**Review – Geolocation and Psychiatry**

((global positioning) OR (geolocation) OR (geospatial coordinates) OR (geospatial position) OR (geocoding) AND ((psychiatry) OR (mental health))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Author/Journal/Year | Title | Objectives | Sample | Main Findings | Observations |
| Engemann et al.  *Schizophrenia Research*  2018 | Childhood exposure to green space – A novel risk-decreasing mechanism for schizophrenia? | To determine if green space is associated with schizophrenia risk, and if different measures of green space associate differently with the risk.  Hypothesis: more green space (higher mean value of NDVI around the residence) reduces the risk of schizophrenia, and that this effect is strongest closest to the residence  Obs.: This research could be used to guide city planning towards green space infrastructure designs to optimally benefit psychological health | Included all persons born in Denmark 1985–2003 and who were alive and residing in Denmark at their 10th birthday (**943,027 persons**)  This is the first nationwide population-based study assessing the potential impact of green space on schizophrenia risk | 7609 persons developed schizophrenia spectrum disorder; considering narrowly-defined schizophrenia as the outcome of interest, 3748 persons developed schizophrenia  NDVI ranged from −0.89 to 0.97 with the lowest values, indicating sparse vegetation, typically in inner city areas and the highest values, indicating dense vegetation (such as forest areas with multiple layers of vegetation), in rural areas, but also in city parks and recreational areas.  Persons residing in the **capital** lived in areas with lowest green space values and persons in rural areas lived with the highest green space values, but with no clear linear correlation with urbanization. Similarly, persons residing in the **capital** were exposed to the lowest heterogeneity of green space whereas persons residing in rural areas lived with the highest green space heterogeneity. Together this supports the assumption of less and lower heterogeneity of green space in the inner parts of cities.  They demonstrated a **dose-response association** between the magnitude of greenspace during childhood and the risk of later developing schizophrenia. The effect of green space is not only determined by quantity but could also be distance dependent.  Living at the **lowest amount of green space** was associated with a **1.52-fold increased risk of developing schizophrenia** compared to persons living at the highest level of green space. This association remained after adjusting for known risk factors for schizophrenia: urbanization, age, sex, and socioeconomic status. The strongest **protective association** was observed during the earliest childhood years and closest to place of residence | They used satellite data from the Landsat program to quantify green space in a new data set for Denmark at 30×30m resolution for the years 1985–2013, linking the Danish population-based register on health and SES with two different individual-level exposure during childhood to quantity and heterogeneity of green space. They used a measure of vegetation greenness, the **normalized difference vegetation index (NDVI)**  They performed the following sensitivity analyses on the effect of NDVI assessing  (1) the potential modifying effect of urbanization  (2) the potential modifying effect of socioeconomic status estimated as parents' education, income, and employment status  (3) the potential modifying effect of sex  (4) the effect of different exposure zone sizes  (5) the effect of measuring NDVI at different ages from birth to the 10th birthday  (6) the effect of measuring green space as mean accumulated NDVI from birth to the 10th birthday for each cohort member with at least 10 observations  Treatment of mental illnesses is provided through the government healthcare system in Denmark, and financial factors are less likely to influence the results presented here. Drug use, crime rates, and exposure to infections are also possible confounders that could influence risk estimates but were beyond the scope of this paper.  R packages: data.table, Hmisc, landsat, lubridate, plyr, raster, rgdal, RStoolbox, sp., and survival |
| Tomita et al.  *Lancet Planet Health*  2017  Não está completo! | Green environment and incident depression in South Africa: a geospatial analysis and mental health implications in a resource-limited setting | We investigated the effect of green living environment in potentially countering incident depression in a nationally representative survey in South Africa. |  | Overall, we found uneven benefit of NDVI on incident depression among our study participants. Although the green living environment showed limited benefit across the study population as a whole, our final analysis based on logistic regression models showed that higher NDVI was a predictor of lower incident depression among middle-income compared with low- income participants (adjusted odds ratio [aOR] 0·98, 0·97–0·99, p<0·0001), although when this analysis was broken down by race, its positive effect was particularly evident amongst African individuals. Living in rural areas was linked to lower odds of incident depression (aOR 0·71, 0·55– 0·92, p=0·011) compared with study participants residing in urban informal areas that often lack formal planning. |  |
| Ridenour et al.  *The American Journal of Drug and Alcohol Abuse*  2013 | High and Low Neurobehavior Disinhibition Clusters within Locales: Implications for Community Efforts to Prevent Substance Use Disorder | The present study tested whether high ND (neurobehavioral disinhibition) clusters into geographic locals.  Hypothesis:  (1) Neighborhood quality (level of fiscal and social resources located there) directly predicted ND while controlling for parental SUD severity  (2) Accounting for geographic barriers (e.g., large rivers, highways) results in greater specification of which areas are deemed to be characterized by high or low ND | The 738 youths recruited from the greater Pittsburgh, PA, area were 10–12-year-old biological offspring of men with either lifetime SUD consequent to using illegal drugs (n=321), lifetime psychiatric diagnosis other than SUD (n=78), or no adult onset axis I or axis II psychiatric disorder (n=339)  Study participants represented well their respective census tracts. | Clustering of youth with high and low ND occurred in specific locales. Accounting for geographic barriers better delineated where high ND is concentrated, areas which also tended to be characterized by greater parental SUD severity and poorer neighborhood quality  Geospatial analysis of youth risk factors, frequently used in community coalition strategies, may be improved with greater statistical and measurement rigor  Geospatial clustering of ND in 10–12- year olds was delineated for the greater Pittsburgh area. Specific locales were identified that are characterized by youth with high ND (which presages substance use and behavior problems). More broadly, study results demonstrated the ability and need to characterize geospatial locations in terms of risk factors for understanding the etiology and prevention of SUD. This line of research offers high potential for locating target populations in need of, and allocating resources for, SUD risk monitoring and prevention. | Previous measures of neighborhood frequently focus on either economic or social resources. Herein, both features of neighborhoods were measured and aggregated  Data were geocoded according to residential address and analyzed as individual cases (i.e., pinpointed on a map) rather than as aggregated subsamples  Geospatial Cluster Analysis: olhar no artigo!  Geographic Barriers |
| Salinas-Pérez et al.  *International Journal of Health Geographics*  2012 | Identification and location of hot and cold spots of treated prevalence of depression in Catalonia (Spain) | A new hybrid approach has been applied to the spatial analysis of treated prevalence of depression in Catalonia (Spain) according to the following descriptive hypotheses: 1) spatial clusters of treated prevalence of depression (hot and cold spots) exist and, 2) these clusters are related to the administrative divisions of mental health care (catchment areas) in this region. |  | MOEA has identified 6 hot spots and 4 cold spots of depression in Catalonia. Our results show a clear spatial pattern where one cold spot contributed to define the exact location, shape and borders of three hot spots. Analyzing the corresponding domain values for the identified hot and cold spots no common pattern has been detected  However, these hot/cold spots comprised municipalities from different catchment areas and we could not relate them to the administrative distribution of mental care in the region. By combining the analysis of hot/cold spots, a better statistical and operational-based visual representation of the geographical distribution is obtained. This technology may be incorporated into Decision Support Systems to enhance local evidence-informed policy in health system research. | Spatial analysis has been performed using a Multi-Objective Evolutionary Algorithm (MOEA) which identified geographical clusters (hot spots and cold spots) of depression through the optimization of its treated prevalence. Catchment areas, where hot and cold spots are located, have been described by four domains: urbanicity, availability, accessibility and adequacy of provision of mental health care. |

**Other cited articles that didn’t show on the search:**

* Duncan D.T., Piras G., Dunn E.C. The built environment and depressive symptoms among urban youth: a spatial regression study. Spat. Spat. Epidemiol. Epidemiol. 2013;5:11–25. [PMCID: PMC3734378]

Cited on Engemann:

* James, P., Banay, R.F., Hart, J.E., Laden, F., 2015. A review of the health benefits of greenness. Curr. Epidemiol. Rep. 2, 131–142.
* Lee, A.C.K., Maheswaran, R., 2011. The health benefits of urban green spaces: a review of the evidence. J. Public Health (Bangkok) 33, 212–222.
* Sandifer, P.A., Sutton-Grier, A.E., Ward, B.P., 2015. Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: opportunities to enhance health and biodiversity conservation. Ecosyst. Serv. 12, 1–15.
* Sugiyama, T., Leslie, E., Giles-Corti, B., Owen, N., 2008. Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships? J. Epidemiol. Community Health 62, e9.

Cited on Salinas-Perez:

*In mental health, for example, Bayesian models have been used to study the relation- ship between poverty and social isolation, and psychi- atric admission rates in acute hospitals in small urban areas of London and New York [6]; the variation in the incidence of psychotic disorders in urban areas in South- east London [7]; the relationship between depression and schizophrenia admission rates and socioeconomic characteristics in the counties of 14 States in the USA [8,9]; and the study of the correlation between mental retardation and clusters of developmental delay [10]. Spatial scan statistics have been used to detect clusters of mental disorders due to psychoactive substance use, and neurotic, stress-related, and somatoform disorders, and their relationship to poverty and neighbourhood social disorganization in Malmö (Sweden) [11]. LISA were applied to analyze spatial patterns of mental health in the slums of Dhaka (Bangladesh) [12]. In addition, a spatial regression model has been used to analyze spatial alloca- tion in mental health expenditure in England [13].*

* Curtis S, Copeland A, Fagg J, Congdon P, Almog M, Fitzpatrick J: The ecological relationship between deprivation, social isolation and rates of hospital admission for acute psychiatric care: a comparison of London and New York City. Health Place. 2006, 12:19–37.
* Kirkbride JB, Fearon P, Morgan C, Dazzan P, Morgan K, Murray RM, Jones PB: Neighbourhood variation in the incidence of psychotic disorders in Southeast London. Soc Psychiatry Psychiatr Epidemiol. 2007, 42:438–445.
* Fortney JC, Rushton G, Wood S, Zhang L, Xu S, Dong F, Rost K: Community- Level Risk Factors for Depression Hospitalizations. Adm Policy Ment Health 2007, 34:343–352.
* Fortney JC, Xu S, Dong F: Community-Level Correlates of Hospitalizations for Persons With Schizophrenia. Psychiatr Serv 2009, 60:772–778.
* Zhen H, McDermott S, Lawson A, Aelion M: Are clusters of mental retardation correlated with clusters of developmental delay? Geospat Health. 2009, 4:17–26.
* Chaix B, Leyland AH, Sabel CE, Chauvin P, Råstam L, Kristersson H, Merlo J: Spatial clustering of mental disorders and associated characteristics of the neighbourhood context in Malmö, Sweden, in 2001. J Epidemiol Community Health. 2006, 60:427–435
* Gruebner O, Khan MMH, Lautenbach S, Muller D, Kramer A, Lakes T, Hostert P: A spatial epidemiological analysis of self-rated mental health in the slums of Dhaka. Int J Health Geogr. 2011, 10:36.
* Moscone F, Knapp M, Tosetti E: Mental health expenditure in England: A spatial panel approach. J Health Econ. 2007, 26:842–864.