**Title**

**DON’T JUST SCREEN, INTERVENE: PROTECTING THE CARDIOMETABOLIC HEALTH OF PEOPLE WITH SEVERE MENTAL ILLNESS**

**Authors**

Johanna Taylor – BA(Hons); MRes; PhD

Research Fellow, Mental Health and Addiction Research Group, Department of Health Sciences, University of York, Heslington, York YO10 5DD

Email: [jo.taylor@york.ac.uk](mailto:jo.taylor@york.ac.uk)

David Shiers – MRCGP; MRCP (UK)

Former GP, North Staffordshire

Honorary Reader in Early Psychosis, University of Manchester, Oxford Road, Manchester M13 9PL

Email: [david.shiers@doctors.org.uk](mailto:david.shiers@doctors.org.uk)

**Conflicts of Interest**

DS is a topic expert for a group undertaking surveillance of NICE guidance on psychosis and schizophrenia in children and young people (NICE CG155) – these are the views of DS and not of NICE or the surveillance group. JT has no known conflict of interests.

**Acknowledgements**

We would like to acknowledge the contribution of the DIAMONDS PPI panel. The panel, which consists of service users with SMI and diabetes, has helped to prioritise research questions for the DIAMONDS research programme ([www.diamonds.nihr.ac.uk](http://www.diamonds.nihr.ac.uk)) and provides input on current projects. In particular, we would like to thank Lynne Camacho, Sally Carling, Paul Frazer and Ernie Lloyd, who helped to develop ideas for this paper and provided personal insights into their experiences of care, and also reviewed the draft manuscript.

Financial support to establish the DIAMONDS research programme was received through the NIHR CLAHRC Yorkshire and Humber mental health and comorbidities theme (www.clahrc-yh.nihr.ac.uk), which includes the Universities of York and Leeds, Bradford District Care NHS Foundation Trust, and Leeds and York Partnership NHS Foundation Trust. The views expressed are those of the authors, and not necessarily those of the NHS, the NIHR or the Department of Health.

**Article points**

* People with severe mental illness (SMI) are at increased risk of diabetes and experience more diabetic complications than those without SMI
* Diabetes commences 10-20 years earlier in those with SMI, below an age when primary care would normally consider active prevention
* Antipsychotic medication can cause weight gain and metabolic disturbances that increase the risk for diabetes, although other factors also play a part
* The Lester Resource provides a practical framework for assessing and managing cardiometabolic risk in people with SMI
* The Lester’s mantra ‘Don’t just Screen, Intervene’ highlights that whilst identifying risk is essential, appropriate intervention is also necessary

**Key words**

psychosis; severe mental illness; schizophrenia; cardiovascular risk; diabetes

**Abstract**

People with severe mental illness (SMI) experience a reduction in life expectancy by around 15-20 years. Higher prevalence of diabetes and diabetic complications contribute to this health inequality. This paper describes the multiple risk factors that contribute; these include the poor metabolic profile of antipsychotic medications, the impact of psychiatric symptoms on physical health and self-management, disparities in healthcare, and wider socio-economic inequalities. We consider how the risk for diabetes and barriers to managing diabetes alongside SMI require more tailored lifestyle interventions, regular monitoring of risk from the onset of psychosis, high quality antipsychotic prescribing, smoking cessation, support for self-management, and collaborative care. Increasing awareness about the particular risks that people with SMI face and the proactive approach that is needed to sufficiently screen and intervene for diabetes may help to ensure that individuals are better supported; the Lester resource provides practitioners with a useful tool to help facilitate this.

**Introduction**

People with severe mental illnesses (SMI) (e.g. schizophrenia, bipolar disorder) experience a reduction in life expectancy by around 15-20 years. While suicide and accidents account for a quarter of premature deaths, most arise from illnesses that shorten lives in the general population, cardiovascular disease (CVD) being the single biggest cause ([Brown et al, 2010](#_ENREF_5)).

Diabetes is a particular concern, contributing to the morbidity and mortality gap and increasing the likelihood of premature CVD ([Ward and Druss, 2015](#_ENREF_33)). Despite this, little is currently done to improve diabetes care for this population. This paper aims to raise awareness about the particular risks that people with SMI face and the strategies that may help to better prevent and manage diabetes in this population.

**Why is diabetes a problem for people with SMI?**

Around 1% of the population experiences a severe mental illness (SMI) ([Reilly et al, 2015](#_ENREF_28)). Psychotic features may include altered perceptions, thoughts, mood, and behaviour and can be highly distressing for the individual and their family and friends. Some recover but the majority continues to experience difficulties. These include not only psychological difficulties but also poor physical health often compounded by inequalities in healthcare ([Ward and Druss, 2015](#_ENREF_33)).

Diabetes affects around 10-15% of people with SMI, a rate 2-3 times higher than in the general population ([Reilly et al, 2015](#_ENREF_28)). Type 2 diabetes (T2DM) accounts for most of the excess cases, and typically commences 10-20 years earlier in those with SMI, the relative risk being highest in younger individuals ([De Hert et al, 2006](#_ENREF_10)). People with comorbid SMI and diabetes, when compared to those with diabetes alone, experience more diabetic complications (microvascular and macrovascular), and have a significantly increased risk of death ([Vinogradova et al, 2010](#_ENREF_32)).

The path to premature diabetes and CVD may be heralded by the onset of psychosis and the initiation of antipsychotic treatment. Aggressive early weight gain averaging 12 kg in the first 24 months of treatment ([Alvarez-Jimenez et al, 2008](#_ENREF_2)), increases the risk for future T2DM (see Figure 1).

**Figure 1.** **Antipsychotic-induced weight gain in chronic and first-episode psychotic disorders: a systematic critical reappraisal**



Other metabolic disturbances also increase the risk for T2DM in this population. A systematic review demonstrated significant glucose and lipid disturbance within 8 weeks of antipsychotic initiation and worsening over the 12 months studied ([Foley and Morley, 2011](#_ENREF_15)). Another review showed that antipsychotics could cause T2DM in people under the age of 24 ([Galling et al, 2016](#_ENREF_16)).

Metabolic syndrome, which describes a clustering of CVD risks, reliably predicts a five-fold increased risk of T2DM in the general population ([Alberti et al, 2006](#_ENREF_1)). Prior to antipsychotic initiation, metabolic syndrome is no more likely in people experiencing a first episode of psychosis than in peers without psychosis ([Fleischhacker et al, 2013](#_ENREF_13)). Yet by age 40, people with schizophrenia have a 3-fold increased rate of metabolic syndrome compared with an age-matched general population ([De Hert et al, 2006](#_ENREF_10)).

Although antipsychotic treatment plays an important role in increasing the risk for T2DM, to understand this population’s vulnerability to metabolic disturbance requires awareness of how psychosis impacts beyond simply the distress of symptoms and medication side effects. Social consequences, often profound, include damaged relationships and social isolation, stigma and discrimination, disrupted education and employment, financial and accommodation uncertainties. SMI can also reduce motivation and cause paranoid thinking, and treatment side-effects include sedation and appetite stimulation ([Holt and Mitchell, 2015](#_ENREF_18)).

Combined, these can influence lifestyles that predispose to T2DM, in particular physical activity, diet and smoking (see Table 1):

* **Physical activity –** fewer than 30% of people with schizophrenia are regularly active compared to 62% for non-psychiatric peers ([Lindamer et al, 2008](#_ENREF_21)). A systematic review found people with psychosis were sedentary for more than 11 hours a day, 3 hours more than non-psychiatric peers ([Stubbs et al, 2016](#_ENREF_31));
* **Diet** – tends to be high in fat and refined sugar, low in dietary fibre, and inadequate fruit and vegetable intake ([Dipasquale et al, 2013](#_ENREF_12));
* **Smoking** – the single biggest preventable cause of premature death in people with SMI; smoking rates are 2-3 times higher than in the general population ([Brown et al, 2010](#_ENREF_5)).

**Table 1.** **Cardiovascular risk factors for people with SMI: estimated prevalence and relative risk compared to the general population**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RISK FACTORS | Schizophrenia | | Bipolar disorder | |
|  | Prevalence | Relative risk | Prevalence | Relative risk |
| Tobacco smoking1 | 50-80% | 2-3 | 54-68% | 2-3 |
| Physical inactivity2 | 70% | 2 | *No data* | |
| Obesity1 | 45-55% | 1.5-2 | 21-49% | 1-2 |
| Hypertension1 | 19-58% | 2-3 | 35-61% | 2-3 |
| Diabetes1 | 10-15% | 2-3 | 8-17% | 1.5-3 |
| Dyslipidaemia1 | 25-69% | ≤5 | 23-38% | ≤3 |

1 adapted from [De Hert et al (2011)](#_ENREF_9) 2 adapted from [Lindamer et al (2008)](#_ENREF_21)

**What about healthcare?**

Unfortunately, people with SMI don’t always receive the care they need for their physical health. This occurs for several reasons, including the lack of co-ordination and sharing of information between primary and mental healthcare providers; inadequate attention to physical health problems; limited understanding among healthcare professionals about the risk of diabetes and the challenges to managing diabetes alongside SMI; and barriers to accessing healthcare experienced by people with SMI due to their psychological, social and economic vulnerabilities ([Mitchell et al, 2009](#_ENREF_24); [McGinty et al, 2015](#_ENREF_22)).

People with SMI describe primary care as the cornerstone of their physical and mental health care, especially valuing continuity and holistic approaches ([Lester et al, 2005](#_ENREF_20)). However, annual GP consultation rates for people with SMI have plummeted from about 13 per year in the mid 90’s to around 3 per year more recently, only marginally higher than for the wider practice population. Additionally, practice nurses, who are key providers of health education and support for those with long-term conditions, are half as likely to see people with SMI as the wider practice population ([Reilly et al, 2012](#_ENREF_29)).

Despite incentivised annual physical health checks for people with SMI in primary care since 2004 as part of the Quality Outcomes Framework, only 29% of 5,091 patients audited by the National Audit of Schizophrenia (NAS) had cardiometabolic risk adequately assessed within the previous 12 months (weight, smoking status, glucose, lipids, and blood pressure); moreover, only 53% of those found to have abnormal blood glucose levels had record of appropriate intervention ([Crawford et al, 2014](#_ENREF_8)). The NAS found unacceptably wide variation in prescribing of antipsychotics as well, including polypharmacy (non-evidenced multiple antipsychotic use) and using doses exceeding British National Formulary recommendations ([Patel et al, 2014](#_ENREF_27)).

Inequalities in diabetes care may also contribute to poor outcomes in people with SMI and diabetes ([Chwastiak et al, 2015](#_ENREF_6)). However, the evidence is unclear; some studies show that, compared to those with diabetes alone, people with SMI are less likely to be prescribed effective medications and receive less monitoring and diabetes education. Other studies show no difference, and some suggest that people with SMI receive more diabetes care ([Mitchell et al, 2009](#_ENREF_24); [McGinty et al, 2015](#_ENREF_22)). No research has investigated these healthcare inequalities in the UK ([Ward and Druss, 2015](#_ENREF_33)).

**What can be done? ‘Don’t just Screen, Intervene’**

Consider the following scenario:

*Tim consults with you following your surgery’s invitation to attend for a check-up. He is 34, has experienced schizophrenia for ten years and receives a repeat prescription for an antipsychotic medicine. You check his blood pressure and enquire of his smoking and alcohol consumption, just as England’s QOF incentivizes. You can find no problems… job done. Or is it?*

Psychosis typically emerges in early adulthood, accelerating exposure to cardiometabolic risk below an age when primary care would normally consider active primary CVD prevention. Awareness of diabetes in people with SMI is also variable ([Foley et al, 2016](#_ENREF_14)), and symptoms of psychosis can mask early indicators of metabolic disturbance.

*“I first received my diagnosis of Type 2 diabetes from my GP after a routine check-up. I had not picked up on any symptoms myself. It was always difficult to tell whether my lethargy and feeling low was my mental health anyway.”*

Around 50% of cases of diabetes may go undetected in those with SMI ([Foley et al, 2016](#_ENREF_14)), compared to about 15% in the general population ([Diabetes UK, 2015](#_ENREF_11)). An Australian study screened 1153 adults with psychosis and found that 12% had T2DM and 19% were biochemically at high risk of diabetes; 54% of these participants were not previously aware of this, and awareness was lowest in the age group 25-34 years ([Foley et al, 2016](#_ENREF_14)). Failure to monitor this young ‘at risk’ population lies at the root of this health inequality.

The **Lester Resource** provides a practical framework for assessing and managing cardiometabolic risk in people with SMI. Developed in a process led by the late Professor Helen Lester, the resource has been endorsed by the National Institute for Health and Care Excellence (NICE), relevant Royal Colleges, Diabetes UK, NHS England, and Public Health England. The Lester’s mantra ‘Don’t just Screen, Intervene’ highlights that whilst identifying risk is essential, it is not sufficient of itself.

Let’s return to our scenario:

*You decide to use the Lester Resource. This means that in addition to checking Tim’s blood pressure and enquiring about his smoking and alcohol consumption, you check his BMI and test for cholesterol/HDL ratio and HbA1c. Tim’s risk of developing diabetes is now much clearer. Do you have all the information you need to intervene? And what’s next?*

For the purpose of this article let’s assume Tim’s BMI is 29 and his lipid results are normal. However, Tim’s HbA1c results place him in the ‘high risk’ category for diabetes. There are numerous interventions that may help Tim. But first and foremost you need to gain a holistic understanding of Tim, the personal challenges he may face in making lifestyle changes as well as the positive resources he might be able to access. A shared approach to decision making is essential; intervention adherence and treatment outcomes are both enhanced when patients are involved in decisions about their care ([Hamann and Heres, 2014](#_ENREF_17)).

* **Lifestyle interventions:** NICE guidelines recommend that people with SMI who are at risk of diabetes, are offered lifestyle interventions. Systematic reviews show that these interventions can alleviate antipsychotic-induced weight gain and metabolic disturbances compared to routine care ([McGinty et al, 2016](#_ENREF_23)). There is less understanding about the specific components and behaviour change techniques that lead to positive and sustainable lifestyle changes; identifying suitable interventions that are tailored for people with SMI may therefore be a particular challenge.
* **Smoking cessation:** A systematic review showed that smoking cessation interventions that work for the general population are equally effective for those with SMI ([Banham and Gilbody, 2010](#_ENREF_3)); a recent study also found that a bespoke intervention was acceptable to people with SMI and those who support them ([Knowles et al, 2016](#_ENREF_19)). Currently though, smoking cessation services are poorly suited to people with SMI despite the fact that many who smoke wish to give up ([Knowles et al, 2016](#_ENREF_19)). For example, stopping smoking can cause rapid increase in blood levels of medications such as antipsychotics and certain antidepressants, and may require accompanying dosage reductions ([Banham and Gilbody, 2010](#_ENREF_3)).
* **Antipsychotic medication:** Careful antipsychotic selection and dosage is vital given their potential impact on cardiometabolic risk. It is important that prescribers in both primary and mental health settings provide clear information to patients about the risk of weight gain and metabolic disturbance. Treatment should be reviewed as a priority if there is rapid (e.g. <3months) metabolic disturbance or weight gain (e.g. >5kg in <3months). Improving access to a dietician at an early stage may help patients to make lifestyle changes alongside taking their medication. Considering an alternative antipsychotic medication associated with an improved metabolic profile may lessen these impacts ([Mizuno et al, 2014](#_ENREF_25)), but any decision to change treatment should be carefully balanced against the risk of psychosis relapse and always involve the patient’s psychiatrist.
* **Metformin:** NICE already recommends use of metformin for the prevention of diabetes when other measures prove unsuccessful ([NICE, 2012](#_ENREF_26)); growing evidence suggests metformin may also lessen weight-gain and metabolic disturbance from antipsychotic medication ([Mizuno et al, 2014](#_ENREF_25)).
* **Monitoring risk:** Monitoring risk is important for diabetes management as well as prevention. An annual diabetes check may help early detection of diabetic complications. This should include assessing for diabetes distress, which is correlated with poor diabetes control and co-morbid depression ([Snoek et al, 2015](#_ENREF_30)). For many people with diabetes, the annual check may be the only time they visit their GP practice. People with comorbid SMI may need more tailored and regular monitoring than this. For example, psychotic episodes or a change in antipsychotic treatment may increase CVD risk and impede efforts to maintain a healthy lifestyle.
* **Supporting self-management:** Like those with diabetes alone, people with SMI and diabetes need support for self-managing their diabetes.

*“I knew nothing about diabetes before. All the information with balancing carbs, insulin, and going hypo was absolutely daunting … Then I realized it was down to me and for the rest of my life. Failure would mean all these nasty complications.”*

Improving access to diabetes self-management education is essential; however, generic interventions may need to be tailored. For example, addressing specific challenges such as poor locus of control, stigma and stress, as well as motivational deficits affecting self-management and limited social support ([Blixen et al, 2016](#_ENREF_4)).

* **Care coordination:** People with SMI and diabetes identifyfragmentation of care as a key barrier to self-management ([Blixen et al, 2016](#_ENREF_4)). Poor continuity of care and limited sharing of information between different services are also identified as important barriers. A collaborative approach to case management between primary and mental health services is needed; collaborative care models consistently show improvements in health outcomes for people with depression and comorbid physical illness ([Coventry et al, 2014](#_ENREF_7)).

**Conclusions**

People with SMI currently receive inferior care for diabetes, partly due to inequalities in healthcare provision but also because their exposure to risk and the challenges they face in accessing appropriate care mean that a more tailored and intensive approach is required. Primary care is ideally placed to tackle this health inequality. Nurse practitioners have the necessary skills and knowledge to proactively manage cardiometabolic risks, and moreover are well placed to coordinate management of detected abnormality within the low-stigma setting of primary care.

Let’s return a final time to our scenario:

*Having established that Tim is at high risk for diabetes, you refer him to a lifestyle intervention, which includes regular physical activity and nutritional counseling. You also arrange for Tim to see his GP to review his antipsychotic medication. Tim has a care coordinator as part of the care he receives from specialist mental health services. You share information about Tim’s risk for diabetes so that they can also help to support Tim as he makes lifestyle changes.*

Increasing awareness about the particular risks that people with SMI face and the proactive approach that is needed to sufficiently screen and intervene for diabetes may help to ensure that individuals are better supported. The Lester resource provides a useful tool to facilitate this. However, only recently has policy and research prioritized this health inequality, and tailored diabetes interventions for this population are still lacking. We hope that the current focus on improving diabetes prevention and management for people with SMI will increase the opportunities to intervene as well as to screen.

**Useful Resources**

**The Lester Resource – Positive cardiometabolic health resource: an intervention framework for patients with psychosis on antipsychotic medication.** 2014 update, Shiers D, Rafi I, Cooper SJ, Holt RI (2014), available at <http://www.rcpsych.ac.uk/pdf/e-version%20NICE%20Endorsed%20Lester%20UK%20adaptation2%20.pdf>

**Diabetes UK Factsheet 13 – Protecting the cardiometabolic health of people with severe mental illness.** Shiers DE, Holt RIG (2012), available at <http://www.rcpsych.ac.uk/pdf/Diabetes%20UK%20factfile%20on%20severe%20mental%20illness.pdf>

**NICE clinical guideline 178 – Psychosis and schizophrenia in adults: treatment and management.** NICE (2014), available at <https://www.nice.org.uk/guidance/cg178/>

**Primary Care Guidance on Smoking and Mental Disorders (2014 update).** Campion J, Shiers D, Britton J, Gilbody S, Bradshaw T (2014), available at <http://www.rcgp.org.uk/clinical-and-research/toolkits/~/media/E7087878A24547E795903F432738AD35.ashx>

**References**

Alberti K G, Zimmet P, Shaw J (2006) Metabolic syndrome – a new world-wide definition. A Consensus Statement from the International Diabetes Federation. *Diabet Med,* **23:** 469-80

Alvarez-Jimenez M, Gonzalez-Blanch C, Crespo-Facorro B et al (2008) Antipsychotic-induced weight gain in chronic and first-episode psychotic disorders: a systematic critical reappraisal. *CNS Drugs,* **22:** 547-62

Banham L, Gilbody S (2010) Smoking cessation in severe mental illness: what works? *Addiction,* **105:** 1176-89

Blixen C E, Kanuch S, Perzynski A T et al (2016) Barriers to Self-management of Serious Mental Illness and Diabetes. *Am J Health Behav,* **40:** 194-204

Brown S, Kim M, Mitchell C, Inskip H (2010) Twenty-five year mortality of a community cohort with schizophrenia. *Br J Psychiatry,* **196:** 116-21

Chwastiak L A, Freudenreich O, Tek C et al (2015) Clinical management of comorbid diabetes and psychotic disorders. *Lancet Psychiatry,* **2:** 465-76

Coventry P A, Hudson J L, Kontopantelis E et al (2014) Characteristics of effective collaborative care for treatment of depression: a systematic review and meta-regression of 74 randomised controlled trials. *PLoS One,* **9:** e108114

Crawford M J, Jayakumar S, Lemmey S J et al (2014) Assessment and treatment of physical health problems among people with schizophrenia: national cross-sectional study. *Br J Psychiatry,* **205:** 473-7

De Hert M, Correll C U, Bobes J et al (2011) Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World Psychiatry,* **10:** 52-77

De Hert M, Van Winkel R, Van Eyck D et al (2006) Prevalence of diabetes, metabolic syndrome and metabolic abnormalities in schizophrenia over the course of the illness: a cross-sectional study. *Clinical Practice and Epidemiology in Mental Health,* **2:** 1-10

Diabetes Uk (2015) *Diabetes: Facts and Stats. Version 4.* Available at: https://[www.diabetes.org.uk/About\_us/What-we-say/Statistics/](http://www.diabetes.org.uk/About_us/What-we-say/Statistics/) (accessed 30/08/16)

Dipasquale S, Pariante C M, Dazzan P et al (2013) The dietary pattern of patients with schizophrenia: a systematic review. *J Psychiatr Res,* **47:** 197-207

Fleischhacker W W, Siu C O, Boden R et al (2013) Metabolic risk factors in first-episode schizophrenia: baseline prevalence and course analysed from the European First-Episode Schizophrenia Trial. *Int J Neuropsychopharmacol,* **16:** 987-95

Foley D L, Mackinnon A, Morgan V A et al (2016) Awareness of Pre-diabetes or Diabetes and Associated Factors in People With Psychosis. *Schizophr Bull,* **42:** 1280-9

Foley D L, Morley K I (2011) Systematic review of early cardiometabolic outcomes of the first treated episode of psychosis. *Arch Gen Psychiatry,* **68:** 609-16

Galling B, Roldan A, Nielsen R E et al (2016) Type 2 Diabetes Mellitus in Youth Exposed to Antipsychotics: A Systematic Review and Meta-analysis. *JAMA Psychiatry,* **73:** 247-59

Hamann J, Heres S (2014) Adapting shared decision making for individuals with severe mental illness. *Psychiatr Serv,* **65:** 1483-6

Holt R I, Mitchell A J (2015) Diabetes mellitus and severe mental illness: mechanisms and clinical implications. *Nat Rev Endocrinol,* **11:** 79-89

Knowles S, Planner C, Bradshaw T et al (2016) Making the journey with me: a qualitative study of experiences of a bespoke mental health smoking cessation intervention for service users with serious mental illness. *BMC Psychiatry,* **16:** 193

Lester H, Tritter J Q, Sorohan H (2005) Patients' and health professionals' views on primary care for people with serious mental illness: focus group study. *Bmj,* **330:** 1122

Lindamer L A, Mckibbin C, Norman G J et al (2008) Assessment of physical activity in middle-aged and older adults with schizophrenia. *Schizophr Res,* **104:** 294-301

Mcginty E E, Baller J, Azrin S T et al (2015) Quality of medical care for persons with serious mental illness: A comprehensive review. *Schizophr Res,* **165:** 227-35

Mcginty E E, Baller J, Azrin S T et al (2016) Interventions to Address Medical Conditions and Health-Risk Behaviors Among Persons With Serious Mental Illness: A Comprehensive Review. *Schizophr Bull,* **42:** 96-124

Mitchell A J, Malone D, Doebbeling C C (2009) Quality of medical care for people with and without comorbid mental illness and substance misuse: systematic review of comparative studies. *Br J Psychiatry,* **194:** 491-9

Mizuno Y, Suzuki T, Nakagawa A et al (2014) Pharmacological strategies to counteract antipsychotic-induced weight gain and metabolic adverse effects in schizophrenia: a systematic review and meta-analysis. *Schizophr Bull,* **40:** 1385-403

Nice (2012) *Preventing type 2 diabetes: risk identification and interventions for individuals at high risk: NICE clinical guidelines PH38*. Available at: https://[www.nice.org.uk/guidance/ph38](http://www.nice.org.uk/guidance/ph38) (accessed 30/08/16)

Patel M X, Bishara D, Jayakumar S et al (2014) Quality of prescribing for schizophrenia: evidence from a national audit in England and Wales. *Eur Neuropsychopharmacol,* **24:** 499-509

Reilly S, Olier I, Planner C et al (2015) Inequalities in physical comorbidity: a longitudinal comparative cohort study of people with severe mental illness in the UK. *BMJ Open,* **5:** e009010

Reilly S, Planner C, Hann M et al (2012) The role of primary care in service provision for people with severe mental illness in the United Kingdom. *PLoS One,* **7:** e36468

Snoek F J, Bremmer M A, Hermanns N (2015) Constructs of depression and distress in diabetes: time for an appraisal. *Lancet Diabetes Endocrinol,* **3:** 450-60

Stubbs B, Williams J, Gaughran F, Craig T (2016) How sedentary are people with psychosis? A systematic review and meta-analysis. *Schizophr Res,* **171:** 103-9

Vinogradova Y, Coupland C, Hippisley-Cox J et al (2010) Effects of severe mental illness on survival of people with diabetes. *Br J Psychiatry,* **197:** 272-7

Ward M, Druss B (2015) The epidemiology of diabetes in psychotic disorders. *Lancet Psychiatry,* **2:** 431-51