to depression and obesity among a nationally representative sample of 15,112 adolescents. SES was

associated with a large proportion of the disease burden within the total population, and the PAR for education tended to exceed that for income. For depression, the adjusted PAR for income was 26%, and the PAR for education was 40%.

Buu et al.[254] examined the long-term effects of childhood familial and neighbourhood risk on adolescent substance use and psychiatric symptomatology (n=220). They recruited alcoholic and neighbourhood control families and their 3- to 5-year-old children, who were assessed at 3-year intervals until ages 18-20. Findings indicated that parental psychopathology, family socioeconomic status, and neighbourhood residential instability were all important risk factors for the development of substance-use disorder and other comorbid psychopathology.

Adolescent perceptions of financial difficulties in the family have also been studied as a mediator for both internalizing and externalizing behaviours[255,256,257]. A study[258] (n=3,278) found that perceived financial difficulties were associated with depression and with harmful drinking patterns in both sexes. Adjustment with comorbidity levelled out the significance of the association of perceived financial difficulties and harmful drinking patterns in boys. The authors concluded that while adolescent perception of financial difficulties is probably associated with the objective financial situation of the family it may also be an indicator of the psychological meaning attached to the situation and should thus be considered a possible risk factor for adolescent maladjustment in clinical practice.

Shame may be seen as closely related to status and has been defined as an emotion signalling threat to our social bonds to other persons, forming a basis for psychological and physical pathologic reactions. To investigate the associations among social status, shaming experiences, and adolescent depression, Åslund et al.[259] conducted a population-based study in Sweden, studying 5,396 students. Social status was measured as 1) attributed status of a family's socioeconomic and social standing and 2) acquired

status of peer group and school. The authors concluded that social status may influence the risk for depression when an individual is subjected to shaming experiences. If shaming experiences were present, participants with both high and low attributed status were at increased risk for depression (OR [low and high groups, respectively], 5.4 to 6.9), whereas medium status seemed to have a protective function. For acquired status, the highest elevated risk was found in participants with low status (OR [girls and boys, respectively], 6.7 to 8.6).

Life-Course Studies

Children who live in extreme poverty or who live below the poverty line for multiple years appear, all other things being equal, to suffer the worst outcomes. Yet, mental health problems also emerge for some children after relatively brief episodes in poverty[243]. A change in household income also influences the child's mental health: drops in income increase depression and anti-social behaviour, while a move out of poverty and an improvement in household income results in improved child mental health. The timing of poverty also seems to be important for certain child outcomes. Children who experience poverty during their preschool and early school years have lower rates of school completion than children and adolescents who experience poverty only in later years[238]. Persistent poverty appears more likely to result in internalizing problems than does transient poverty, but transient poverty may be more likely to result in externalizing problems than persistent poverty[243].

Najman et al.[260] examined the impact of the timing and duration of family experiences of poverty on child/adolescent aggressive/delinquent behaviour and tobacco and alcohol consumption (n=3,103). In multivariate analysis, family poverty experienced at the 14-year follow-up predicted persistent aggressive/delinquent behaviour as well as smoking and higher levels of alcohol consumption at the 21-year follow-up. However, the strongest associations were for recurrent experiences of family poverty, with the group

that experienced repeated poverty (3–4 times) being more than twice more likely to be aggressive/delinquent at both 14 and 21 years, and to drink more than one glass of alcohol per day at 21 years.

Najman et al.[261] also determined whether exposure to family poverty over a child's early life-course predicted adolescent and young adult anxiety and depression (n=2,609). Poverty at the 14-year follow-up was the strongest predictor of adolescent and young adult anxiety and depression. The more frequently the child was exposed to poverty, the greater was the risk of that individual being anxious and depressed at both the 14- and 21-year follow-ups. The authors concluded that it was the cumulative impact of recurrent poverty over the early life-course that had the most consistent association with subsequent reductions in mental health.

A study[262] by the National Institute of Child Health and Human Development Early Child Care Research Network examined the relations of duration and developmental timing of poverty to children's development. Chronically poor families provided lower quality childrearing environments, and children in these families showed lower cognitive performance and more behaviour problems than did other children. Any experience of poverty was associated with less favourable family situations and child outcomes than never being poor. Being poor later tended to be more detrimental than early poverty. Mediational analyses indicated that poverty was linked to child outcomes in part through less positive parenting.

Bor et al.[244], in Australia, examined the relationship between low family income experienced at different points in time (the antenatal period, 6 months post birth and at 5 years of age), chronic low income status and its impact on child behaviour measured at 5 years of age (n=5,296). The more often families experienced low income, the higher the rate of child behaviour problems at age 5. Low family income was still independently associated with social, attentional and thought behaviour problems after controlling for

smoking in the first trimester, parenting styles, maternal depression and marital disharmony at age 5. The association between low family income and internalizing and externalizing behaviour problems was largely mediated by maternal depression.

Melchior et al.[263] followed 1,037 children in New Zealand from birth to age 32 years to investigate risk factors for poor adult health among socioeconomically disadvantaged children. Low childhood SES was associated with an increased risk of substance dependence and poor physical health in adulthood (for tobacco dependence, RR=2.27, 95% CI 1.41 to 3.65; for alcohol or drug dependence, RR=2.11, 95% CI 1.16 to 3.84). Children from socioeconomically disadvantaged families were not, however, at elevated risk of adult depression or anxiety disorders.

In a longitudinal study (n=1,000) in New Zealand, Poulton et al.[264] found that, compared with those from high socioeconomic status backgrounds, children who grew up in low socioeconomic status families had a twofold increase alcohol dependence (21.5% vs. 12.1% for adult) in adult life. Alcohol and tobacco dependence at age 26 years were weakly linked to low childhood SES and were more strongly associated with contemporaneous adult SES. Depression at age 26 years was not linked to low childhood SES but was significantly associated with contemporaneous adult SES.

A prospective study[63] (n=939) in Dunedin, New Zealand, showed no effect of parental socioeconomic status on onset of depressive disorder in adolescents and no relationship between depression and later educational attainment. Thus, it found no evidence for selection effects among youth with the internalizing disorders of anxiety and depression. In contrast, it found strong evidence for selection effects among youth with the externalizing disorders of conduct disorder and attention deficit disorder.

A prospective study[265] in Brazil assessed the influence of perinatal and social factors on mental health problems in children aged 7–9 years (n=805). Only paternal age (<20

years) was associated with mental health problems (PR=1.27). Children born to single mothers (PR=1.31) and those with birth weight from 1,500 to 2,499 g (PR=1.18) and from 2,500 to 2,999 g (PR=1.17) had a higher risk of emotional problems, but those from low income families had a lower risk (PR=0.80). Children with a father of less than 20 years had a higher risk of having problems with their peers (PR=1.75). A maternal education of 9 years or over was inversely associated with peer (PR=0.70) and conduct problems (PR=0.73). A maternal education of 4 years or less increased the risk of hyperactivity (PR=1.48).

In a longitudinal study (n=4,434) in Australia, Spence et al.[266] found that symptoms of anxiety and depression at age 14 years were associated with early childhood experience of maternal anxiety and depression, poverty, and mother's marital relationship distress and break-up. Poverty, maternal anxiety and depression, distressed marital relationship and marital break-up during the child's first five years produced small, but significant, increases in risk of high anxiety and depression symptoms in adolescence. Poverty had a stronger impact for girls than boys.

Wadsworth & Achenbach[267] tested the two mechanisms of the hypothesized social causation of psychopathology – differential incidence and cumulative prevalence – over 9 years in a sample of 1,075 children and youths. They found a SES-linked differential incidence on anxious/depressed, somatic complains, thought problems, delinquent, and aggressive syndromes, higher for those of the lowest socioeconomic status. SES-linked differential cumulative prevalence was found for withdrawn and somatic complains; this finding indicated that low-SES cases did not improve as much as did middle- and high-SES cases, which resulted in greater accumulation of low-SES cases.

Another prospective longitudinal study[268] investigated socioeconomic differences in adult depression and in social support from adolescence to adulthood and the modifying effect of social support on the relationship between socioeconomic status and

depression. They found that at 32 years of age there was a social gradient in depression, with a substantially higher prevalence among subjects with lower SES. Low parental SES during adolescence did not affect the risk of depression at 32 years of age, but the person's lower level of education at 22 years did. Lower level of support among subjects with lower SES was found particularly in females. Some evidence indicated that low level of social support had a greater impact on depression among lower SES group subjects. However, this relationship varied depending on the domain of social support, life stage and gender. On the other hand, the results did not support the hypothesis that social support would substantially account for the variation in depression across SES groups.

Natural Experiments

Evidence from natural experiments, and within-family studies of naturally occurring economic mobility has proven to be consistent with the hypothesis that family income per se influences family investments in children, family stress processes, and, in turn, children's psychological development[243].

Costello et al.[269] took advantage of a natural experiment to study the effects of family income gains on youth mental health (n=1,420). Studying youth in an American Indian reservation, these authors observed youth psychiatric disorder prevalence before and after the opening of a casino that provided income supplements to all tribal members. Before the casino opened, the persistently poor and ex-poor children had more psychiatric symptoms (4.38 and 4.28, respectively) than the never-poor children (2.75), but after the opening levels among the ex-poor fell to those of the never-poor children, while levels among those who were persistently poor remained high (OR=1.50; 95% CI 1.08 to 2.09; and OR=0.91, 95% CI 0.77 to 1.07, respectively). As a whole, American Indian youth experienced decreases in externalizing symptoms associated with conduct and oppositional defiant disorders when their families moved out of poverty in this

experiment. Youth internalizing symptoms associated with anxiety and depressive disorders demonstrated less response to income gains, however. Failure of parents to provide adequate supervision was the only stressor that met the requirements to be considered as a full mediator. Later, a new study[270] was conducted to examine the effects of those income supplements on the prevalence of adult psychiatric disorders. Of the 1,420 who participated in the previous study, 1,185 were interviewed as adults. It was found that the lower prevalence of psychopathology in American Indian youth following the family income supplement, compared with the non-exposed, non-Indian population, persisted into adulthood, particularly alcohol and cannabis abuse, dependence, or both. The youngest age cohort of Indian youth had the longest exposure to the family income: fewer of the Indian youngest age cohort had any psychiatric disorder (31.4%) than the Indian middle cohort (41.7%; OR=0.43, 95% CI 0.24 to 0.78; P=0.005) or oldest cohort (41.3%; OR=0.69, 95% CI 0.51 to 0.94; P=0.01) or the youngest non-Indian cohort (37.1%; OR=0.66, 95% CI 0.48 to 0.90; P=0.008). The youngest Indian cohort also achieved higher levels of education as adults and fewer minor criminal offenses than the rest. In adulthood, fewer delinquent friends mediated the relationship between the family supplement and adult substance use disorders.

Neighbourhood Studies

The possibility that neighbourhood conditions affect children's development has captured much attention because of its implications for prevention. A nationwide study[271] of 2-year-old twins showed that children in deprived neighbourhoods were at increased risk for emotional and behavioural problems over and above any genetic liability and concluded that the link between poor neighbourhoods and children's mental health may be a true environmental effect. Environmental factors shared by members of a family accounted for 20% of the population variation in children's

behaviour problems, and neighbourhood deprivation accounted for 5% of this family-wide environmental effect.

Kalff et al.[272] (n=734) examined in Maastricht, the Netherlands, whether neighbourhood level socioeconomic variables had an independent effect on reported child behaviour problems over and above the effect of individual level measures of socioeconomic status. They concluded that living in a more deprived neighbourhood was associated with higher levels of child problem behaviour, irrespective of individual level socioeconomic status. Child behaviour problems were more frequent in families of low parental occupation and education ($F=14.51$, df 3,721, $p<0.001$; $F=12.20$, df 3,721, $p<0.001$, respectively) and in families living in deprived neighbourhoods ($F=13.26$, df 2,722, $p<0.001$). The effect of neighbourhood level deprivation remained after adjustment for individual level socioeconomic status (B over three levels of deprivation: 1.36; 95% CI 0.28 to 2.45).

In another study[273], also in the Netherlands, neighbourhood disadvantage was associated with higher total, internalizing, and externalizing problems, even after controlling for parental socioeconomic status.

Winstanley et al.[274] examined whether adolescent perceptions of neighbourhood disorganization and social capital were associated with adolescent alcohol or drug use, alcohol or drug dependence, and access to alcohol or drug treatment (n=38,115). After controlling for individual- and family-level characteristics, neighbourhood disorganization and social capital were associated with alcohol or drug use and dependence. Medium and high levels of social capital were negatively associated with alcohol or drug use and dependence. Social capital was unrelated to access to alcohol or drug treatment. Neighbourhood disorganization was positively associated with alcohol or drug use, dependence, and access to treatment.

A longitudinal study[275] (n=2,805) examined whether children's mental health was associated with neighbourhood structural characteristics (concentrated disadvantage, immigrant concentration, and residential stability) and whether neighbourhood social processes (collective efficacy and organizational participation) underlied such effects. A substantial proportion of variance in children's total internalizing scores (intra-class correlation, 11.1%) was attributable to between-neighbourhood differences. Concentrated disadvantage was associated with more mental health problems and a higher number of children in the clinical range, after accounting for family demographic characteristics, maternal depression, and earlier child mental health scores. Neighbourhood collective efficacy and organizational participation were associated with better mental health, after accounting for neighbourhood concentrated disadvantage. Collective efficacy mediated the effect of concentrated disadvantage.

Pickett & Wilkinson[276] conducted cross-national comparisons of 23 rich countries and cross-state comparisons within the United States to examine associations between child well-being and material living standards (average income), the scale of differentiation in social status (income inequality), and social exclusion (children in relative poverty). The main outcome measure was the Unicef index of child well-being and its components for rich countries. The overall index of child well-being was negatively correlated with income inequality ($r=-0.64$, $P=0.001$) and percentage of children in relative poverty ($r=-0.67$, $P=0.001$) but not with average income ($r=0.15$, $P=0.50$). Many more indicators of child well-being were associated with income inequality or children in relative poverty, or both, than with average incomes. Among the US states and District of Columbia all indicators were significantly worse in more unequal states. Only teenage birth rates and the proportion of children dropping out of high school were lower in richer states. They concluded that improvements in child well-being in rich societies may depend more on reductions in inequality than on further economic growth.

OLDER PEOPLE AND SOCIOECONOMIC STATUS

With rapid population aging, there is a growing interest in examining the influence of SES on the mental health of older people[277]. Depressive disorder is common among elderly people: studies show that 8–20% being cared for in the community and 37% being cared for at the primary level are suffering from depression[1]. Depressive symptoms in the elderly adversely affect their functioning, quality of life, and life expectancy[278,279]. Depressive disorders among elderly people go undetected even more often than among younger adults because they are often mistakenly considered a part of the ageing process.

Differences in the association between various socioeconomic variables and depression have been reported cross-nationally[280]. A study[280] investigated socioeconomic status differences in health among the aged (60 years or older) in Germany and the United States. Income was the best SES predictor in Germany, whereas education, occupational prestige, assets, and home ownership were not consistently related to health. Analyses of the US data demonstrated weaker and less consistent associations of health measures with SES indicators. The data also showed that social inequalities in health tended to diminish at older ages in the United States, but such disparities varied only slightly by age in Germany. One interpretation of this finding points to higher selective mortality of middle and early old age groups with a low SES in the United States due to stronger health-related deprivation.

Two contrasting hypotheses have been used to explain the two distinct life-course patterns observed in research—the cumulative advantage hypothesis and the age-as-leveller hypothesis[281]. Consistent SES-based divergence in health outcomes with age is often explained to be the result of the process of cumulative advantage, in which various resources related to SES accumulate with age to further advantage those of higher

SES[282]. The shift to convergence in health in old age found in other studies is typically explained with the age-as-leveller hypothesis, which holds that later-life convergence by SES is the result of universal biological frailty in old age and government support to the elderly, which narrows the gap in health care usage in old age[283,284]. Dealing with the issue of mortality selection bias, Kim & Durden[281] examined age trajectories of both physical and mental health by SES using a national sample of 3,617 US adults. They found that the education-based gap in depression diverged over time for all adult age groups, supporting the hypothesis of cumulative advantage. In contrast, the income-based gap in depression converged in older age, supporting the hypothesis of age-as-leveller. Thus, this study found that although income inequality increased in older ages, the effect of income on mental health can decrease in older ages.

Back & Lee[277] examined the association between SES and depressive symptoms in a sample of 4,165 older adults (aged 65 and older) in Korea. There was an inverse association between higher levels of socioeconomic factors and depressive symptoms. In the multivariate analysis, wealth was significantly associated with depressive symptoms in men, whereas education and income were significantly associated with depressive symptoms in women.

Contrasting results have been reported on the relationship between depressive symptoms and income[285,286]. Murata et al.[286] investigated the prevalence of depression by area and socioeconomic status (n=32,891, aged 65 and over) in Japan. After adjustment for age, illness, higher level of activities of daily living, sex, marital status, and self-rated health, depression was still significantly associated with lower SES and residential area. Odds of being depressed were 2.35 times higher for low-income elderly compared to their high-income counterparts. Another study[287] assessed mental health status and its association with income and resource utilization in old-old Chinese citizens in Hong Kong (n=1,696, age 70 or above). Lower geriatric depression was

associated with higher income. Geriatric depression was also associated with a number of major chronic conditions and higher resource utilization, including physician visits and medication use. In another study[288] (n=10,969), "debt" had significant relationships with the increased incidence of mild–moderate and severe late-life depression (OR=1.3 and 2.1, respectively).

Luo & Waite[289] conducted a study to examine the relationships between socioeconomic status and health across the life-course (n=19,949, over 50 years old). They found that lower childhood SES was associated with worse health outcomes in later life. Part of the effect of childhood SES on adult health occurred through childhood health; an even larger share of this effect was due to the impact of childhood SES on education and income in adulthood. They also found a stronger effect of adult SES for those with lower childhood SES than for those with more advantaged childhoods. College education seemed more important for women's later health, whereas income seemed more important for men's health.

A study in the US[290], using data from the New Haven component of the Established Populations for Epidemiologic Studies of the Elderly (n=2,109), reported that living in a poor neighbourhood was associated with depression even after controlling for individual characteristics such as age, gender, marital status, and SES.

Hybels and colleagues[291] also examined the association between neighbourhood context and level of depressive symptomatology in older adults (n=2,998 adults 65 or older). In ecologic level analyses, level of census tract socioeconomic disadvantage was associated with increased depressive symptoms. Using multilevel modelling, younger age, being widowed, lower income, and having some functional limitations were associated with increased depression symptoms. However, none of the neighbourhood characteristics was significantly associated with depression symptoms.

Another study[215] explored the role of absolute and relative deprivation in predicting late-life depression on both individual and country levels (n=22,777, aged 50–104 years, from 10 European countries). Measures of absolute and relative deprivation were significant in predicting depression at both country and individual levels. The authors also concluded that increases in individual-level income did not mitigate the effect of country-level relative deprivation and that the adverse impact of societal inequality cannot be overcome by increased individual-level or country-level income.

Muramatsu[292] investigated whether county-level income inequality was associated with depression among Americans aged 70 and older (n=6,640) and whether income inequality effects were stronger among people with lower SES and physical health. Principal findings were that income inequality was significantly associated with depression among older Americans and that the association was stronger among those with more illnesses.

ETHNIC MINORITIES AND SOCIOECONOMIC STATUS

Ethnicity is one of the dimensions of social stratification.

The analysis of race in health research has been complicated by erroneous beliefs that biological differences are largely responsible for racial health variation[293], but no objective biological and genetic criteria allow the formulation of a valid racial taxonomy[294]. However, "race is not merely an illusion or ideological counterfeit either: race/ethnicity shapes societies and the individuals within them in powerful ways"[293]. Racial groups are essentially "discursive formations, i.e., categories generated, contested, renegotiated, and dissolved through socio-historical processes"[293]. A positive sense of ethnic identity potentially mediates psychological health because it is a source

of self-concept, self-esteem, and social belonging that prevents or helps individuals cope with mental problems.

In the US, results from epidemiologic studies largely indicate that there is no consistent inverse relationship between socioeconomic status and depression among racial-ethnic groups. These findings are counterintuitive because in general Blacks, Latinos, and Asians historically have lower levels of education, household income, and higher unemployment rates compared to Whites and also because they have higher burden of most physical health conditions[295,296,297].

Gavin et al.[298] examined whether there were associations between individual measures of socioeconomic status and the 12-month prevalence of major depressive disorder in representative samples of Blacks, Latinos, Asians, and Whites in the US (n=16,032). They found a lower prevalence of 12-month major depressive disorder among Blacks, Latinos, and Asians compared to non-Hispanic Whites. There was an association between household income and major depressive disorder among Whites, but the association was not statistically significant. Statistically significant associations were present between educational attainment and major depressive disorder among Whites. High compared to low household income was not significantly associated with a decreased risk of major depressive disorder among Blacks, Latinos, and Asians. Among foreign-born Latinos and US-born and foreign-born Asians, there was an elevated risk for major depressive disorder among those reporting household income levels less than $80,000, but this association was not statistically significant.

Hudson et al.[299] examined the relationship between multiple indicators of SES and major depressive episode among African Americans. For 12-month major depressive episode, higher household income (OR=5.20, CI 1.41 to 19.12) and unemployment (OR=3.78, CI 1.09 to 13.12) predicted greater odds of major depressive episode among African American men, while there was an inverse relationship between education and 12-

month major depressive episode. Only unemployment was significantly associated with lifetime major depressive episode among African American men. For African American women, a significant inverse relationship between household income and 12-month major depressive episode was observed (OR=0.33, CI 0.13 to 0.82). No significant relationships were observed between wealth indicators, measured by net worth and home value, and depression among African Americans.

It has been suggested that this patterning could be due to misreporting bias or to greater utilization of positive coping strategies (e.g., religiosity, social support) by racial-ethnic groups, but validation studies and empirical research call these arguments into question. Another possible explanation is that higher SES does not protect against the development of depression among racial-ethnic groups. The diminishing returns hypothesis posits that racial-ethnic minority groups do not experience the same economic returns associated with higher SES achievement as Whites[300]. This social awareness of constrained opportunities could be internalized and manifest itself in poor health and mental health outcomes. Another possible explanation is the minority poverty hypothesis, which centres on the belief of a unique disadvantage experienced by racial/ethnic minorities living in poverty[29].

Recent studies drawing from the Collaborative Psychiatric Epidemiology Surveys have suggested that the risk of depression or other mental health problems may differ by immigrant group or by the circumstances related to migration. Hispanic Americans (with the exception of those from Puerto Rico), Asian Americans, and Black Americans have fewer mental disorders than do white Americans[301,302,303]. Some of these studies found that rates of disorders increase with time spent in the United States[304], with third-generation immigrants having the highest risk for mental health problems, while recent immigrants are at relatively lower risk[303,305]. However, another study also drawing from the Collaborative Psychiatric Epidemiology Surveys found that being native-born and

having higher English language proficiency were inversely associated with mental health problems[302]. These mixed results suggest that the immigration process may influence the mental health of specific groups of immigrants differently.

Perceived incongruence between expectations before immigration and outcomes after immigration or experiences of unemployment after arrival in the new country may also differentiate mental health outcomes across immigrants. A decline in subjective social status may also put immigrants at risk of depression. Nicklett & Burgard [306] analysed the association between downward social mobility, by comparing immigrants' subjective social status in their country of origin with their subjective social status in the United States, and the odds of a major depressive episode (n=3,056). Analyses suggested that a loss of at least 3 steps in subjective social status was associated with increased risk of a depressive episode (OR=3.0, 95% CI 1.3 to 6.6).

Leu and colleagues[307] examined how age at immigration influences the association between adult subjective social status and mental health outcomes (n=1,451). They hypothesized that adult subjective social status would be more predictive of health outcomes among immigrants who arrive in the US in mid- to late-adulthood compared with immigrants who arrive earlier. Data demonstrated worse mental health among Asian immigrants who arrived before age 25 years (13% versus 9% of prevalence of mood dysfunction), despite greater educational and income gains at the time of the survey, compared with immigrants who arrived later. As predicted, age at immigration moderated the relationship between adult subjective social status and mood dysfunction. Adult subjective social status was related to health among immigrants arriving when they were 25 years and older, but there was no association between subjective social status and mental health among immigrants arriving before the age of 25 years.

Compared with a nationally representative sample of the US population, American Indians are at heightened risk for posttraumatic stress and alcohol dependence, but at lower risk for depression[308]. However, more Black Americans may have schizophrenia than White Americans[309]. While substantial evidence exists to suggest that clinicians over-diagnose schizophrenia and under-diagnose mood disorders in African Americans[310], clinical decisions do not account for all of the observed differences. Depression is more likely to be chronic, severe, disabling, and untreated among Black Americans compared with white Americans[311].

In the UK, most large studies report treated morbidity and suggest that all-diagnosis rates for African-Caribbean people are at least twice those for White people, while admission rates are reported as three to five times higher for schizophrenia[37]. Rates may be even higher among second generation African-Caribbean people.

A study using data from a National Population Health Survey in Canada[293] examined racial/ethnic differences in mental health. Overall, results suggested that East and Southeast Asian, Chinese, South Asian, and black Canadians had better mental health than English Canadians. Jewish Canadians had poorer mental health than English Canadians. All other racial/ethnic groupings had similar mental health as English Canadians. Although there were socioeconomic, social resource, and interaction effects, the analysis showed that they do not fully explained racial/ethnic mental health variation.

Another study[74], in Ontario (Canada), evaluated the relationship between lifetime and 12-month depression and several socio-demographic factors (n=12,376). Prevalence of 12-month and lifetime depression among individuals who were born in Canada was higher compared to Canadian residents who immigrated to Canada irrespective of gender.

Data from a national Canadian study[312] examined the differential effects of poverty on the mental health of foreign-born children, Canadian-born children of immigrant parents, and children of non-immigrant parents. Compared with their receiving-society counterparts, foreign-born children were more than twice as likely to live in poor families, but they had lower levels of emotional and behavioural problems. The effect of poverty on children's mental health among long-term immigrant and receiving-society families was indirect and primarily mediated by single-parent status, ineffective parenting, parental depression, and family dysfunction. In comparison, the mental health effect of poverty among foreign-born children could not be explained by the disadvantages that poor families often suffer (like single-parent status and intra-familial problems), but mainly to material deprivation.

The apparently good mental health of immigrant children is a paradox. Familial poverty jeopardizes children's mental health and productivity, and immigrant families typically are poorer than their host country counterparts. Nevertheless, immigrant children are at least as healthy as majority-culture children and often outperform them in school. Immigration policy provides a partial explanation. Admission to Canada and the United States is neither random nor easy. As a result of selective immigration, many migrant households consist of well-educated, occupationally skilled, healthy people. Selection probably is only part of the answer, however. Although many newly arrived immigrant families are poor, factors that are specific to immigrant life may invest poverty with a different meaning for newcomers, compared with receiving-country families[312].

Costello[313], in US, examined the effect of poverty on the prevalence of psychiatric disorder in rural Black and White children. Federal criteria for poverty were met by 18% of the White and 52% of the Black families. Black and White children were exposed to equal numbers of risk factors overall, but the association between poverty and psychopathology was stronger for White children (OR=2.1, 95% CI 1.1 to 4.2) than for

Black children (OR=1.5, 95% CI 0.9 to 2.6). Family history of mental illness, poor parenting, and residential instability mediated this association in both groups.

Research has also investigated the association between neighbourhoods and indicators of mental health.

Schulz et al.[314] examined the social and economic correlates of depressive symptoms among African American women residing within a predominantly African American urban neighbourhood in Detroit, USA, with relatively few economic resources. Their results suggested that for women in this racially segregated area with a high concentration of poverty, relationships between household income and symptoms of depression were partially mediated by financial stress and social support, but that stressors associated with neighbourhood disorder and discrimination influenced depressive symptoms independent of household income.

Jackson[315] developed a theory model which posits that individuals who are exposed to chronic stress and live in poor environments will be more likely to engage in poor health behaviours, such as smoking, alcohol use, drug use, and overeating, because they are the most environmentally accessible coping strategies for socially disadvantaged groups. These behaviours act on common biologic structures and processes associated with pleasure and reward systems, consistent with the hypothesis that these behaviours alleviate, or interrupt, the physiological and psychological consequences of stress. The Baltimore Epidemiologic Catchment Area Study was used to evaluate this aetiologic model[316], studying the interaction between stress and poor health behaviours (smoking, alcohol use, poor diet, and obesity) and risk of depression 12 years later for 341 Blacks and 601 Whites. At baseline, Blacks engaged in more poor health behaviours and had a lower prevalence of depression compared with Whites (5.9% vs. 9.2%). The interaction between health behaviours and stress was non significant for Whites (OR=1.04, 95% CI 0.98 to 1.11); for Blacks, the interaction term was significant and negative (β:-0.18,

P<0.014). Findings were, therefore, consistent with the proposed aetiologic model linking social disadvantage, exposure to stress, coping via poor health behaviours, and mental and physical health disparities.

Pickett et al.[206] surveyed published research on ethnic group density and health. Generally, given individual material circumstances, living in a poorer area was associated with worse health. Members of ethnic minorities who live in areas where there are few like themselves were likely to be materially better off, and living in better neighbourhoods, than those who live in areas with a higher concentration. However, through the eyes of the majority community, they may be made more aware of belonging to a low status minority group, and the psychosocial effects of stigma may offset any advantage.

CHAPTER 8:

PATHWAYS

Evidence for a social gradient in health is strong. However, it is difficult to estimate the causal relationships between income, social factors and health, because interactions among the variables are numerous and varied, as is the influence of other factors, and the long time lags. Moreover, even when a causal connection appears to be particularly robust, the mechanism of action is usually unknown.

Researchers have examined a number of possible mechanisms for SES–health disparities, including access to health care, residential characteristics, environmental exposure, physiological processes, health and cultural behaviours, and psychosocial factors. Some researchers have also suggested that income inequality at the societal level may have a direct impact on individual health. What is clear is that none of these factors provides a complete explanation for the gradient and that there are different paths linking SES to health.

HEALTH CARE

It is frequently assumed that SES differences in access to, use of, and quality of health care account for SES differences in health outcomes. Thus, it is critically important to build universal health coverage that may answer to the needs for care and allow access to high quality and preventative health care.

Although surely important, restricted availability of health care among those of lower SES can not account for the whole SES differentials in disease incidence: SES-health

gradient exists even in countries with universal health care and SES-health differences still exist at the upper range of the SES hierarchy, in which health care coverage is likely to be more universal.

MATERIAL RESOURCES

The material interpretation of health inequalities emphasises the graded relation between socioeconomic position and access to tangible material conditions, from basics such as food, shelter, and access to services and amenities, as well as car and home ownership, access to telephones and the internet[14]. A variety of factors in the physical environment may account for the health effects of low SES, including exposure to damaging agents, poor nutrition, inadequate housing and sanitation, residential crowding and noise, over-stimulation, higher levels of crime and employment in jobs that have a high risk of injury or disability[317].

In children, the effects of poor nutritional status occur both pre- and post-natally. Low SES in pregnant women is associated with poor nutrition during pregnancy, which has effects on fetal growth, on poor long-term memory, and on an increased likelihood of neural tube defects (owing to inadequate intake of folic acid) and iron deficiency (owing to inadequate intake of meats and vegetables rich in iron)[25]. Chronic undernutrition can deplete the energy resources of both parent and child, making the child more lethargic and less able to elicit attention from the parent and the parent less sensitive and supportive of the child[318]. The result is not only compromised growth but increased likelihood of insecure attachment, negative affect, and limited mastery motivation.

A number of studies has found that a child's home environment—opportunities for learning, warmth of mother-child interactions, and the physical condition of the home—

accounts for a substantial portion of the effects of family income on cognitive outcomes, on academic achievement, and on behavioural problems[319,320].

Dilapidated, crowded housing and multiple moves from one dwelling (and often school) to another have long been cited as factors associated with the SES gradient in child health. Lack of access to cognitive stimulating materials and experiences, such as the availability of books (and other literacy resources), computers, trips and parental communication, limits their cognitive ability and reduces their opportunities for social exchanges and of benefiting from school[321].

Part of the observed connection between SES, cognitively stimulating experiences, and child well-being probably reflects parental attitudes, expectations, discipline, styles of interacting with children, and sensitivity to the emotional needs of the child[25]. High-SES parents engage children in more and richer conversations, with more contingent responsiveness and more efforts to elicit child speech. High-SES parents also read to their children more, and provide more teaching experiences[25]. High-quality parent-child interactions are associated with resilience among children who live in stressful, impoverished environments. On the other hand, the distresses and distractions connected with crowding result in fewer and less-rich exchanges between parent and child.

Longitudinal studies also provide empirical support for the path linking low SES to lower competence and maladaptive behaviour via harsh or neglectful parenting and compromised parent-child relationshiph[249,322]. Parental stress leads to harsh and inconsistent discipline, less sensitivity to the needs of the child, and reduced verbal communication[323,324]. These parenting practices are posited to lead to children's inability to learn how to regulate negative emotions and how to develop a sense of security with and attachment to important figures in their lives. Emotional deregulation and insecure attachment in childhood may lead to mistrust of others, poor social and

coping skills, and feelings of depression, anxiety, and anger. Other studies have established that parental mental health accounts for some of the effect of economic circumstances on child health and behaviour. Parents who are poor are likely to be less healthy, both emotionally and physically, and parental irritability and depressive symptoms are associated with more conflictual interactions with their children[325].

In their schools, poor youth are also more likely than youth who are not poor to encounter unsafe school conditions, teacher shortages, high teacher turnover rates, and teachers assigned to topics they are not qualified to teach[243]. McLoyd[320] has argued that teachers tend to perceive low-SES pupils less positively (both in terms of their academic and self-regulatory skills), providing poor children with less positive attention and less reinforcement for good performance. Over time, the frustrations connected with school failure and negative exchanges with teachers are likely to increase acting out behaviours and the likelihood that children will affiliate with deviant peers. Poor youth are also more likely than other youth to experience relational and physical victimization[326].

Child development scholars have called attention to the more general chaotic living conditions of poor youth, the potential harm of this chaos for children's physiological responses to stress, and, in turn, the negative consequences of dysfunctional stress response for psychological development[327]. In their communities, youth in poverty encounter a variety of environmental toxins and stressors, including high levels of air and water pollutants, overcrowding, poor municipal services, and few merchants or retail stores[328]. Through peer relationships in their neighbourhoods, poor children and adolescents are also more likely than youth who are not poor to be exposed to antisocial and deviant behaviour, as well as violence[329]. Furthermore, poor youth are less likely than middle-class and wealthier youth to attend before- and after-school programs or to engage in organized extracurricular activities, such as clubs, music lessons, and sports[330].

Neighbourhood design and housing distribution may impact individual mental health by facilitating social network development and influencing perceptions of greater social support among neighbours[331,332]. Both architectural features of communities (plazas, green spaces, recreation centres) and institutions (clubs, parent-teacher groups, child care, churches, crime control) may promote social integration that in turn improves health. Access to recreational and institutional resources is also important.

SOCIAL ENVIRONMENT

Individuals are embedded within social structures that determine exposure to stressors (adverse life events), stress-buffering mechanisms at their disposal, and perceptions of stress. Communities differ in patterns of social networks, which in turn determines availability of social support and social capital (features such as levels of interpersonal trust, norms of reciprocity, and mutual aid, which act as resources for individuals and facilitate collective action).

Studies have demonstrated relationships between SES, mental health and diverse aspects of social functioning, including contact with others, network size, reciprocity in relationships, satisfaction with support, the tendency to seek social support, work support, social trust, social cohesion, and generalized support perceptions[23].

Social and health scientists contend that social capital in the form of social affiliation and social cohesion within communities may help reduce the risk of morbidity and maladaptive functioning[333]. They argue that informal social control, maintenance of healthy norms, and access to various forms of social support can contribute to both healthier lifestyles and positive well-being. Collective efficacy involves the extent to which there are social connections in the neighbourhood and to which residents monitor and supervise the behaviour of others in accordance with social standards.

Neighbourhood stability also fosters the development of trusting relationships and strong ties with neighbours.

Disadvantaged urban neighbourhoods lack social and economic resources, predisposing them to high levels of physical and social disorder and low levels of informal social control. Low levels of trust and high levels of social isolation serve as barriers to collaborative efforts to reduce crime and other signs of neighbourhood disorder. Association of concentrated disadvantage and residential instability with violence are largely mediated by collective efficacy[334]. Stress from perceptions of the social environment as threatening and dangerous is associated with higher levels of depression, anxiety, substance abuse, and psychological distress.

Social disorganization theory posits that neighbourhoods characterized by a high percentage of low-SES residents, and cofactors of low SES such as single parenthood and ethnic heterogeneity, decrease the likelihood of social order[25]. Wilson[335] stated that neighbourhoods with high rates of joblessness and single-parent families tend to produce a feeling of "social isolation" for adults caring for children. This, over time, undermines family management and results in socialization practices and family lifestyles that are not conducive to adaptive functioning (e.g., active problem solving, household organization, warm and stimulating parenting, a focus on schooling, adequate monitoring). It also results in a loss of self- and group identification that sustains customary behaviour and prevents deviant behaviour[25].

HEALTH-RELEVANT BEHAVIORS

It is also possible that SES may exert its effects on health through adverse health behaviours, such as diet, smoking, excessive alcohol intake, and physical inactivity.

Health promotion efforts that are not targeted at the poor are likely to increase SES disparities, because they are used more readily by those with more resources to act on the information.

PSYCHOLOGICAL/PSYCHOSOCIAL FACTORS

It is the extent to which SES involves exposure to psychological risks and buffers that is of special interest from a mental health perspective. The processes linking SES and mental problems divide broadly into two groups: stress and strain[52,214]. Individuals are differentially exposed to stressors, and differentially equipped with resources to combat stressors, as function of their SES. The stress theory postulates that personal resources, such as coping style, self-esteem, mastery, and locus of control, buffer the impact of stress. The strain theory addresses the impact of community features such as values, social welfare, social cohesion, infrastructure, and public health policy.

Research indicates that individuals with low SES encounter more frequent negative life events and chronic stressors[336, 337, 338], interpret ambiguous social events more negatively[317], and maintain a smaller bank of resources (tangible, interpersonal, and intrapersonal) to deal with stressful events[23]. Exposure to chronic and acute stressors, in turn, has a direct negative impact on emotional experiences and a direct association with pathways affecting health outcomes.

Among the psychosocial factors with the strongest evidence to support their role in generating inequalities in health are parenting, the psychosocial work environment, control, social support, and social status.

The quality of the early family environment is an obvious potential contributor to this pattern of psychosocial risk[85,317]. “Risky families”, characterized by overt family conflict

and deficient nurturing, fail to provide children with the experiences they need to develop effective socio-emotional skills. Children raised in these disadvantaged situations may acquire a propensity to experience and display chronic negative affect, with less control over their environment (i.e. learned helplessness), difficulties in forming supportive social networks and intimate relationships (attachments), and may become vulnerable to a wide array of emotional and physical disorders[339]. Risky families are more likely to emerge in low SES than high SES families.

Psychosocial work environment that combines high demands, low decision latitude, and low rewards has also been shown to be a prospective risk factor for mental health. A meta-analysis[340] provided robust evidence that common mental disorders are predicted by characteristics such as job strain, low decision latitude, low social support, high psychological demands, effort-reward imbalance, and high job insecurity. Individuals with low SES tend to report more often this employment status.

The psychological impact of living in poverty is also mediated by stigma, social isolation, exclusion and the shame and humiliation of poverty. Poverty represents lack of control. People experiencing poverty report higher levels of hopelessness, fatalism, a lack of control over their circumstances, and lower levels of satisfaction with life than the better off[69,245]. People living in a low-SES environment tend to develop a set of behaviours, termed "reactive responding"[341], characterized by chronic vigilance, acting on the basis of environmental demands rather than self-generated goals, having simple, short-term goals, developing a narrow range of skills, maintaining a present orientation, reacting emotionally, and using few options to deal with environmental demands. Poor physical health, rapid social change and limited opportunities as a result of less education may also mediate the risk of suffering from mental disorders. These characteristics are not only prevalent, but they also perpetuate themselves and the poverty that induces them.

The association between SES and intrapersonal resources might also originate or be maintained through asymmetrical relationships associated with status hierarchies or social status[342]. Social status may be defined as hierarchical position in relation to that of other individuals in a society or social context but can also refer to power, authority, or prestige[259]. From an evolutionary perspective, low social status may be seen as a potential threat to survival because it could mean less access to resources, less opportunity to mate, and less opportunity to cooperate with others. Some Darwinian psychiatrists believe that depression is functional, in an evolutionary sense, because it expresses subordination, which is useful to the survival of the species (the Involuntary Defeat Strategy[343] or the Social Competition Hypothesis of Depression[344]). In the modern world, low social status may be more connected to symbolic threats to self, thus providing a major source of chronic stress.

Marmot[16] has argued that low social status is stressful because the lower individuals are in the social hierarchy, the less likely it is that their fundamental human needs for autonomy and for full social participation will be met. Failure to meet these needs leads to metabolic and endocrine changes that in turn lead to increased risk of disease. Others[345] have argued that low social status is stressful because of our fear of being seen as inferior. We build a sense of self-worth partly through the eyes of others and through processes of social comparison[345]. Negotiating social interaction and the public space can be a source of powerful social anxieties if we feel put at a social disadvantage, made to feel inferior, put down or disrespected. Wilkinson[342] raises the hypothesis that the most important psychosocial determinant of population health are the levels of the various forms of social anxiety in the population, and these in turn are determined by income distribution, early childhood, and social networks.

The concept of “relative income” or “relative deprivation” appears to be at the core of the psychosocial interpretation. Wilkinson[342] argues that perception of the relative

standing in social hierarchy underlies the social gradient in health, and that the relative position in income distribution of society serves as a marker for social status. Thus, "income is an impoverished way of capturing the condition of life that gives rise to health differences"[229], as it determines ability to participate in the way defined as acceptable by society. Studies often posit that low relative income exacerbates feelings of low self-worth, depression, and hostility, suggesting that relative deprivation is particularly relevant for mental health related outcomes[2].

According to Wilkinson[342], measures of income inequality can plausibly be interpreted as measures of the burden of relative deprivation on health in each society. Wilkinson's thesis is that, after certain absolute levels of gross national product per capita are attained (about US $5000 - the point at which chronic diseases begin to displace acute illness as the chief causes of death), the major determinants of differing levels of health status amongst nations lie in their degree of income inequality. He argues that more unequal societies have worse health and higher prevalence of problems such as morbidity and mortality, obesity, teenage birth rates, mental illness, homicide, low trust, low social capital, hostility, racism, poor educational performance among school children, the proportion of the population imprisoned, drug overdose mortality and low social mobility[346].

Kawachi & Kennedy[347] summarised three mechanisms through which evidence has shown high levels of income inequality can adversely affect health status:

1. High levels of income inequality, perceptions of relative rank and the negative emotions they foster are mirrored in an individual's antisocial behaviour and reduced civic participation, which results in less social capital and cohesion within the community, leading to increased risk of social isolation, stress and, ultimately, poor individual and community health. Kawachi & Kennedy[348] found that people were much more likely to feel trustful towards others in those US

states in which income differences were smaller (r=0.71). There is evidence from a large number of studies that homicide and violent crime are substantially more common in less egalitarian countries. This evidence strongly suggests that as social status differences in a society increase, the quality of social relations deteriorates;

2. High levels of income inequality lead the rich to withdraw support for public services, such as public education and accessible health care, leading to a decline in individual and community health. In a society with sharing and public provision of goods and services, income would matter less to social participation and receipt of services. In a society where both participation and receipt of services depend heavily on individual income, its lack is serious[349];

3. High levels of income inequality increase the opportunity for invidious comparisons, which increase people's stress levels, leading to a decline in their individual and therefore the community's health. Dressler coined the term "cultural consonance in lifestyle" to refer to the degree to which individuals succeed in achieving the cultural model of lifestyle[347]. To the extent that individuals strive and fail to meet the cultural ideal, there are adverse health effects.

Psychosocial factors can affect health partly through direct physiological effects of chronic stress[350], and partly through their influence on health related behaviours[229].

PSYCHOBIOLOGICAL MECHANISMS

AND CHRONIC STRESS

The association between low socioeconomic status and poor health is well established. Research looks at how social factors "get under the skin" and influence health and disease outcomes[351]. Empirical studies suggest that psychosocial factors are important mediators for these effects, and that the effects are mediated by psychobiological mechanisms related to stress physiology.

Homeostasis and Stress

All living organisms maintain a complex dynamic equilibrium, or homeostasis, which is constantly challenged by internal or external adverse effects, termed stressors[352]. The term allostasis means ''stability through change'', the ability to maintain homeostasis in spite of changes in the external environment[353].

Psychobiological responses of the stress system depend on acquired expectancies (learning) of the relations between responses and stimuli[354] and they are essential for adaptation, performance and survival. The triggering of the "fight or flight" response, a state of physiological arousal for brief emergencies, results in the activation of a range of central and peripheral areas of the nervous system and associated cognitive, behavioural and physiological changes[352]. Cognitive-behavioural changes include heightened vigilance and attention, and behavioural motivation to adjust to changes in external conditions. Physiological changes include increased blood pressure, heart rate, and blood glucose levels, and changes to immune system functions. However, a period of recovery is necessary to rebalance and to manage new demands.

Chronic stress generally refers to stress that persists "abnormally" or that lasts for a long time, either because it occurs repeatedly, continuously, or because it poses severe threats that are not easily adapted or overcome[355]. Whereas acute response to stress is adaptive, chronic activation of the system is thought to damage the feedback loops that return the mediators to their normal levels[356]. The term ''allostatic load'' describes the ''wear and tear'' and the ''chronic effects of non-adaptive reactions in changing environments''[353] that can accelerate disease processes. The emerging concept of allostatic load provides a means of augmenting the concept of "stress" as a basis for elucidating the behavioural and physiological mechanisms by which genes, early life experiences, living and working environment, interpersonal relationships, diet, exercise, sleep, and other lifestyle factors all converge to affect body chemistry, structure, and function over a life-time[357].

There is evidence of direct connections between the psychological characteristics of social position and biological functioning[350]. Disfavoured life circumstances and opportunities affect the regulation of central and peripheral nervous system functions that are important for emotional experience and expression, for mood regulation, for cognition, for social information processing, and for adaptively coping with life stressors at the levels of behaviour and physiology. These brain circuitries, collectively referred to as the "social brain", include areas of the prefrontal cortex (particularly cingulate, orbital and medial areas), insula, amygdala, hippocampus, and temporoparietal junction, along with networked cell groups in the midbrain and brain stem. The development and functioning of these circuitries are modulated by a complex interplay of endogenous neuropeptides, monoaminergic and cholinergic neurotransmitters, and genetic and epigenetic substrates.

Mediators of Homeostasis and Stress

Stress mediators include the classic neuroendocrine hormones of the stress system and other neurotransmitters, cytokines and growth factors[352], most plausibly those involved in i) supporting emotional and social information processing and related behaviours; and ii) co-regulating autonomic, metabolic, neuroendocrine, and immune functions associated with disease processes.

The main components of the stress response are the hypothalamic-pituitary-adrenal-axis (with cortisol as main actor) and the limbs of the autonomic system (with the catecholamines adrenaline and noradrenaline as main actors)[47,353]. Both of these systems work in close interaction with the immune system[353]. Exaggerated platelet reactivity, heightened inflammatory processes, and altered central serotonergic function have also been studied[23].

Cortisol Studies

Cortisol is the hormone released by the hypothalamic-pituitary-adrenal-axis that has received the most research attention, in part due to its widespread regulatory influences covering the central nervous system, the metabolic system and the immune system.

In healthy adults the normal diurnal rhythm is characterised by post-waking peak cortisol levels (cortisol awakening response) and subsequent declining cortisol levels throughout the day[358]. The sustained activation occurring following exposures to repeated or long-term stressful situations without coping, leads to increased baseline levels of cortisol, an exaggerated rise on awakening from sleep and attenuated responses to stress stimuli.

Chronically elevated levels of cortisol have been linked to a variety of pathogenic processes including cognitive decline, immunosuppression and insulin resistance.

Cortisol reactivity and regulation have long been related to helplessness and depression[350]. Elevated hypothalamic-pituitary-adrenal-axis activity and hypercortisolism are consistently associated with forms of anxiety disorder, major depression and paranoia. Patients treated for depression respond less well where disturbed activity of the hypothalamic-pituitary-adrenal-axis persists, and heightened hypothalamic-pituitary-adrenal-axis activity predicts higher risk of relapse. Increased corticotropin-releasing factor secretion and activity is associated with melancholic depression, anorexia nervosa, panic disorder and obsessive-compulsive disorder, and elevated corticotropin-releasing factor in cerebrospinal fluid is symptomatic of posttraumatic stress disorder[47]. Cortisol may also have effects on brain structures; social stress in primates produces receptor changes and morphological changes in the hippocampal pyramidal cells[47].

Low SES in pregnant women is associated with higher levels of stress, higher infection rates and poor nutrition, which increase plasma levels of corticotropin-releasing factor and glucocorticoids in both the mother and the fetus[359] and can thereby restrain fetal growth and trigger prematurity[360]. Glucocorticoid administration during pregnancy is associated with increased externalizing behaviour, shyness, distractibility and inattention, as well as lower IQ in children[361]. Chronic exposure to stress early in life may lead to re-adaptations of the hypothalamic-pituitary-adrenal-axis activity and early childhood adversity has been associated with higher basal cortisol levels throughout the day or a flatter diurnal slope in both adolescence and adulthood[362,363]. Correlational studies have shown associations between childhood poverty and salivary cortisol[364,365,366], with mixed findings in the association between SES and cortisol in adults[353,356]. In population-based studies, lack of social recognition, high levels of job stress, and high levels of perceived stress have been associated with high levels of morning cortisol[350]. Lack of friends and poor early attachment have also been associated

with similar patterns of raised basal cortisol levels and attenuated responses to experimental stressors[342].

Studies of the attachment patterns of parents and their children suggest that early experiences of caregivers may contribute to the intergenerational transmission of physical and psychological vulnerability. Animal studies suggest that early caregiving responses help determine the infant's stress reactivity, through epigenetic modifications of targeted regulatory sequences, which affects risk for disease and, in the longer term, interest in providing care for one's own offspring[367,368].

Inflammation Studies

Increasing evidence suggests that inflammation contributes to the pathophysiology of depression[369]. Excess levels of inflammatory mediators occur in a subgroup of depressed patients, and studies show that inflammation can cause depression.

A prospective longitudinal cohort study[370] in New Zealand investigated the association between depression and inflammation, testing whether a history of childhood maltreatment could identify a subgroup of depressed individuals with elevated inflammation levels. Although depression was associated with high levels of high-sensitivity C-reactive protein (relative risk=1.45, 95% CI 1.06 to 1.99), this association was significantly attenuated and no longer significant when the effect of childhood maltreatment was taken into account. Individuals with current depression and a history of childhood maltreatment were more likely to have high levels of high-sensitivity C-reactive protein compared with control subjects (n=27, RR=2.07, 95% CI 1.23 to 3.47). In contrast, individuals with current depression only had a non-significant elevation in risk (n=109, RR=1.40, 95% CI 0.97 to 2.01). Results were generalizable to the inflammation factor. The authors concluded that a history of childhood maltreatment contributes to the co-occurrence of depression and inflammation.

Serotonergic Studies

Serotonergic neurotransmission is a substantial modulator of emotional behaviour, and low brain serotonergic activity is another candidate pathway connecting SES with health. Studies use several measures of serotonergic function, including measurement of CSF 5-hydroxyindoleacetic acid (5-HIAA) concentration (serotonin's principal metabolite), neuroendocrine challenges, and responsiveness to serotonergic stimulation of frontal brain regions.

Low brain serotonergic activity is associated with aggressiveness, low social affiliation, a propensity for impulsive, high-risk behaviours and major depression or suicidal tendencies[38].

Individual differences in brain serotonergic functional activity include environmental and genetic influences. Animal studies show that stressful social environments are associated with alterations in brain serotonergic systems[371]. Matthews et al.[371] evaluated the association between socioeconomic status and central serotonergic responsiveness in a community sample of adult men and women (n=270). They found that individuals who reported low family income and little education showed a blunted prolactin response to a fenfluramine challenge compared with persons with higher family income and more education.

It was reported[372] that exposure to an adverse rearing environment lowers central nervous system (CNS) serotonergic activity in a nonhuman primate (rhesus monkeys), but only among animals having the shorter variant of a functional, biallelic repeat polymorphism in the regulatory region of the serotonin transporter (5-HTT) gene.

During the past decade a growing number of studies[373] has examined the association between allelic variation in the serotonin transporter (5-HTT) gene linked functional polymorphic region (5-HTTLPR) and personality traits related to depression, anxiety,

and hostility. Studies indicated that allelic variation in the functional polymorphism 5-HTTLPR interacts with stressful life events to predict the occurrence of depression. Specifically, homozygous carriers of the less transcriptionally efficient 5-HTTLPR short (s) allele had increased rates of major depression as a function of increased numbers of varied past life stressors. Thus, early environment importantly moderated the phenotypic expression of the genotype. Taylor et al.[374] examined the relation of a stressful early family environment, recent adversity/stress, and the 5-HTTLPR to depressive symptomatology in a normal sample (n=118). They found that early or current environment, in conjunction with the serotonin transporter polymorphism, predicts depressive symptomatology. Gene-by-environment (G×E) interactions were observed between the 5-HTTLPR and both early family environment and current adversity/stress. Individuals homozygous for the short allele had greater depressive symptomatology if they had experienced early or recent adversity but significantly less depressive symptomatology if they reported a supportive early environment or recent positive experiences, compared with participants with the s/l or l/l genotype.

Thus, functional genetic variation in one component of serotonergic neurotransmission, the serotonin transporter, seems to moderate the influence of low SES on brain serotonergic activity[38].

Neuroimaging Studies

Research is beginning to shed light on the mechanisms through which experiences in the social world during early childhood affect the structure and function of the brain.

Human brain development occurs within a socioeconomic context and childhood socioeconomic status influences neural development[246]. Studies that assessed multiple neurocognitive systems found that the largest effects of SES are on language processing, with more moderate effects on executive function, particularly on working memory and

cognitive control. Additionally, some studies found moderate effects of SES on declarative memory and spatial cognition. There is also evidence of SES-related differences in the neural processing of emotion. A growing body of research indicates that cognitive performance is modified by epigenetic mechanisms, indicating that experience has a strong influence on gene expression and resultant phenotypic cognitive traits. Candidate causal pathways from environmental differences to differences in brain development include lead exposure, cognitive stimulation, nutrition, parenting styles and transient or chronic hierarchy effects.

There is longstanding evidence from animal models that chronic social stressors can remodel the structure of several brain regions, particularly corticolimbic regions within the medial prefrontal cortex, amygdala, and hippocampus[38, 375]. These networked components of the corticolimbic circuitry coordinate behaviour with neuroendocrine (hypothalamic-pituitary-adrenal) and autonomic (sympathoadrenal) function in the service of adaptively coping with emotionally salient environmental and psychosocial challenges. Many of these cellular and structural changes have been related not only to alterations in gross brain morphology (e.g., the regional volume or concentration of grey matter) but also disruptions in higher-order cognitive abilities, mood states, and bidirectional signalling between brain circuits and major peripheral physiological stress response axes.

Lower perceived SES is related to smaller hippocampal brain volume and greater amygdala reactivity to threat cues as measured by functional magnetic resonance imaging in several studies. Amygdala hypertrophy and/or hyperactivity are associated with a range of psychiatric disorders[47]. A neuroimaging study[376] showed that low subjective parental SES, a putative indicator of socioeconomic disadvantage during childhood and adolescence, is uniquely associated with greater amygdala reactivity to threatening (angry) facial expressions but not to neutral or surprised facial expressions.

Increased amygdala reactivity to angry or otherwise threat-related facial expressions could reflect a neural "embodiment" of experiences associated with early socioeconomic disadvantage that influence sensitivity to perceived social threats. Amygdala reactivity has been shown to co-vary with concurrent changes in the neural representation of social hierarchies in humans[377]. In a study[378], adolescents with social anxiety showed greater amygdala activation when anticipating evaluation from peers previously rated as undesired for an interaction. A cross-sectional structural neuroimaging study[375] demonstrated that individuals who subjectively report holding a lower SES show a reduced grey matter volume in the rostral area of the anterior cingulate cortex, a brain region functionally connected with the amygdala and that is implicated in the regulation of emotional states and the risk of affective disorders. Cumulative longitudinal reports of chronic psychological stress have been associated with reduced hippocampal grey matter volume[379]. There is evidence that exposure to early life stressors predicts reduced cingulate volume in adulthood [380], possibly increasing psychological vulnerability and sensitivity to perceived adverse psychosocial conditions or life stressors. Lederbogen et al.[381] showed that urban upbringing and city living have impact on social evaluative stress processing in humans, thus linking the urban environment for the first time to social stress processing. Current city living was associated with increased amygdala activity, whereas urban upbringing affected the perigenual anterior cingulate cortex.

Boles[382] reanalysed published data from studies conducted in the 1970s and 1980s and concluded that they reveal reduced lateralization/hemispheric asymmetry in lower SES groups. Developmentally, this finding is consistent with either maturation delay or reduced functional specialization, or both.

CONCLUSION

The goal of this literature review was to identify the state-of-the-art regarding the associations between income and mental health.

The body of evidence that I presented suggests that exposure to a wide range of social stressors, namely to several forms of social disadvantage, may play an important role in the aetiology of mental health problems. If inequalities in health are a manifestation of the social determinants of health, a purely biomedical approach will not solve the problem, nor will a response that emphasizes individual lifestyle choices, and the solutions should have a social component, which may encompass fairer, more equitable, and more ethical distribution of resources.

Nevertheless, further empirical studies on social inequalities in health are needed to make sense of the mixed research findings, to understand the pathways through which they influence health and to find out ways of reducing their magnitude.

There is a lack of population-level research on the relationship between socioeconomic factors and specific mental disorders in my home country, Portugal, and this problem is particularly relevant when there is an ongoing economic crisis. Interestingly, the analysis of European data by the EU contribution to the World Mental Health Surveys Initiative consortium[173], which included data on Portugal, did not find an association between income and the presence of any mental disorder, contradicting the enormous amount of literature pointing out that income is related to inequalities in mental health. A possible explanation for not having found this association, as outlined by the authors, could lie in the fact that income inequalities within societies or among countries were not considered. Therefore, I would like to further pursue the study of this subject and deepen the analysis of the data for Portugal.

As the second part of my research project, I propose to assess whether in Portugal there is an association between mental disorders and a) individual absolute income, b) individual relative income, c) neighbourhood median household income, and d) income inequality.

PART B:

PROJECT WORK PLAN

SPECIFIC AIMS

The goals of the research I propose to perform are:

- To assess whether there is an association between individual absolute income and mental disorders in Portugal.

- To assess whether there is an association between individual relative income and mental disorders in Portugal.

- To assess whether there is an association between neighbourhood median household income and mental disorders in Portugal, controlling for various individual factors and individual income. This would confirm that more deprived communities have higher rates of mental disorders.

- To assess whether there is an association between income inequality and mental disorders in Portugal, controlling for various individual factors and neighbourhood-level median household income. If confirmed, this could mean that there is something inherently health-determining in income inequality.

STUDY HYPOTHESES

- Hypothesis 1: In Portugal, there is an association between absolute income and the prevalence of mental disorders.

- Hypothesis 2: In Portugal, there is an association between relative income and the prevalence of mental disorders.

- Hypothesis 3: In Portugal, there is an association between the neighbourhood-level median household income and the prevalence of mental disorders, controlling for various individual factors.

- Hypothesis 4: In Portugal, a higher level of income inequality is associated with higher levels of mental disorders, controlling for various individual factors and neighbourhood-level median household income.

STUDY DESIGN

Sample and Setting

The study will use individual-level data from the first Portuguese Mental Health Survey, a national cross-sectional household survey integrated in the WHO World Mental Health Survey Consortium. The WHO World Mental Health Survey Initiative aimed to assess the prevalence of common mental disorders, their correlates and their relationship with services use.

The target population was the usually resident, non-institutionalized Portuguese-speaking population of Continental Portugal aged 18 or above, living in permanent private dwellings, interviewed between 2006 and 2009. A total of 3849 persons were interviewed.

Sampling and Recruitment Plan

A nationally representative sample, stratified by region and social class was created. The sample was a stratified multistage clustered area probability household sample. A sample of municipalities of the country was selected in the first stage, followed by subsequent stages of geographic sampling to arrive at a sample of households. A listing

of household members (10,339 households) was created and one individual was randomly selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. According to the Census 2001, 27,960 "localities" existed in Continental Portugal, with a resident population aged 18 or above of 7,719,986. 262 localities were selected randomly with probability proportional to size.

Selection was stratified by region (North, Centre, Lisbon, Alentejo, and Algarve) and size of locality (1 – Less than 2,000 inhabitants; 2 – 2,000-9,999 inhabitants; 3 – 10,000-19,999 inhabitants; 4 – 20,000-99,999 inhabitants; 5 – 100,000+ inhabitants). Number of non-empty strata: 23 (no localities with 100,000 or more in either Alentejo or Algarve).

Households were selected on the basis of interval proportional to number of households in each locality (non-private housing units not considered), on the basis of Census 2001 data. A total of 10,339 addresses were selected.

Selection of Instruments

In this project, the unit of analysis is the individual. Characteristics of the respondents' neighbourhoods will be linked to individual survey data.

The instrument used to assess the psychiatric disorders and the variables related to individual, family, social and economic factors was the Computer Assisted Personal Interviewing (CAPI). The CAPI is a computerized form of the Composite International Diagnostic Interview (WMH CIDI) made available by the World Mental Health Survey Initiative version. All interviews were carried out face-to-face by trained lay interviewers between 2006 and 2009, and 3849 persons were interviewed. Written informed consent was obtained from all respondents prior to the interviews.

Neighbourhood-level median household income and income inequality measures will be derived from an exogenous data source, national databases on average household income provided by the Portuguese Office of National Statistics (INE).

Variables in the Analyses

Dependent Variables: Clinical Variables

The presence of past 12-month and lifetime groups of mental disorders (mood, anxiety, and alcohol-related disorders, plus a category of any mental disorder) was assessed using the definitions and criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and the ICD-10 Classification of Mental and Behavioural Disorders (ICD-10). The diagnostic section of the interview was based on the World Health Organization's Composite International Diagnostic Interview (WHO CIDI, 1990). The CIDI is an instrument developed by the WHO and the National Institute for Mental Health (NIMH), and the original version was modified and expanded for its utilization in the WMH Survey Initiative.

Thus, the survey used the WMH-CIDI, a fully structured diagnostic interview, to assess the following disorders:

- Anxiety disorders (agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, posttraumatic stress disorder, social phobia, specific phobia)

- Mood disorders (bipolar I and II disorders, dysthymia, major depressive disorder)

- Disorders that share a feature of problems with impulse control (bulimia, intermittent explosive disorder, and adult persistence of childhood/adolescent disorders – attention deficit/hyperactivity disorder, conduct disorder, and

oppositional-defiant disorder – among respondents in the 18- to 44-year age range)

- Substance disorders (alcohol and drug abuse and dependence)

Individual, Independent, Variables

Key independent variables will include the following individual-level socio-economic indicators:

- Age, categorised in four groups (≤34 years, 35–49, 50–64, and >65 years)
- Gender: separate analyses will be performed for women and men
- Marital status, classified into three categories (married/cohabiting, separated/widowed/divorced, and living alone/never married)
- Working status, categorised in three groups (employed, unemployed/disabled, other)
- Income, classified into four groups (low, low-average, high-average, high). It will be calculated by dividing annual net household income by the number of individuals living in the household
- Wealth, assessed as net worth, i.e., household assets (including values from home and land, own business, savings, and other sources) minus negative assets or debt. It will be divided into quartiles
- Education: the educational level of the subjects will be categorized into four groups (no education/incomplete primary, incomplete secondary, secondary finished, higher education)

- Physical health or functional capacity of the individual, defined as the presence of a current physical health problem or disability (hypertension, diabetes mellitus, heart disease, stroke, arthritis, cancer, lung disease, liver disease, psychiatric illness)

- Region will be defined in five categories (North, Centre, Lisbon, Alentejo, and Algarve)

- Urbanicity: five levels of urbanization were defined on the basis of the number of inhabitants (<2,000; 2,000-9,999; 10,000-19,999; 20,000-99,999; ≥100,000 inhabitants)

- Religion, classified in two groups (with or without religious belief)

Exposure Variables: Neighbourhood Characteristics

According to the Census 2001, 27,960 "localities" exist in mainland Portugal, and 262 localities were selected randomly for the survey, with probability proportional to size. The neighbourhood units for this analysis will be these 262 localities.

Based on study participants' home addresses, characteristics of the respondents' neighbourhoods will be linked to the individual-level survey data.

I will characterize each of these geographic units according to their median household income and income distribution, using income data from an exogenous data source (INE).

To calculate neighbourhood income I will use individual income data obtained from the national database provided by the Portuguese Office of National Statistics (INE). Then I will classify neighborhood socioeconomic status as of "low," "medium," or "high".

I will use the Gini coefficient as a measure of income inequality, and group each locality into approximate thirds of "low," "medium," or "high" inequality.

STATISTICAL ANALYSIS PLAN

Descriptive statistics will include weighted prevalences (percentages, Odds Ratios, 95% confidence intervals).

Initial bivariate analyses will examine the associations between clinical variables, individual variables and neighbourhood variables. In order to explore independent contributions of individual and neighbourhood socio-demographic variables on clinical variables, analyses will then use multilevel logistic regression analysis.

ETHICAL CONSIDERATIONS

This study will start after obtaining approval by the Ethics Committee of NOVA Faculty of Medical Sciences of Lisboa.

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