TECHNICAL COMMENTARY

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Socioeconomic status

Introduction

Any association of socioeconomic status with a higher risk for schizophrenia has been largely inconsistent. There are additional factors related to low socioeconomic status, such as urban living, stressful life events and migrant status which may have influence on any association. If apparent, higher rates of schizophrenia in lower socioeconomic groups may be due to people with schizophrenia drifting into them because of disability or discrimination. However, this debate is still not resolved, and there is no consistent pattern with regard to the direction and magnitude of socioeconomic differences in schizophrenia.

Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2000 that report results separately for people with a diagnosis of schizophrenia, schizoaffective disorder, schizophreniform disorder or first episode schizophrenia. We also included reviews of psychotic symptoms. Reviews were identified by searching the databases MEDLINE, EMBASE, CINAHL, Current Contents, PsycINFO and the Cochrane library. Hand searching reference lists of identified reviews was also conducted. When multiple copies of reviews were found, only the most recent version was included. Reviews with pooled data are prioritised for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis. Reviews with less than 50% of items checked have been excluded from the library. The PRISMA flow diagram is a suggested way of providing information about studies included and excluded with reasons for exclusion. Where no flow diagram has been presented by individual reviews, but identified studies have been described in the text, reviews have been checked for this item. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large, there is a dose dependent response or if results are reasonably consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[1]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found seven systematic reviews that met our inclusion criteria[2-8].

- Moderate quality evidence suggests a small increased incidence of schizophrenia with increased national income inequality.
- Moderate to low quality evidence suggests an association between neighbourhood-level socioeconomic deprivation and increased incidence of psychotic disorders.
- Moderate to low quality evidence suggests a small increase in prevalence of subclinical psychotic symptoms in people with lower

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income, and a small increase in incidence of subclinical psychotic symptoms in people with less education. There is also a small association with unemployment.

- Moderate to low quality evidence suggests least developed countries report lower prevalence rates of schizophrenia than developed countries, with no differences in incidence rates.
- Moderate to low quality evidence suggests no relationship between regional infant mortality rates (a proxy indicator of socioeconomic status) and prevalence of schizophrenia. There was also no association between countries' per capita gross national product and incidence schizophrenia.

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Burns JK, Tomita A, Kapadia AS

Income inequality and schizophrenia: Increased schizophrenia incidence in countries with high levels of income inequality

International Journal of Social Psychiatry 2014; 60(2): 185-196

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Comparison	**Income inequality and incidence of schizophrenia.**
Summary of evidence	**Moderate quality evidence (large samples, precise, unable to assess consistency, indirect) suggests a small increased incidence of schizophrenia with increased national income inequality.**
Income inequality	
A small significant relationship between increasing income inequality and increasing incidence of schizophrenia; 26 countries worldwide: β = 1.02, 95%CI 1.00 to 1.03, p = 0.02 Adjusted for urbanization, gross domestic product, migrant population and unemployment rate.	
Consistency in results‡	Unable to assess; no measures of heterogeneity is reported.
Precision in results§	Precise
Directness of results‖	Unclear measure of socioeconomic status.

Fusar-Poli P, Tantardini M, De Simone S, Ramella-Cravaro V, Oliver D, Kingdon J, Kotlicka-Antczak M, Valmaggia L, Lee J, Millan MJ, Galderisi S, Balottin U, Ricca V, McGuire P

Deconstructing vulnerability for psychosis: Meta-analysis of environmental risk factors for psychosis in subjects at ultra high-risk

European Psychiatry 2017; 40: 65-75

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Comparison	**Socioeconomic status in people with ultra high-risk (UHR) mental states, determined as; attenuated psychotic symptoms, brief and**

	limited intermittent psychotic symptoms, and genetic risk and functional deterioration.
Summary of evidence	**Moderate quality evidence (large sample, imprecise, inconsistent, direct,) suggests increased unemployment in people with ultra high-risk mental states.**
Unemployment	
A significant, small increased odds of being unemployed in people with UHR mental states; 8 studies, N = 98,898, OR = 2.828, 95%CI 1.526 to 5.243, $p < 0.001$, $I^2 = 71\%$, $p < 0.001$ There was no evidence that the UHR samples were more likely to have low parental socioeconomic status. There was no evidence of publication bias	
Consistency in results	Inconsistent
Precision in results	Imprecise
Directness of results	Direct

Kinney DK, Teixeira P, Hsu D, Napoleon SC, Crowley DJ, Miller A, Hyman W, Huang E

Relation of Schizophrenia Prevalence to Latitude, Climate, Fish Consumption, Infant Mortality, and Skin Color: A Role for Prenatal Vitamin D Deficiency and Infections?

Schizophrenia Bulletin 2009; 35(3): 582-595

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Comparison	**Regional socioeconomic status, estimated from infant mortality rates and regional prevalence of schizophrenia, controlling for latitude and climate.** **Infant mortality rates (an estimation of socioeconomic status) are taken from 25 years prior to when study was conducted, as authors state that the average age of onset for schizophrenia is early to mid-20's.**
Summary of evidence	**Moderate to low quality evidence (large samples, unable to assess precision and consistency, indirect) suggests no relationship between regional infant mortality rates and risk of developing**

	schizophrenia.
Infant mortality rates	
No significant relationship between infant mortality rates and regional prevalence of schizophrenia; 49 studies, N = 2,392,539 Statistics not reported	
Consistency in results	Unable to assess; no measure of heterogeneity is reported.
Precision in results	Unable to assess; no confidence intervals are reported.
Directness of results	Indirect measure of socioeconomic status.

Linscott RJ, van Os J

An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: on the pathway from proneness to persistence to dimensional expression across mental disorders

Psychological Medicine 2013; 43: 1133-1149

View review abstract online

Comparison	**Prevalence and incidence of subclinical psychotic symptoms in people with different levels of income, education and employment.**
Summary of evidence	**Moderate to low quality evidence (unclear sample sizes, some inconsistency and imprecision, direct) suggests a small increase in prevalence of subclinical psychotic symptoms in people with lower income levels, and a small increase in incidence in people with fewer years of education.**
Income, education and employment	
Significant, small increased prevalence of subclinical psychotic symptoms in people with lower income, and small increased incidence in people with less education. Incidence and prevalence were higher in those unemployed, although differences with those employed were not significant; Income Prevalence: 4 studies, N not reported, OR = 0.68, 95%CI 0.50 to 0.91, $p < 0.05$, $I^2 = 69\%$, $p < 0.05$	

Incidence: 1 study, N not reported, OR = 1.41, 95%CI 0.65 to 3.03, $p > 0.05$ Education Prevalence: 7 studies, N not reported, OR = 0.89, 95%CI 0.70 to 1.13, $p > 0.05$, $I^2 = 76\%$, $p < 0.01$ Incidence: 2 studies, N not reported, OR = 0.64, 95%CI 0.48 to 0.84, $p < 0.05$, $I^2 = 0\%$, $p > 0.05$ Employment Prevalence: 6 studies, N not reported, OR = 1.38, 95%CI 0.92 to 2.06, $p > 0.05$, $I^2 = 74\%$, $p < 0.01$ Incidence: 2 studies, N not reported, OR = 1.30, 95%CI 0.97 to 1.74, $p > 0.05$, $I^2 = 0\%$, $p > 0.05$	
Consistency in results	Inconsistent for prevalence rates.
Precision in results	Precise for income prevalence, education prevalence and education incidence.
Directness of results	Direct

March D, Hatch SL, Morgan C, Kirkbride JB, Bresnahan M, Fearon P, Susser E

Psychosis and place

Epidemiologic Reviews 2008; 30: 84-100

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Comparison	**Incidence of psychosis relative to neighbourhood socioeconomic deprivation in developed countries.** **Most studies include only people with schizophrenia.**
Summary of evidence	**Moderate to low quality evidence (large samples, unable to assess precision and consistency, indirect) suggests an association between socioeconomic deprivation and increased incidence of psychotic disorders.**
Socioeconomic deprivation	
24 observational studies (USA and Western Europe), N = population level data Authors report that socioeconomic deprivation of neighbourhoods may increase risk (9 studies only) and levels of social capital (3 studies) and ethnic density (3 studies) may decrease risk. Drift and selection cannot be ruled out conclusively as an explanation.	
Consistency in results	Unable to assess; no measure of heterogeneity is reported.

Precision in results	Unable to assess; no confidence intervals are reported.
Directness of results	Indirect measure of individual socio-economic status

Saha S, Chant D, Welham J, McGrath J

A systematic review of the prevalence of schizophrenia

PLoS Medicine / Public Library of Science 2005; 2(5): e141

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Comparison	**Prevalence of schizophrenia with influence of socioeconomic status.**
Summary of evidence	**Moderate to low quality evidence (large samples, unable to assess precision and consistency, indirect) suggests an association between least developed countries and low prevalence rates of schizophrenia.**
Developed, emerging and least developed countries	
85 observational studies, N = population level data Using per capita gross national product of the study site and World Bank definitions of mean income; < US$2995 per annum = least developed, US$2995 to US$9266 = emerging economy, >US$9266 = developed. *Significantly lower prevalence of schizophrenia in least developed countries;* Difference in harmonic means – all 3 groups; $F_{2,85} = 3.57$, $p = 0.03$ Difference in harmonic means – least developed vs. developed groups; $F_{1,74} = 6.55$, $p = 0.04$	
Consistency in results	Unable to assess; no measure of heterogeneity is reported.
Precision in results	Unable to assess; no confidence intervals are reported.
Directness of results	Indirect measure of individual socio-economic status

Saha S, Welham J, Chant D, McGrath J

Incidence of schizophrenia does not vary with economic status of the

country. Evidence from a systematic review **Social Psychiatry and Psychiatric Epidemiology 2006; 41: 338-340** View review abstract online	
Comparison	**Incidence of schizophrenia with influence of socioeconomic status.**
Summary of evidence	**Moderate to low quality evidence (large samples, unable to assess precision and consistency, indirect) suggests no differences in the incidence of schizophrenia.**
Developed, emerging and least developed countries	
52 observational studies, N = population level data Using per capita gross national product of the study site and World Bank definitions of mean income < US$2995 per annum = least developed, US$2995 - 9266 = emerging economy, >US$9266 = developed. The median (and 10-90% quantiles) incidence rates per 100,000 persons for least developed countries (3 studies) = 20.0 (0.4-35.0), emerging economies (9 studies) = 11.0 (5.0-26.0) and developed countries (42 studies) = 16.0 (8.0-48.0). *There was no significant difference in incidence rates between these groups;* $F_{2,52} = 0.20$, $p = 0.82$ When developing countries' incidence rates were compared to emerging and least developed countries' incidence rates combined, there was also no significant group difference.	
Consistency in results	Unable to assess; no measure of heterogeneity is reported.
Precision in results	Unable to assess; no confidence intervals are reported.
Directness of results	Indirect measure of socioeconomic status

Explanation of acronyms

β = coefficient, CI = confidence interval, F = one-way ANOVA F-test for (harmonic) means, I^2 = measure of heterogeneity, N = number of participants, OR = odds ratio, p = statistical probability of obtaining that result ($p < 0.05$ generally regarded as significant)

Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results, publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[9].

† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. 0.2 represents a small effect, 0.5 a moderate effect, and 0.8 and over represents a large treatment effect[9].

Odds ratio or relative risk ratio refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in the treatment group relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment. Conversely, an RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a certain risk factor. An RR of 1.00 means there is no difference between groups. The RR effect is statistically significant if the CI completely sits on either side of 1.00 and the *p* value is < 0.05. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[10]. ln OR stands for logarithmic OR where a ln OR = 0 shows no difference between groups and the

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ln OR is statistically significant if the CI completely sits on either side of zero.

Correlation coefficients (eg r) indicate the strength of association or relationship between variables. They are an indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the dependent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of treatment effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent substantial heterogeneity and 75% to 100%: considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity.

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, this criteria should be relaxed[11].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available so is inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

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