

The Lancet Psychiatry Commission:

A Blueprint for Protecting Physical Health in People with Mental Illness

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Executive Summary

The poor physical health of people with mental illness is a multi-faceted, transdiagnostic, and global problem. Physical health disparities are observed across the entire spectrum of mental illnesses, in low, middle- and high-income countries. This stems from both a heightened risk of physical diseases in people with mental illness, along with their reduced access to adequate healthcare. The high rates of physical comorbidities (and typically-poor clinical management of this) drastically reduces life expectancy, and also increases the personal, social and economic burden of illness across the lifespan.

This *Commission* has brought together an international team of researchers, clinicians, and key stakeholders from various backgrounds and professionally / personally-relevant experience, in order to summarize advances in understanding on this topic, and present clear directions for health promotion, clinical care and future research. The breadth and multifactorial nature of physical health disparities across the range of mental health diagnoses poses an almost limitless number of potential considerations. Therefore, rather than attempting to cover all of the different possible combinations of physical-mental comorbidities individually, the aim of this Commission was to: (i) establish highly-pertinent aspects of physical health-related morbidity and mortality which apply transdiagnostically, (ii) highlight the common modifiable factors driving these disparities, (iii) present actions and initiatives for health policy and clinical services to address these issues, and (iv) identify promising areas for future research towards discovering novel solutions. This was addressed across 5 different Parts of the Commission: Parts 1 and 2 determined the scope, priorities and key targets for physical health improvement across multiple mental illnesses. Parts 3, 4 and 5 discussed emerging strategies and produced recommendations for improving physical health outcomes in people with mental illness. Leaders and contributors for each Part are shown in the [Appendix \(pg.1\)](#) .

[Part 1: 'Its more than premature mortality'](#)

[Part 1](#) identified almost 100 systematic reviews/meta-analyses examining the prevalence of physical comorbidities in mental illness. Around 70% of the meta-research focused on cardiometabolic diseases; consistently reporting that mental illnesses were associated with 1.4- to 2-fold increased risk for obesity, diabetes and cardiovascular diseases compared to the general population. Although mostly studied in 'severe mental illness' ('SMI', and particularly psychotic disorders), the prevalence of cardiometabolic diseases was similarly elevated across a broad range of other diagnoses, including substance use disorders (SUDs), and 'common mental disorders' ('CMDs', such as depression and anxiety).

[Part 2: Key modifiable factors in health behaviours and health services](#)

[Part 2](#) built on the findings of [Part 1](#) with a hierarchal evidence synthesis of modifiable risk factors for physical diseases in mental illness. The bulk of top-tier evidence identified that smoking, excessive alcohol consumption, sleep disturbance, physical inactivity and dietary risks were elevated across a broad range of diagnoses, across various economic settings, and from illness onset. Additionally, [Parts 1 and 2](#) identified a scarcity of meta-research on prevalence or risk factors for (i) infectious diseases, and (ii) physical multimorbidity, in mental illness; along with highlighting how further attention in these areas is particularly crucial for tackling the physical-mental comorbidities observed in LMIC settings.

[Part 3: The interplay between psychiatric medications and physical health](#)

[Part 3](#) examined the interaction between psychotropic medications and physical health, across a range of conditions. Antipsychotics remain the best evidence-based treatments for psychotic disorders, and reduce mortality rates compared to no treatment, but have adverse impact on multiple aspects of physical health. Although antidepressants have less immediate impact on cardiometabolic health than

antipsychotics ‘per individual’, antidepressants are prescribed at much higher rates, which is increasing overtime. Thus, further research is required to establish on the population burden from cardiometabolic side-effects of antidepressants, particularly from long-term usage. [Part 3](#) also discusses emerging pharmacological strategies for attenuating and managing risk, and provides recommendations for upskilling staff in prescribing practices.

[Part 4: Multi-Disciplinary approaches to Multi-Morbidity](#)

[Part 4](#) discusses on ‘multidisciplinary lifestyle interventions’ in mental healthcare. The ‘Diabetes Prevention Program’ (DPP) is an example of a gold-standard lifestyle intervention, with broadly demonstrated success in the general population. However, people with mental illness rarely have access to DPP-based programs through either primary or secondary care services. On the basis of ‘lessons learnt’ from large-scale clinical trials, our Commission puts forth that future lifestyle interventions in mental healthcare must take into account the core principles of the DPP, by partnering with appropriately-trained physical health professionals, and providing sufficient access to supervised exercise services. Within this, it must be remembered that “Prevention” sit at the centre of the DPP. Similarly, lifestyle interventions for people with mental illness should be available pre-emptively, in order to protect metabolic health from first illness presentation. Priorities for future initiatives and research include (i) translating DPP-based interventions for people with mental illness - across primary care, secondary services and LMIC settings, and (ii) using implementation science and cost-effectiveness evaluations to develop a business-case for integrating DPP-based interventions as standard in mental healthcare.

[Part 5: Innovations in integration of physical-mental healthcare](#)

[Part 5](#) focuses on the availability, content and context of physical healthcare for people with mental illness. Hart’s “Inverse Care Law” puts forth that the quality of health and social care varies inversely with the need of the population served. This applies clearly to physical healthcare for people with mental illness, who are at higher risk at baseline ([Parts 1 and 2](#)), receive physically-compromising treatment ([Part 3](#)), and then suffer reduced access to adequate lifestyle and medical interventions ([Parts 2, 3 and 4](#)). Nonetheless, [Part 5](#) summarises and signposts to valuable new resources and guidelines from national and international health bodies aimed at addressing these inequalities, across public health and clinical levels.

Regarding prevention, there is an urgent need for national health strategies to now provide further consideration to those with mental illness, who are often ‘left behind’ from population-gains in public health. Regarding health services, the development of integrated care models for efficient management physical-mental multimorbidity are a critical step forwards; particularly for in LMICs settings, where health inequalities for people with mental illness are greatest. In relation to this, applying ‘syndemic’ approaches for conceptualising the interaction between physical-mental health comorbidities may improve the implementation of customised health interventions for a given location/social setting. Continuing advances in digital health technologies may also present new opportunities for addressing health inequalities on a global scale, although realising this potential will depend upon further rigorous research.

The Commission concludes with a discussion on **Accountabilities and Responsibilities** around the role of governments, health commissioners, health providers and research funding bodies in *turning ideas into action*; for implementing the recommendations of this Commission ([Figure 1](#)) and addressing the disparities in physical health faced by people with mental illness.

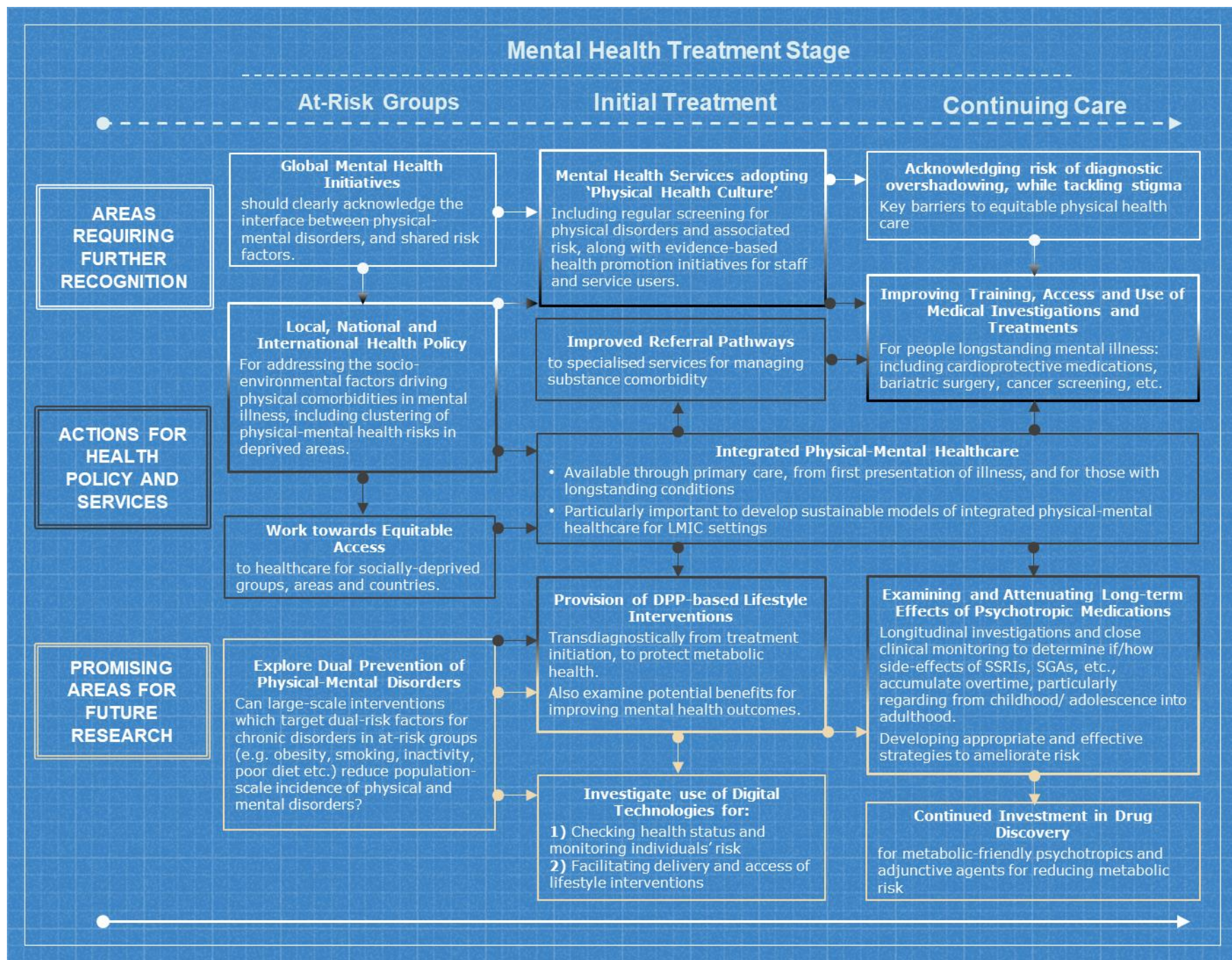


Figure 1. A blueprint for protecting physical health in people with mental illness.

Notes: Box placement on X-axis represents 'start point'; i.e. applicable from that point in mental health stage, and onwards. Box placement (and line colouring) on Y-axis represents overlap with with 'areas' for greater recognition, clinical actions, and future research.

Part 1: “It’s more than premature mortality”

Introduction

The premature mortality of people with mental illness has been recognised by the medical community for over half a century.^{1,2} Whilst this was initially demonstrated in severe mental illnesses (SMI) such as schizophrenia and bipolar disorder, there is now evidence showing that individuals across the entire spectrum of mental disorders have substantially reduced life expectancy compared with the general population.³⁻¹¹ Although suicide contributes to a devastating proportion of these premature deaths (with ~17% of mortality in people with mental illness attributed to unnatural causes)^{12,13}, the leading causes of years of life lost in people with mental illness are due to ‘poor physical health’, specifically with regards to non-communicable and infectious diseases which exist as a comorbidity to the psychiatric symptoms which characterise mental illness.¹¹⁴⁻¹⁹ The consequent poor physical health outcomes of people with mental illness have been alluded to as a human rights issue,²⁰ and research on this topic has increased dramatically over the last two decades ([see appendix pg.2](#)).

Despite the increasing research in this area and the general advancements in healthcare and medicine, the poor physical health (and associated gap in life expectancy) experienced by people with mental illness has not improved.^{12,21,22} In fact, increasing research indicates that the years of life lost due to physical health conditions in people with mental illness is actually increasing over time.²¹⁻²⁴ Furthermore, the premature mortality itself is only the end-point of a myriad of health inequalities which can affect people with mental disorders across the life course. However, whilst the psychiatric literature is unified in its consensus on the life shortening impact of physical comorbidities, the prevalence and impact of the range of physical comorbidities that can potentially affect individuals across the spectrum of mental disorders (beyond just SMI) is less widely examined.

Physical-Mental Comorbidities: A Meta-Review of the Literature

To produce an overview of the literature in this field, we systematically identified all recent systematic reviews and meta-analyses examining chronic physical health conditions in people with common mental disorders (CMDs), SMI, alcohol and substance use disorders (SUDs) and various other mental health conditions. In particular, we sought to identify the top-tier evidence regarding the prevalence of chronic conditions in comparison to the ‘general population’ (generally defined as samples without mental illness). The details of the evidence gathering process are displayed in [pg. 2-5 of the appendix](#). We then considered this body of meta-research, alongside the seminal original studies and key recent reports from healthcare and governmental bodies, in determining the scopes and priorities for the Commission overall.

As detailed in [Table 1](#), there have been almost 100 systematic reviews and meta-analyses since the turn of the century examining the physical health comorbidities associated with mental illness. The findings from all the most recent systematic reviews/meta-analyses on the prevalence or risk of physical illness for each category of mental illness are shown in [appendix \(pages 6-14\)](#). In common with other reviews,²⁵ we found a shortage of evidence from low and middle-income countries. To date, the majority of meta-research on physical health in mental disorders has focused on cardiovascular or metabolic diseases in high-income countries. Overall, the available evidence here showed that individuals across the entire spectrum of disorders generally have a 1.4 – to 2-fold increased risk for cardiometabolic diseases, compared to individuals without mental illness ([see appendix, pages 6-14](#)). For instance, in depression,

Table 1. Map of existing systematic reviews / meta-analyses examining physical comorbidities across different mental disorders.

	Common mental disorders (48 reviews)			Severe Mental Illnesses (30 reviews)			Alcohol & Substance Use disorders (7 reviews)		Other (8 reviews)				Mixed mental illness (7)	Total reviews
	Depression	Anxiety	Mixed CMD	Schizophrenia	Bipolar Disorder	Mixed SMI	Alcohol disorders	Substance use disorders	ADHD	Autism spectrum disorder	Eating disorders	Personality disorders		
Number of studies	33	12	3	15	8	7	5	1	4	1	2	1	7	99
Non-communicable diseases														
Asthma	2 369,370				1 371					1 372	1 373			5
Autoimmune disorders						1 374								1
Cardiovascular disease	16 375-390	6 29,391-395	2 396,397	2 398,399	1 400	3 14,401,402								30
Cancer	4 36,403-405			5 37,406-409									1 410	10
Diabetes	7 411-417	1 26		2 418,419	2 420,421	1 402	1 30				1 34		2 68,422	17
Metabolic syndrome	2 69,423	3 28,424,425	1 426	3 419,427,428	2 183,429,430	1 402	1 31						1 431	14
Obesity		2 27,432			1 433				3 32,434,435				1 33	2 436,437
Osteoporosis/ bone loss	1 438			1 439							1 35			3
Parkinson's disease	1 40													1
Rheumatoid arthritis				1 440		1 374								2
Infectious diseases														
Hepatitis B						3 42,43,441								3
Hepatitis C						3 42,43,441	1 442,443	1 444-446						5
HIV						3 42,43,441	1 442,443						1 447	5
Syphilis						1 43								1
Tuberculosis							1 448							1
Mixed physical disorders and comorbidities														
Mixed illness/ comorbidities				2 449,450	1 430	1 402								4

Red indicates number of systematic reviews / meta-analyses, black provides reference numbers

* includes studies which examined several different conditions (hence numbers in columns do not add up)

the risk of developing cardiac diseases, hypertension, stroke, diabetes, metabolic syndrome, and obesity are around 40% higher than the general population. Similarly, 18 recent reviews of cardiovascular and metabolic health in SMI showed clear evidence of a 1.4- to 2-fold risk increased risk across all cardiovascular and metabolic diseases examined. Although there is less quantity of evidence for other disorders, the existing reviews in anxiety disorders,²⁶⁻²⁹ SUDs,^{30,31} ADHD,³² and personality disorders,³³ consistently find evidence of poor cardiometabolic health; with significantly higher rates of obesity, diabetes and metabolic syndrome than the general population ([appendix pg. 6-14](#)). In fact, the only inverse relationship between cardiometabolic health and mental disorders is the reduced incidence of diabetes in anorexia nervosa (OR=0.71).³⁴ Due to the physically-damaging behaviours inherent to the condition itself, individuals with this condition face severely elevated risks from other health issues, such as a twelve-fold increase in incidence of osteoporosis,³⁵ and among the highest rates of premature mortality across all mental disorders.¹² Furthermore, other eating disorders, such as bulimia are associated with drastically elevated odds for as diabetes (OR=3.45)³⁴, which is even higher than other psychiatric conditions.

The relationships between mental disorders and cancer risk is more equivocal. While some reviews have found that mental illnesses are associated with a small increase in risk of cancer overall,³⁶ others have found no relationships or even decreased cancer risk.^{37,38} This may stem from variance in risk with regards to cancer type. For increased, while there is increased risk of lung cancer in both CMDs and SMI, colorectal cancer risk appears to be similar (or even lower) than the general population.^{36,37} This could be partly due to other causes of death occurring at younger ages reducing the lifetime rates of cancer in people with mental illnesses, although further research is required to fully understand these relationships. Another area requiring further large-scale investigation is the relationship between psychiatric and neurological disorders, as the categorical separation between these two overlapping types of illness may result in underestimations of the true burden of mental illness on a global level.³⁹ Although a recent meta-analysis has shown that people with depression face a doubled risk of developing Parkinson's disease,⁴⁰ the relationships between other psychiatric and neurological disorders has yet to be established.

Remaining Gaps in the Meta-Research

Of note, there was an absence of meta-analyses on Chronic Obstructive Pulmonary Disease (COPD) in people with mental disorders, although individual health database studies have convincingly demonstrated that the increased prevalence of COPD is a important risk factor for the premature mortality observed in people with mental illness.^{19,41} Perhaps also underestimated is the deleterious impact of infectious diseases on physical health in people with mental disorders, as this is largely unexplored in mental health conditions other than SMI ([Table 2](#)). The reviews we identified on infectious diseases in SMI populations found that the average incidence (across multiple countries) for hepatitis B, C and HIV was 15.63%, 7.21% and 7.59% respectively,⁴² and 1.1% to 7.6% for syphilis.⁴³ Although these global estimates are useful, other recent studies examining the prevalence of infectious diseases in SMI samples within a specific setting/country provide further insights into how individuals with mental illness experience a disproportionate risk. For instance, in the United States, the prevalence rates of hepatitis B and hepatitis C in patients with SMI is around 20% (for both), whereas the relative prevalence of these conditions in the general U.S. population is 0.3% and >2% respectively ^{44,45}. Similarly, the median prevalence of HIV among people with SMI in the U.S. is 1.8%; almost 4 times greater than the general U.S. population ⁴⁴. In LMIC settings, infectious diseases are a major cause of mortality in

Table 2. The prevalence of various behavioural risk factors across different mental health diagnoses.

	Alcohol	Tobacco use	Physical Activity	Sedentary Behaviour	Poor Diet	Poor Sleep
Major Depression	Around 30% have/had alcohol use disorder. ⁴⁵¹	More likely to smoke, be nicotine dependent, less likely to quit, and more likely to relapse ⁴⁵²	Around 60-70% do not meet physical activity guidelines. ^{60,453}	Sedentary for 8.5 hrs per day. ⁴⁵³	Significantly higher food intake and poorer diet quality than general population. ⁸³	Significant poorer continuity of sleep and reduced sleep depth compared to healthy controls. ⁴⁵⁴
Anxiety Disorders	17.9% have alcohol dependence/abuse. ⁴⁵⁵	Heightened risk of regular smoking (+41%) and nicotine dependence (+58%). ⁴⁵⁶	Individuals with panic disorders, social phobia and agoraphobia report significantly less activity. ⁴⁵⁷	Inconsistent evidence for increased sedentary time in people with anxiety. ⁴⁵⁸	Insufficient evidence on diet in anxiety disorders.	Anxiety disorders, ^{454,459} and OCD ⁴⁶⁰ are associated with reduced sleep quality
Bipolar Disorder	1 in 3 have/had alcohol use disorder. ⁴⁶¹	Elevated rates of current smoking; higher than MDD but lower than schizophrenia. ⁸⁶	Majority meet PA guidelines and no different to general population. ^{30,60}	Sedentary over 10 hours per day. ^{30,60}	Consume ~200 calories more than general population per day. ⁸⁷	Even between episodes, people with bipolar disorder have elevated sleep-wake disturbance, similar to insomnia patients. ⁴⁶²
Schizophrenia	1 in 5 have/had alcohol use disorder. ⁴⁶³	Significantly higher rates of current smoking, heavy smoking and nicotine dependence. ⁸⁴	Majority do not meet physical activity guidelines. ^{35,60}	Sedentary for ~11 hrs per day. ⁴⁶⁴	Consume ~400 calories more than general population per day. ⁸⁷	Significantly reduced sleep time & quality of sleep. ^{454,459}
First-Episode Psychosis	27% have/had alcohol abuse/dependence. ⁴⁶⁵	58% are tobacco users, significantly higher than matched controls ⁴⁶⁶	Less active than long-term schizophrenia. ³⁵	Insufficient evidence on sedentary behaviour in early psychosis.	Insufficient evidence on diet in early psychosis.	Significantly reduced sleep time & quality of sleep. ⁴⁵⁹
Post-Traumatic Stress Disorder	Elevated rates of comorbid alcohol misuse compared to general population (10-61%). ⁴⁶⁷	22% more likely to be current smokers than general population. ⁴⁶⁸	9% less likely to be physically active than general population. ⁴⁶⁸	Insufficient evidence on sedentary behaviour in PTSD.	5% less likely to have a healthy diet than general populations. ⁴⁶⁸	Significant poorer continuity of sleep and reduced sleep depth compared to healthy controls ⁴⁵⁴

Red = Multi-national meta-analysis

Purple = Systematic review of case-controlled, clinical and/or epidemiological research

Blue = Large-scale epidemiological studies

Note: 'Significantly' refers to p<0.05 compared to general population.

people with SMI. For example, in a 10-year follow-up study in Ethiopia, individuals with SMI died 30 years prematurely compared to the general population, with half of all these deaths due to infectious diseases⁴⁶. Overall however, the prevalence and outcomes of infectious diseases among people with mental illness in LMIC settings is currently underrepresented in the literature, and further scientific and governmental attention should be turned towards this; particularly given that this is where rates of infection are highest, and inequalities for people with mental illness are most pronounced.⁴⁷ Furthermore, despite the compelling evidence for increased risk of infectious diseases in adults with SMI, the prevalence of infectious diseases in other mental disorders, and the extent to which this applies to young people with mental illness, is not widely established. Future research should investigate this matter, while also determining the underlying factors which account for the increased incidence of infectious diseases among people with mental illnesses, in order to develop more appropriate and targeted solutions for tackling this (as discussed in [Part 2](#)).

It should also be noted that much of the literature assessing physical health in mental illness to date has examined the incidence of specific health outcomes or conditions in isolation. Currently, there is a gap in understanding around the prevalence and impact of physical multimorbidity (i.e. the presence of more than 1 chronic physical condition) in people with mental illness. Nonetheless, some recent large scale multi-national studies have demonstrated that people with SMI^{41,48}, CMDs^{49,50} and SUDs^{18,51} are at greatly increased risk of physical multimorbidity, right from illness onset.⁵² Multimorbidity occurs from a relatively young age in people with mental illness^{41,52}, and greatly increases personal and economic burden associated with chronic conditions, while also reducing life expectancy.^{53,54} Therefore, urgent attention is required to address the onset and accumulation of physical multimorbidity, particularly in low-and-middle-income (LMIC) settings, where physical multimorbidity is elevated among people with mental illness,^{48,67, 68} and yet services are inadequately resourced to deal with the increased burden and complexity of these cases. Additionally, there is an urgent need for future research to test and develop cost-effective approaches for addressing the root causes of multimorbidity, in order to prevent long-term disability from arising in at-risk groups.

Further Considerations on Physical-Mental Comorbidities

Although the impact of physical comorbidities on life expectancy in mental illnesses is well established,^{13,14} there is a need for further research to examine if the psychological distress associated with mental illness itself is in anyway compounded by the additional burden of these chronic conditions. For instance, in the general population, diabetes is commonly associated with distress, which can have a profound impact on the person's quality of life and ability to manage their overall health.⁵⁵ Nascent evidence increasingly shows that diabetes-related distress also affects people with CMDs,⁵⁵ SMI⁵⁶ and substance use disorders⁵⁷. Relatedly, the incidence of obesity is significantly elevated across most classes of mental disorders ([appendix pg.6-14](#)), even when compared to the alarmingly high rates of obesity in the general population. Weight gain is often distressing and negatively impacts an individual's QOL, self-esteem, and may impede treatment seeking behaviour in fear of further weight gain⁵⁸. Obesity also perpetuates concomitant changes in lifestyle behaviours, through disposing individuals towards social withdrawal⁵⁹ and sedentary behaviour⁶⁰, which are themselves associated with the hallmarks of many mental disorders, and also key risk factors for worsening cardiometabolic health⁶¹. Furthermore, there is emerging evidence that obesity and metabolic syndrome is an independent predictor of relapse and re-

hospitalisation for those with SMI.^{62,63} The reasons for this are unclear, but one biological pathway which could explain this relationship is the inflammatory effects of abdominal obesity; as heightened inflammation has also been associated with worsened mental health⁶⁴ and even increased suicidality⁶⁵. Beyond the personal burden, further research is also needed to establish the financial implications of physical comorbidities in people with mental illness, as discussed in [Panel 1](#).

In conclusion, to fully tackle physical health inequalities in people with mental illness, we must focus not only on ‘adding years to life’, but also on ‘adding life to years’ – specifically by preventing and reducing the incidence and impact of chronic health conditions across the life course. In particular, the evidence to date presents cardiometabolic diseases as a highly relevant and transdiagnostic target for improving physical health outcomes across a broad spectrum of mental illnesses. Although schizophrenia is typically associated with the greatest degree of cardiovascular risk (partly due to the side-effects of antipsychotic medications), there is now compelling evidence that obesity, metabolic syndrome, diabetes and cardiometabolic disease are similarly elevated in other mental disorders, including CMDs.^{26-29,66-73} Given the higher prevalence of these mental disorders across the population, developing transdiagnostically-applicable strategies for improving cardiometabolic health outcomes in these populations (along with SMIs) could considerably reduce the premature mortality and lifelong burden of poor physical health which affects people with mental illness across the globe. Within this, the impact and prevalence of other NCDs and infectious diseases, in both high income and LMIC setting, cannot be neglected. Indeed, understanding the epidemiology of mental-physical comorbidity in LMICs,⁷⁴ and developing evidence-based interventions integrating mental and physical healthcare in these settings,⁷⁵ is increasingly recognised a major research priority for global health. The following parts of the Commission aim to identify the key modifiable factors driving mental and physical health comorbidities, discuss strategies for improving the management and prevention of these conditions, and present directions for both immediate clinical action and future research aiming to reduce the physical health inequalities experienced by people with mental illness (as displayed in [Figure 1](#)).

Panel 1. What is the cost of physical comorbidities in people with mental illness?

- 'Cost of Illness' (COI) studies estimate the costs attributable to a diagnosis or group of diagnoses. Such studies have convincingly demonstrated that medical and psychiatric comorbidity is associated with higher hospital costs and increased readmission rates.⁷⁶⁻⁷⁸
- Although this highlights additional costs of comorbidities, these studies are limited in scope since they only account for the cost of one health care resource (hospitalisation).
- To capture the full economic burden of physical comorbidities in mental illnesses, analyses should include the direct costs of medical care (hospitalisation, medication, outpatient consultations etc. including both government and private costs), along with costs related to accessing medical care (i.e. transportation) and indirect costs associated with lost productivity for both patients and carers. For instance, data from the United States found that the majority of total costs from people treated for depression in was attributable to comorbid conditions (both mental health and non-mental health related).⁷⁹
- However, few studies to date have been able to report specifically on the contribution of comorbid physical conditions to total costs - although there is economic data showing that a large proportion of total costs from people with bipolar disorders are attributed non-mental health treatment,⁸⁰ along with double the annual medical treatment costs for metabolic conditions.⁸¹
- Given the complex picture of mental health and physical comorbidities, future COI studies will require robust methods and integrated data sources (administrative, survey and/or registry data) to provide comprehensive estimates of the cost attributable to physical comorbidities in mental illness.
- Finally, while COI are important from a burden viewpoint, other types of economic evaluation are required to determine the cost-effectiveness of investing in specific physical health interventions/services for people with mental illness.

Part 2: Key Modifiable Factors in Health Behaviours and Health Services

Introduction

[Part 1](#) identified cardiometabolic diseases as a category of physical comorbidities that are particularly pervasive and impactful on well-being, morbidity and mortality, across many mental disorders.^{26-29,55-57,66-73,82} Along with side-effects of psychotropic medications (covered in [Part 3](#)), reasons for the increased cardiometabolic morbidity and mortality in people with mental illness can be divided into patient-related and provider/system-level factors.²⁵ Clear modifiable patient-related factors known to heavily influence cardiometabolic diseases are ‘lifestyle risk factors’ such as smoking, poor diet, and inactivity^{35,83-85}; adverse health behaviours which also influence many other aspects of physical health.^{26-29,66-73}

However, the extent to which lifestyle-related risk factors across various mental disorders differs from the general population across is not fully established. This may result in an imprecision in current lifestyle interventions for people with mental illness, or even an over-focus on one specific behavioral modification at the expense of neglecting other important risk factors (e.g. increasing exercise at expense of diet, or focusing on smoking over alcohol intake, etc.).

Therefore, we applied a systematic hierarchical approach ([described in appendix, pg. 15-16](#)) in order to identifying the latest top-tier evidence on lifestyle-related risk factors for non-communicable diseases (NCDs) in people with mental illness. In doing this, we focused on behaviour risk factors in affective and psychotic conditions, rather than mental health conditions which are characterized by physically-damaging behaviours, such as eating disorders and substance/alcohol abuse (as in these cases, the greatest behavioural risks to physical health are clearly just those behaviours which define the conditions themselves). The findings from recent meta-analyses, systematic reviews and population-scale studies on lifestyle risk factors in various mental health populations are summarized in [Table 2](#).

Overview of the Evidence: Lifestyle risk factors across various diagnoses

The initial aim of our hierarchal evidence synthesis was to determine the key behavioural/lifestyle risk factors associated with individual mental disorders. However, the bulk of the literature shows that all psychiatric diagnoses are associated with an entire spectrum of lifestyle risk factors (see [Table 2](#)). However, although mental disorders were associated with unhealthy lifestyles compared to the general population, comparisons between disorders indicate that an even higher risk in people with schizophrenia of smoking, sedentary behaviour and diet.^{83,85-87} This may be partially mediated by socio-economic factors, as the incidence of schizophrenia is higher in socially deprived communities,⁸⁸ that also have higher rates of behavioural risk factors.⁸⁹ However, behavioural risk factors are still greater in schizophrenia than other disorders even when controlling for socio-economic factors. For instance, a recent population-scale study of the U.K. Biobank⁸³ found that individuals with severe mental illness ate more obesogenic food than the general population, particularly those with schizophrenia (see [Figure 2](#)). Importantly, these differences persisted after adjusting for social deprivation and education.⁸³ One contributor may be the use of second generation antipsychotics (SGAs) (see [Part 3](#)), as even trials in healthy volunteers show that SGAs

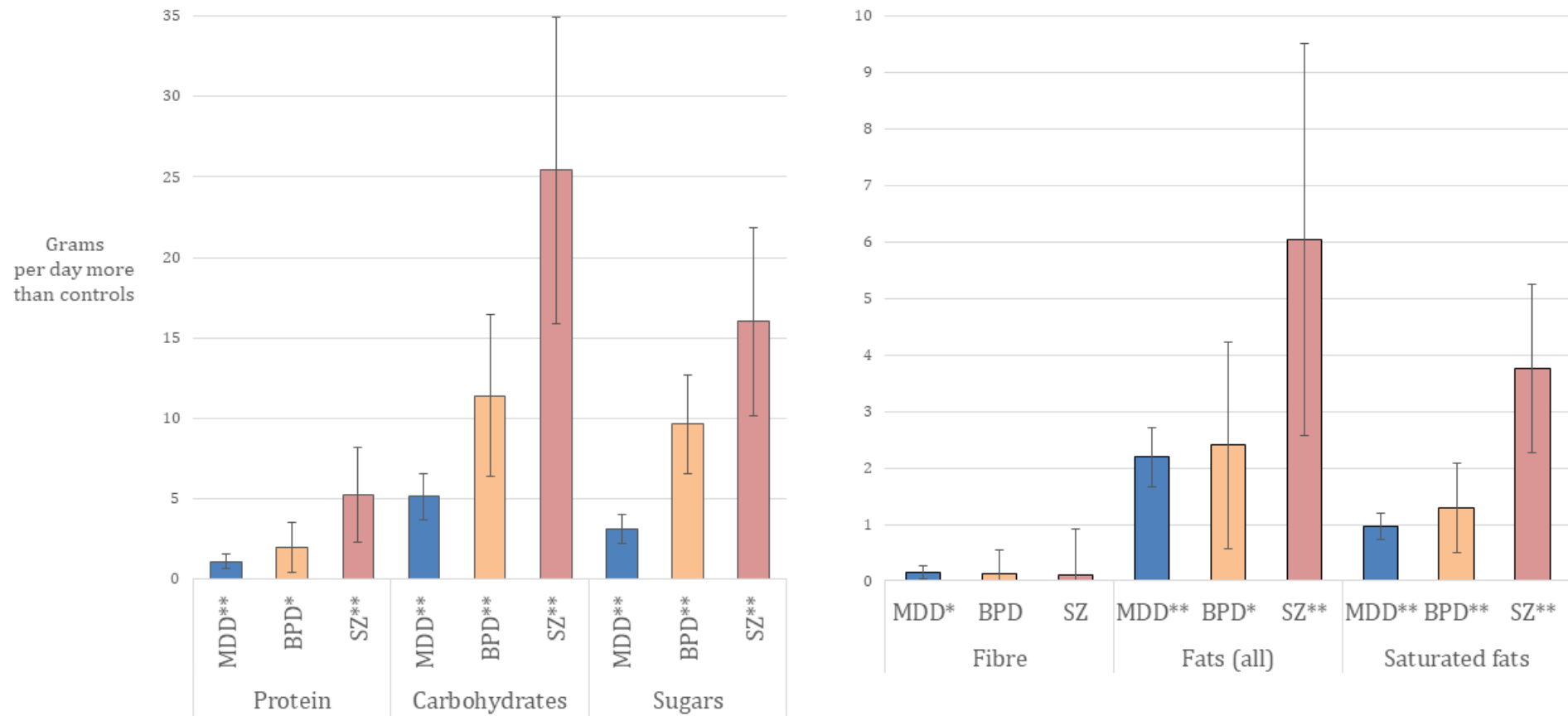


Figure 2. Comparing dietary food intake in mental health populations using the U.K. Biobank.⁸³

Bar heights represent amounts by which macronutrient intake (grams) among people with major depressive disorders (MDD; n=14,619), bipolar disorders (BPD; n=952) and schizophrenia (SZ; n=262) exceeds average daily intake among healthy controls (n=54,010). Bar height represents age- and gender-adjusted mean difference in daily intake (g) compared to healthy controls. Error bars represent 95% confidence interval of adjusted mean. *p<0.05 compared to healthy controls. **p<0.001 compared to healthy controls.

such as olanzapine can reduce satiety and increase appetite⁹⁰, lethargy and sedation.⁹¹⁻⁹³ The implications of this for early intervention strategies are presented in [Panel 2](#). However, although certain SGAs such as olanzapine can have the most immediate cardiometabolic side-effects, this should not detract from potential side-effects of other psychotropic medications, which although not as pronounced, are more widely prescribed. Further discussion around the side-effects of SGAs and other more broadly prescribed psychotropic medications (such as antidepressants) is presented in [Part 3](#).

Health Behaviours and Mental Illness in Low and Middle Income Settings

Whereas much of the data presented in [Table 2](#) is derived from high-income countries, recent studies have shown similar relationships in low and middle income countries (LMICs).^{84,86,94-99} These include the WHO Study on global AGEing and adult health (SAGE) and WHO World Health Survey (WHS), as data from both shows that individuals with depression in LMICs were more likely to smoke (OR=1.41)⁹⁴, not meet physical activity guidelines (OR=1.42)⁹⁵, and engage in over 8 hours per day of sedentary behavior (i.e., ≥8 hours/day) (OR=1.94)⁹⁶ than non-depressed counterparts. Similar patterns in LMICs are also found in individuals with anxiety and psychotic disorders.^{84,86,97-99} Given the different sociocultural factors affecting mental and physical health in LMICs, the persistence of associations between various lifestyle factors in multiple mental health conditions further confirms the robustness of the link and the need for intervention. Furthermore, as LMICs continue to develop, inhabitants are faced with novel changes to health behaviour, such as reduced need for physical activity, and the availability of tobacco and “fast-food”. As these factors disproportionately affect people with mental illness, further efforts are needed to translate lifestyle interventions and screening into LMIC health services. Potential approaches for this are discussed in [Part 5](#).

Whereas [Table 2](#) most considers risk factors for NCDs, other behavioural risk factors such as intravenous drug use and risky sexual practices are also overrepresented in people with severe mental illness, leading to infectious disease in both LMIC and high-income settings (as described in [Part 1](#)). Most evidence is restricted to adults with SMI and may underestimate the prevalence in other ages and diagnoses. For instance, a recent meta-analysis of 3,029 adolescents with a range of psychiatric diagnoses reported a 15% lifetime prevalence of sexually transmitted illnesses (95% CI = 3-50%) and that 40% engaged in risky behaviour at their last encounter (95% CI = 23-78%)¹⁰⁰. Furthermore, these risky behaviours interacted with other lifestyle factors with recent alcohol use increasing the likelihood of unprotected sex (OR = 1.66, 95% CI = 1.09, 2.52)¹⁰⁰. The clustering of risk factors for both NCDs and infectious diseases should not be overlooked, and again suggests that screening for multiple lifestyle factors will provide the most efficient methods for improving health outcomes in people with mental illness.

Conceptualizing and Intervening for Health Behaviours ‘Across the Board’ in Mental Illness

In summary, although our evidence synthesis process was designed to identify key behavioural risk factors for specific mental disorders, the overall evidence suggests that simultaneously considering multiple lifestyle factors across diagnoses more appropriate in understanding and managing risk factors. However, transdiagnostic multi-factorial approaches are not widely reflected in the literature to date, which generally focuses on specific factors for individual disorders. Furthermore, there is an absence of suitable tools for clinicians to comprehensively assess lifestyle factors as part

of standard care. Basing physical health assessment entirely on biological markers (such as >7% increase in bodyweight, high blood pressure and lipid profile) could potentially tilt screening methods towards been 'too late' for interventions for protecting metabolic health and preventing obesity to be applied preemptively (see [Panel 2](#)). This concept is now reflected in clinical guidelines, which are increasingly recommending that assessments of diet, physical activity and health risk behaviours are be used alongside the anthropomorphic/blood markers of metabolic status,¹⁰¹ to more fully capture current physical health and future risk.

To facilitate the shift towards more comprehensive health promotion in mental illness, a positive first step would be developing 'brief but broad' tools for lifestyle screening. These could be used transdiagnostically, in various settings or services, to assess a range of behavioural risk factors (e.g. exercise, diet, substance use and sleep) at once, and thus identify key drivers of poor physical health on a case-by-case basis. In addition to providing more clear information on individual's specific risk factors for prescribers and practitioners to address, comprehensive lifestyle assessment would also present patients with more 'actionable' physical health information than that which is typically provided based on biological markers of metabolic screening. Whereas self-report questionnaires may be too burdensome and inaccurate, digital technologies (including smartphones and wearables) may ultimately present a feasible and accurate method of broad lifestyle assessment^{102,103}.

Along with developing suitable assessment tools, more efficient pathways should be provided for helping people with mental illness to overcome their behavioural risk factors (see [Part 4](#)). This could include developing multidisciplinary referral pathways (available through both primary and secondary care) which can provide access to specialized physical activity, smoking cessation, dietician or other allied health services - depending on individuals' specific behavioural profiles and health goals, in order to provide more personalized lifestyle interventions. A further urgent challenge is the dissemination of risk behaviour interventions in LMIC settings, where individuals with mental illness are disproportionately affected by risk for infectious diseases and NCDs. Alongside this, LMICs are increasingly faced with new challenges towards maintaining a healthy lifestyle, due to the spread of fast-food services, new technologies facilitating physical inactivity, and tobacco promotion and legislation.¹⁰⁴⁻¹⁰⁶ Promising emerging approaches, ideal content, and factors affecting implementation of the necessary interventions across various settings are discussed in [Part 4](#) and [Part 5](#).

Looking Beyond Lifestyle: Health Provider and System-Level Factors

Although important, lifestyle-related factors are unlikely to be the only explanations for poor physical health outcomes in people with mental illness.²⁵ For SMI in particular, mortality remains high *even after* adjusting for behavioural risk factors such as smoking, physical activity and body mass index.¹⁰⁷ Increasingly strong evidence suggests this is due to issues at the health provider or system level. From the outset, people with SMI are less able to access sufficient health care. In the United States, they are twice as likely as those without mental disorders to have been denied medical insurance because of a pre-existing condition.¹⁰⁸ These disparities extend across all levels of health services. In primary care, people with schizophrenia are less likely to have had a physical examination (e.g. weight, blood pressure),¹⁰⁹ or to be assessed and treated for hyperlipidaemia.^{110,111} They also have more emergency department visits, and experience avoidable admissions to hospital

for physical conditions¹¹² which, with appropriate primary care, should not require inpatient treatment. In the area of oral health, there is also evidence of decreased access to appropriate care in a range of psychiatric diagnoses including depression, anxiety, substance use disorder and severe mental illness.^{113,114}

Management of physical health in secondary health services may be no better than in primary care.¹¹⁵ Of particular concern is that people with mental illness are less likely to receive medical or surgical interventions commonly received by the general community. For example, people who have had prior contact with mental health services are less likely to receive cardiac catheterisations and coronary artery bypass grafting, which in turn contributes to the higher mortality rates for circulatory disease observed in these populations.¹¹⁶⁻¹¹⁸ They are also less likely to receive appropriate medications, such as b-blockers and statins, on discharge following myocardial infarction.¹¹⁹ In the case of cancer, the incidence of cancer in psychiatric patients is no higher than that of the general population (see [Part 1](#)), although mortality is higher.^{120,121} This again appears to be driven by disparities at health service level, as people with mental illness are less likely to be offered cancer screening,¹²² have reduced likelihood of surgery for all types of cancer,¹²³ and wait longer for their operations.¹²³

One explanation for these disparities in care is that clinicians may attribute emerging somatic symptoms to the underlying psychiatric disorder resulting in missed diagnoses, sometimes termed 'diagnostic overshadowing'.^{124,125} In addition, people with a mental illness may have difficulties with: reporting medical complaints; interpreting physical symptoms and distinguishing them from symptoms of their mental illness; and staying engaged with psychiatric and primary care services (i.e. by attending follow-up appointments).^{124,126}

Other factors explaining why physicians may be reluctant to offer some medical procedures because of the ensuing psychological stress, along with concerns about capacity, informed consent or compliance with postoperative care, or the presence of contra-indications such as substance abuse and smoking.¹²⁶ However, contra-indications to specialized interventions, such as smoking or problems with informed consent, are less relevant to the prescription of vascular drugs such as ACE inhibitors, beta-blockers, or statins known to reduce subsequent morbidity and mortality.¹²⁷ Furthermore, recent data have shown that people with schizophrenia are equally adherent to diabetes medication as the general population, thus further supporting the need for healthcare providers to remain optimistic about prescribing cardiometabolic medications in people with mental illness.¹²⁸ Finally, access may be compromised by financial costs, fragmentation of care and stigma.^{124,126,129} Although health care should be the one sector where challenging behaviour might be recognized as a symptom of illness, there is evidence that various healthcare providers have stigmatised views on people with mental illness.^{124,125} Nonetheless, there are increasing calls for health services to routinely offer health screening and lifestyle interventions to people with psychiatric disorders as they would with a chronic physical condition.¹³⁰

In conclusion, people with mental illness are less likely to receive the same level of health care as others in the community with the same level of physical health problems. Given the complexity of the problem, interventions should be targeted at both providers and the overall health system (see [Part 5](#)). Greater integration of physical-mental healthcare in primary care settings is a fundamental recommendation for improving the management of physical comorbidities in people with mental

illness, as discussed extensively in [Part 5](#). For mental health clinicians, it is important not to attribute emerging somatic symptoms solely to the underlying mental illness, and there should be refresher training in mental health services in the detection, management and prevention of chronic medical conditions.¹²⁹ Furthermore, developing (i) clinical tools for comprehensive lifestyle assessment, and improving referral pathways to targeted interventions, will enable practitioners to identify and manage cardiometabolic risk factors in a timely manner. Thus, at the service level, it is necessary to improve screening procedures to support prevention initiatives, while investing in the integration of physical health within mental health services (and vice versa). The evidence and current recommendations for interventions and care innovations which can move towards tackling these specific issues are addressed in [Part 4](#) and [Part 5](#).

Panel 2: Why Wait for Weight? Tipping the scales towards Prevention

Currently, clinical guidelines for metabolic screening upon initiation or continuation of SGAs put forth that blood pressure, body mass index (BMI), blood glucose and lipids should be checked at least every six months.¹³¹⁻¹³³ This has been a highly positive and well-received step towards better considering the physical health outcomes in people with SMI. However, decades of research in the general population have shown that preventing conditions such as obesity and metabolic syndrome from ever arising is considerably more efficient than attempting to reverse their long-term consequences.¹³⁴ Thus, if proactive lifestyle interventions in mental illness are provided only after sizeable changes in biological or clinical markers of adverse metabolic health are noted from screening, the window of opportunity to maximize effective prevention may be missed.

As shown in [Table 2](#), individuals with first episode psychosis (FEP) are at considerable lifestyle risk right from illness onset, as they are less physically active and have higher rates of alcohol use disorders than even those with long-term schizophrenia, while also displaying similar nutrient deficits and astonishingly high rates of smoking (at around 60% in both groups – which greatly exceeds prevalence in the general population). Indeed, many behavioural risk factors appear to precede, rather than accompany, the onset of psychotic disorders,¹³⁵ and metabolic disturbance may be present from illness onset.¹³⁶ Then, upon treatment initiation, SGAs (whilst important to stabilize mental health) further increase metabolic risk (see [Part 3](#)).

Given the high likelihood of physical health deterioration under these conditions, it could be considered a ‘duty of care’ to ensure that all individuals prescribed SGAs are not only screened but also provided with access to evidence-based lifestyle interventions (as detailed in [Part 4](#)) from the very initiation of treatment - even for those with *currently* intact metabolic health. Whereas health screening should clearly continue, rethinking our preventative approaches, and intervening on the basis of lifestyle plus pharmacological risk (rather than waiting for visible weight-gain and metabolic dysfunction to arise) could produce more timely and effective strategies for improving physical health outcomes.¹³⁷

Part 3: The interplay between psychiatric medications and physical health

Introduction

As discussed in [Part 1](#), a broad range of psychiatric diagnoses are associated with high rates of comorbid physical conditions (particularly cardiometabolic diseases). Whereas lifestyle risk factors for chronic illness seem to apply transdiagnostically, across the spectrum of mental illnesses ([Part 2](#)), the specific physical health risks associated with individual diagnoses are modified by the types of psychotropic medications used to treat these conditions. This Part aims to present the latest understanding on the interaction between psychotropic medications and physical health across a range of conditions, and to discuss pharmacological strategies for attenuating and managing the physical health risks associated with mental illness and psychotropic adverse drug reactions (ADRs).

ADRs associated with psychotropic medications

Antipsychotic medications

Antipsychotic medications are the cornerstone of treatment for people with psychotic disorders, leading to reduced acute symptoms¹³⁸, relapses¹³⁹, emergency hospital admissions¹⁴⁰, re-hospitalisation^{141,142} and mortality^{22,143}. They are also used in bipolar affective disorder (BPAD)¹⁴⁴¹⁴⁵. The long-term effects of physical health related ADRs, however, remain a major concern. Such ADRs can be divided broadly into the following categories: cardio-metabolic, endocrine, neuro-motor, and other. Details of ADRs associated with specific antipsychotics are displayed in the [appendix \(Page 17: Table 3.1\)](#).

Cardio-metabolic.

Weight gain is a particularly important ADR, as it mediates other cardio-metabolic outcomes, such as type 2 diabetes mellitus (T2D) and cardiovascular diseases (CVDs). Weight gain is the most distressing side effect reported by callers to mental health helplines¹³² and is associated with poorer quality of life¹⁴⁶⁻¹⁴⁸ and barriers to social engagement.¹⁴⁹ These factors are associated with compromised adherence with treatment leading to relapse and poor mental health outcomes.^{62,63} Most antipsychotic medications lead to weight gain, with clozapine and olanzapine having the highest propensity and haloperidol, lurasidone and ziprasidone having the lowest^{150,151}. Multiple aetiological factors drive weight gain in people with psychotic disorders, including lifestyle risk factors ([Table 2](#)). Antipsychotic medication induced weight loss pathways include H1, D2, 5HT2c blockade, and dysregulation of GLP-1^{152,153}. A wealth of recent meta-analyses ([Table 1](#)) have documented an at least two-fold elevated risk of metabolic syndrome, and T2D in people with schizophrenia, BPAD and major depressive disorder (MDD) relative to the general population ([see appendix pages 6 – 13 for details](#)).

Endocrine.

Antipsychotic-induced hyperprolactinaemia is the most common endocrine ADR¹⁵⁴. Antipsychotic medications block dopamine in the tuberoinfundibular pathway, leading to reduction in inhibition of prolactin synthesis and secretion, with hyperprolactinaemia developing most commonly with first generation antipsychotics, as well as risperidone paliperidone and amisulpride. Hyperprolactinaem

can be asymptomatic, or may lead to complications such as menstrual disturbance and sexual dysfunction (including reduced libido, erectile dysfunction, vaginal dryness and orgasmic dysfunction¹⁵⁵) in the short-term¹⁵⁶, and osteopenia in the long-term.¹⁵⁷

Neuro-motor.

Extra-pyramidal side effects (EPSE) are the most common neuro-motor ADR of antipsychotics, can be socially stigmatising and are associated with poor quality of life, treatment dissatisfaction and non-adherence^{146,147}. EPSE include dystonia (muscle spasm), Parkinsonism (tremor, rigidity, and bradykinesia), akathisia (subjective restlessness), and tardive dyskinesia (abnormal involuntary movements). Exact mechanisms are still unknown, but are likely related to dopamine receptor blockade in the nigrostriatal pathway¹⁵⁸. The annualised incidence of tardive dyskinesia is lower among second-generation antipsychotic medications compared to first-generation antipsychotic medications¹⁵⁹. Neuroleptic malignant syndrome (NMS) is a rare (incidence 1-2 per 10,000/year), but serious condition that can be life-threatening¹⁶⁰. Its incidence has reduced since the wider use of second-generation antipsychotic medications. NMS is characterized by fever, severe rigidity, autonomic disturbances and confusion¹⁶⁰.

Other

Antipsychotics have been associated with varying degrees of cardiac conduction delays, indicated by prolongation of QTc, which can predispose to torsade de pointes leading to sudden death¹⁶¹ and should be monitored in patients at risk. Anticholinergic effects are also common with antipsychotic medications, especially with chlorpromazine, clozapine, and olanzapine¹⁶². Anticholinergic effects are mediated by antagonization of acetylcholine by inhibition of the muscarinic receptors. They can be either central (e.g. cognitive impairment, impaired concentration, memory impairment, and sedation), or peripheral (e.g. constipation, dry eyes, mouth and skin, blurred vision, tachycardia, and urinary retention). These effects are particularly burdensome in the older population and can have cumulative effects when multiple anticholinergic agents are used¹⁶². Somnolence, sedation and hypersomnia are also common with antipsychotics¹⁶³. Although there may be short term benefits with sedation in the acutely exacerbated/agitated patient, somnolence and sedation can impact upon physical activity, body weight, concentration, ability to participate in daily activities and psychosocial rehabilitation, and may lead to medication non-adherence¹⁴⁶. Most antipsychotic medications can reduce the seizure threshold, but the greatest dose-related risk for seizures is associated with clozapine¹⁶¹.

Clozapine

Clozapine is the only approved antipsychotic medication for people with treatment-resistant schizophrenia¹⁶⁴. It is the most effective antipsychotic medication for reducing positive symptoms¹⁶⁵ and hospitalisations¹⁶⁶. However, clozapine is associated with severe neutropenia/agranulocytosis (incidence 0.9% 95% CI: 0.7–1.1%) usually in the first month following commencement, rarely leading to death (incidence 0.013% 95% CI: 0.01–0.017%)¹⁶⁷. Cardiac ADRs can be life-threatening and include myocarditis (incidence 0.03%-1%, usually within first month)^{168,169} and cardiomyopathy (incidence 0.06-0.12%, usually after the first year)^{168,170}. Other ADRs include weight gain, T2D, sedation, sialorrhoea, constipation, tachycardia, postural hypotension, gastro-oesophageal reflux, nocturnal enuresis, seizures, and obsessive-compulsive symptoms¹⁷¹.

Mood stabilisers

Mood stabilisers are used in BPAD¹⁷² and adjunctively in refractory schizophrenia^{173,174}. Individuals prescribed lithium have a mean weight gain of 4kg over 2 years¹⁷⁵. Lithium is also associated with thyroid disease¹⁷⁶, including development of goitre (occurring in up to 50% of patients¹⁷⁷), hypothyroidism¹⁷⁸), as well as hyperthyroidism.¹⁷⁹ Lithium is also associated with polydipsia, polyuria, diabetes insipidus other forms of renal dysfunction¹⁷⁸. Sodium valproate is also associated with metabolic effects, with at least half of individuals experiencing weight gain in the first three months after initiation¹⁸⁰ with a mean weight gain of 6.4kgs¹⁸¹. It is also associated with insulin resistance which increases the risk of developing T2D¹⁸². Considering that antipsychotic medications are often prescribed concurrently with mood stabilisers, the weight gaining effects of both classes of medication could be additive and therefore additional caution is required¹⁸³. While lithium and sodium valproate represent the two most widely prescribed mood stabilising medications, other mood stabilisers, such as carbamazepine have a lower propensity for weight gain¹⁸⁰ and lamotrigine is weight neutral¹⁸⁴. All mood stabilizers have been associated with teratogenic effects and should be avoided in pregnancy and lactation ([see Appendix Page 18: Table 3.2](#)).

Antidepressants

Common ADRs with newer generation antidepressant drugs include headache, nausea, agitation, sedation, dizziness, sexual dysfunction, hyponatremia as well as weight gain and metabolic abnormalities.¹⁸⁵ While gastrointestinal side effects, headache and sexual side effects are a class effect of pro-serotonergic antidepressants, sedation, weight gain and metabolic effects vary across agents. More antihistaminergic agents (e.g., mirtazapine) are more associated with cardiometabolic effects and sedation. Less commonly, antidepressants can be associated with cardiac (e.g. arrhythmias), neurological (e.g., seizures) and hepatic ADRs.¹⁸⁵ Treatment with tricyclic antidepressants (TCAs) is frequently associated with anticholinergic effects, including dry mouth, sedation, blurred vision, xerostomia, constipation, urinary retention, as well as increased appetite, weight gain and also hyponatraemia (especially in older patients).¹⁸⁶ Furthermore, those drugs carry a risk of orthostatic hypotension and falls.¹⁸⁷ Additionally, they have a known arrhythmogenic effect; ECG changes may include PR, QRS and PT prolongation ([see Appendix Page 19: Table 3.3](#)).

Pharmacological Management of Physical Health Comorbidities in People with Mental Illness

For the physical comorbidities associated with serious mental illness (SMI) commonly seen in the general population (e.g. CVD), national and international prescribing guidelines developed for non-SMI populations should be followed. Conditions secondary to psychiatric pharmacological treatment (e.g. EPSE) require a more specialized approach. There is a need for greater monitoring of the physical health parameters of people on antipsychotics, and the provision evidence based pharmacological treatments¹⁸⁸. Where safe and feasible, modifying psychiatric medications (dose reduction or switch) that have been associated with the ADR should be considered, in consultation with the patient. Here, we provide a targeted, evidence-based approach to commonly observed physical health ADRs in SMI.

Type 2 diabetes mellitus

The approach to pharmacological management of T2D in SMI should follow guidelines for the general population ([Appendix Page 20](#)). First-line pharmacological therapy is metformin monotherapy. Second-line therapies are listed in [Appendix \(Page 20: Table 3.4.\)](#). A summary of the relative risks and benefits of T2D treatments in SMI is presented in [Table 3](#). Metformin reduces the risk of transition from pre-diabetes to T2D^{189,190} and should be considered for individuals with SMI and pre-diabetes. GLP-1RAs have also been shown to reduce the transition to T2D, as well as leading to clinically significant weight loss.¹⁹¹

Weight gain

When behavioural interventions fail, pharmacological methods for attenuating weight gain in SMI should be considered. Pharmacological agents are described in detail in the [appendix \(Page 21: Table 3.5.\)](#), with the most evidence in antipsychotic-treated individuals existing for metformin and topiramate. (Vancampfort et al., 2019a) Bariatric surgery can also be considered as a last-resort treatment option where behavioural and pharmacological interventions fail. Antipsychotic weight gain tends not to be dose dependent, so dose reduction will not be effective in reducing weight ¹⁹².

Arterial Hypertension

The approach to pharmacological management of hypertension in SMI should follow guidelines used in the general population, described in [appendix \(Page 20: Table 3.4\)](#).

Dyslipidaemia

There is limited data on treatments for dyslipidaemia specific for people with mental illness. The guidance here comes from general population studies. Statins reduce the risk of coronary heart disease events by 20-30%.¹⁹³⁻¹⁹⁵ Cardiovascular risk calculators, incorporating factors such as age, hypertension, T2DM, and particularly those that include diagnosis of SMI and antipsychotic use (e.g. QRISK3 calculator)¹⁹⁶ are useful in making decisions about initiation of statin-therapy.¹⁹⁷ The approach to pharmacological management of dyslipidaemia in SMI should follow guidelines used in the general population (see [Panel 3](#)). There is currently no strong evidence to target hypertriglyceridaemia therapeutically to decrease cardiovascular risk.

Sinus tachycardia

Sinus tachycardia in patients with SMI may be a feature of the illness, drug withdrawal, or an acute drug reaction (e.g. serotonin syndrome or neuroleptic malignant syndrome). Psychotropic related tachycardia is persistent and usually dose-related. Where dose reduction/medication switch is not feasible, and inappropriate sinus tachycardia has been confirmed (including a 24-hour ECG), first line treatment is a cardioselective beta-blocker, e.g. atenolol 25-100 mg/day with up-titration until heart rate normalizes (60-100bpm). If beta-blockers are not tolerated (e.g., postural hypotension), or are ineffective, ivabradine (5-7.5mg twice daily), can be introduced.¹⁹⁸ There is evidence for efficacy and tolerability of ivabradine in clozapine-induced tachycardia.¹⁹⁹

Table 3. Risks, Benefits and Evidence base for diabetes treatments in SMI

Drug Class	Mechanism	Risk	Benefit	Evidence base in SMI
Biguanide Metformin	Increases insulin sensitivity, reduces hepatic synthesis and release of glucose, increases peripheral glucose uptake	-Lactic acidosis -B12 deficiency -If GI upset try modified release formulation -Contraindicated in eGFR < 30ml/min/1.73m ³	-Weight loss (3kg) -Low risk of hypoglycaemia	-Good evidence for use in SMI, and should be considered 1 st line. ⁴⁶⁹ -Consider in patients with pre-diabetes receiving olanzapine and clozapine. ⁴⁷⁰
Dipeptidyl peptidase-4 (DPP-4) inhibitor e.g. sitagliptin	Inhibits action of DPP4 which acts to break down incretins (e.g. GLP-1). This increases incretin effect, as seen in GLP1R agonists.	-Possible increased hospitalizations for heart failure with alogliptin and saxagliptin -Possible increased pancreatitis risk	-Weight neutral -Low risk of hypoglycaemia	Insufficient trial data in SMI.
Glucagon-like peptide-1 receptor (GLP1R)-agonists e.g. exenatide	Incretin mimetic: Stimulates release of insulin, reduces glucagon release, delays gastric emptying, reduces appetite.	-Nausea/Vomiting -Possible increased pancreatitis risk -Subcutaneous administration	-Weight loss (3-4.5kg) -Low risk of hypoglycaemia -Liraglutide FDA approved for prevention of major cardiac events.	-Current evidence base suggests should be considered 2 nd line therapy in SMI. -Evidence for exenatide use in patients treated with clozapine. ⁴⁷¹ - GLP-1RAs have been shown to reduce the transition to T2D ¹⁹¹
Sulphonylurea e.g. gliclazide	Increases endogenous production of insulin	-Weight gain - Hypoglycaemia		Insufficient trial data in SMI.
Sodium glucose transporter 2 (SGLT2) inhibitor e.g. dapagliflozin	Inhibit SGLT2 in the proximal renal tubule thereby reducing glucose reabsorption of glucose promoting glucosuria	-Polyuria -Postural -hypotension -Urinary tract infection -DKA can occur in stress settings -Mild fracture risk	-Weight loss (2-3kg) -Low risk of hypoglycaemia -Empagliflozin FDA approved to reduce CV mortality. Canagliflozin reduces cardiac events.	Insufficient trial data in SMI.
Thiazolidinediones (glitazones) e.g. pioglitazone	Improve insulin sensitivity by promoting adipogenesis and reducing circulating fatty acid and lipid availability.	Weight gain Heart failure Oedema Bone fractures	-May reduce stroke risk -Low risk of hypoglycaemia	Insufficient trial data in SMI.
Insulin	Supplements insufficient endogenous production of insulin	Weight gain Hypoglycaemia	-In acute setting/poorly controlled T2D may be only effective treatment in stabilizing sugars	Insufficient trial data in SMI

Postural Hypotension

Beyond causes seen in the general population, postural hypotension may be related to psychotropic medication, notably clozapine and quetiapine²⁰⁰. If increased fluid intake and salt consumption are ineffective, dose adjustment or switch of the responsible psychiatric medication should first be considered, followed by non-pharmacological therapy ([appendix page 22: Table 3.6](#)) with regular blood pressure monitoring.

Nicotine and Smoking Cessation

Smoking and resultant physical morbidity plays a central role in the excess mortality of individuals with mental illness^{201,202}, therefore reducing smoking rates is a priority that cannot be underestimated. However, clinicians should be cognizant of the fact that abrupt smoking cessation can change the pharmacokinetics and pharmacodynamics of many psychotropic medications (e.g. increasing blood levels of clozapine, and to a lesser extent olanzapine and fluvoxamine). Thus, patients embarking on smoking cessation should be followed up closely, plasma levels of medications should, if possible, be monitored, and appropriate dose adjustments be made.

Nicotine Replacement Therapy

In the general population, nicotine replacement therapy (NRT) increases the odds of successful smoking cessation by 1.5-2-fold, with good evidence of efficacy in mental illness.²⁰³ NRTs should be used for approximately 8-12 weeks. Different preparations are available, including sublingual tablets, gum, patches, nasal spray, inhalators, lozenges, and e-Cigarettes. Bupropion and Varenicline can increase the likelihood of successful smoking cessation without increasing the risk of neuropsychiatric events in people with SMI.²⁰⁴

Extrapyramidal Side Effects

Acute dystonias are seen in up to 10% of individuals,²⁰⁵ are more common in antipsychotic-naïve individuals, and can occur rapidly after initiation of antipsychotics. Treatment is with an anticholinergic medication (e.g., benztropine), given orally, intramuscularly or intravenously dependent on urgency. Parkinsonism is seen in approximately 20% of individuals,²⁰⁶ and other than changing medication or reducing the dose of medication, treatment is with an anticholinergic medication. The risk of akathisia varies dependent on the antipsychotic medication prescribed, but is estimated to occur in 25% of individuals on first-generation antipsychotics.²⁰⁷ If dose reduction of the causative medication is unsuccessful, a switch to quetiapine, olanzapine or clozapine can be considered.^{208,209} Other treatments include beta-blockers (e.g. propranolol 30-90mg/day),²¹⁰ 5-HT₂ antagonists (e.g. mirtazapine 15mg/day, mianserin 30mg/day, cyproheptadine 16mg/day),²¹⁰⁻²¹² antimuscarinics (e.g. benztropine 6mg/day),²¹³ and benzodiazepines (e.g. clonazepam 0.5-3mg/day).²¹⁰ Tardive dyskinesia occurs in 5% of patients per year of antipsychotic exposure¹⁵⁹. It is recommended that anticholinergics should be stopped, and treatment rationalized (stopping the causative drug or reducing the dose), with clozapine most likely to provide symptomatic relief²¹⁴. Adjunctive treatments include tetrabenazine,²¹⁵ as well as FDA -approved novel VMAT-2 inhibitors, such as valbenazine, and deutetrabenazine.²¹⁶

Anticholinergic Effects

The first line management of anticholinergic ADRs of antipsychotics is dose reduction, if feasible.²⁰⁰ For constipation, due to anticholinergic-related reductions in gastric motility²¹⁷, stool softeners, including macrogol or docusate, and a stimulant laxative, such as senna, may be effective.²¹⁸

Sialorrhea is common with clozapine. Augmentation with diphenhydramine or benzamide antipsychotics (including amisulpride) have been shown in a recent meta-analysis to ameliorate sialorrhea²¹⁹.

Sexual Side Effects

Patients with sexual side effects (including, reduced libido, delayed or blocked ejaculation, erectile dysfunction, decreased orgasm, persistent genital arousal, lactation, numbness in vagina / nipples) should be assessed, examining prolactin levels, concomitant medications and comorbid causes (which may be psychological or physical e.g. diabetes mellitus, cardiometabolic disease).²⁰⁰ Raised prolactin levels may require antipsychotic dose reduction or switching, if feasible, or co-prescription of low dose aripiprazole.²⁰⁰ Patients with sexual dysfunction on SSRIs could be switched to another antidepressant or given a trial of bupropion or sildenafil, if appropriate²²⁰.

Thyroid Disease

Treatment of hyperthyroidism in lithium-treated patients depends on the cause, and may require a pertechnetate scan to differentiate the cause (e.g. Graves' hyperthyroidism or toxic multinodular goitre requiring thionamides/radioiodine/surgery, or lithium induced thyroiditis with consideration of lithium cessation)¹⁷⁶. Lithium-induced hypothyroidism may occur in the presence or absence of goitre. When it occurs, treatment with levothyroxine is indicated, according to general guidelines for the management of primary hypothyroidism.²²¹ Lithium-induced goitre requires ultrasound examination to assess for diffuse versus nodular enlargement, and where appropriate, fine needle aspiration to guide diagnosis. Levothyroxine (T4) may stabilise or reduce lithium-induced goitre.²²² Because of the relatively high incidence of thyroid disease with lithium, baseline clinical thyroid examination and serological assessment of thyroid function is recommended, followed by at least annual monitoring during treatment. The development of thyroid dysfunction on lithium does not usually necessitate cessation of lithium therapy, and the risks/benefit balance of continuing treatment should always be considered.

Renal Disease

Lithium-induced nephrogenic diabetes insipidus, with associated polyuria and polydipsia can be disabling, is usually at least partially reversible with lithium cessation although may be permanent after prolonged therapy²²³ If ongoing lithium treatment is required and there is only a mild-moderate concentrating defect, introduction of amiloride (which is thought to reduce accumulation of lithium in collecting tubule cells) can reduce urine volume, increase urine osmolality, and improve responsiveness to antidiuretic hormone.²²⁴ Thiazide diuretics alongside a low-sodium diet have also been observed to have a paradoxical effect of reducing urinary output in nephrogenic diabetes insipidus.²²⁵ In the case of chronic kidney disease secondary to chronic interstitial nephritis, lithium cessation may be indicated if renal insufficiency progresses. There may be some recovery of renal function following discontinuation of lithium, although progressive renal failure can occur.²²⁶ Regular monitoring of renal function is required, as is monitoring of other risk factors for renal failure (e.g. hypertension and diabetes mellitus) is important.

Summary

The burden of ADRs associated with psychotropic medications is important to consider in the context of treatment effectiveness and patient acceptability. Antipsychotics remain the best evidence based treatments for psychotic disorders, and leads to lower all-cause mortality in schizophrenia than no treatment²²⁷. Mood stabilisers are the most effective treatment for BPAD¹⁷², while antidepressants have a key role in treatment of depression²²⁸. Careful and regular monitoring of laboratory and clinical parameters may help in early identification of ADRs and prevent development of iatrogenic comorbidities. We would counsel against ceasing or switching psychotropic treatments to modalities that are less effective without careful consideration of the risk of relapse. Involvement of the patient as part of shared decision making is important when balancing medication effectiveness with ADRs.²²⁹

Panel 3. General principles when prescribing anti-hypertensives and statins for people with SMI.

Anti-hypertensives

- If there are no specific indications for a particular medication, then any of the following 4 medication classes can be used first-line:²³⁰ thiazide diuretics, long acting calcium channel blockers (e.g. amlodipine), ACE inhibitors, or angiotensin II receptor (ARB) blockers.
- A thiazide-like diuretic or long-acting dihydropyridine calcium channel blocker should be used as initial monotherapy in patients of black race.²³¹

Statins

- Consider using a cardiovascular disease risk assessment tool (e.g. QRISK3 calculator)¹⁹⁶ to guide introduction of a statin. Measure both total and high density lipoprotein (HDL) cholesterol to achieve the best estimate of CVD risk²³²
- Before offering statins for primary prevention of cardiovascular disease, discuss benefits of lifestyle modification and optimise the management of other modifiable CVD risk factors if possible.
- Offer statin therapy (e.g. atorvastatin 20mg once daily) for primary prevention of cardiovascular disease if QRISK3 assessment tool determines the individual has a $\geq 10\%$ 10-year risk of developing cardiovascular disease²³²

Part 4: Multi-Disciplinary approaches to Multi-Morbidity

Lifestyle Interventions: What works (and when)?

Modifiable lifestyle factors such as physical activity, dietary habits and smoking are increasingly recognised as fundamental to both physical and mental health. Interventions targeting these modifiable risk-factors, delivered by practitioners with specific expertise, are referred to as ‘multidisciplinary lifestyle interventions’. The efficacy of such multidisciplinary lifestyle interventions in reducing the risk of cardiometabolic-related morbidity in the general population is well established.¹⁸⁹ Accordingly, the 2018 WHO Guidelines²³³ recommend that lifestyle interventions are considered as first line strategies for the management of physical health (including weight management, cardiovascular disease and cardiovascular risk reduction and diabetes treatment and prevention) for adults with SMI (severe mental illness). However, this commission puts forth that a broad spectrum of mental disorders, beyond just SMI, have elevated rates of cardiometabolic diseases ([Part 1](#)) and lifestyle risk-factors ([Part 2](#)) which are further compounded by medications commonly used to treat mental illnesses ([Part 3](#)). Thus, a first step in reducing the physical health disparities facing people with mental illness is ensuring the adoption, translation, and routine provision of evidence-based lifestyle interventions as a standard component of mental health care. However, not all lifestyle interventions are created equal. Therefore, we aim to explain here how the efficacy and effectiveness of multidisciplinary lifestyle interventions are impacted by both their content and timing. Some key considerations for individual components of multidisciplinary interventions are presented in [Panel 4](#).

Whereas it may seem counter-intuitive to dedicate intensive resources to individuals with relatively ‘intact’ metabolic health, focusing on cardiometabolic protection in at-risk populations may present the optimal approach for lifestyle interventions (see also [Panel 2](#)). An example of gold-standard lifestyle intervention in the general population is the *Diabetes Prevention Program* (DPP) developed and evaluated in the USA.¹⁸⁹ The key features of the DPP’s lifestyle intervention are detailed in [Table 4](#), and include individual case managers, frequent face-to-face contact with participants, a structured educational component including behavioural self-management strategies, supervised physical activity sessions, a maintenance intervention combining group and individual approaches, motivational strategies, and individualization through a “toolbox” of adherence strategies, tailoring of materials and strategies to address ethnic diversity; and an extensive network of training, feedback, and clinical support.¹⁸⁹

The primary study of the DPP recruited 3,234 nondiabetic adults at elevated risk for developing type-2 diabetes (established via multiple risk factors); aiming to achieve a minimum of 7% weight loss/weight maintenance and at least 150 min of physical activity per week. The lifestyle intervention resulted in a 58% reduction in the development of type-2 diabetes over the three year study, with only 4.8 cases of diabetes per 100 person-years observed the lifestyle intervention group, compared to 11.0 cases in the control condition.^{189,190} Furthermore, both the clinical benefits and cost-effectiveness of the DPP lifestyle interventions was maintained over a 10-year follow up, even when compared to metformin as a control condition.^{234,235} This shows that lifestyle interventions containing beneficial components ([Table 4](#)) can reduce the incidence and burden of

Table 4. Key components of lifestyle interventions (adapted from the Diabetes Prevention Program, 2002) ¹⁸⁹

1. Measurable and specific goals	2. Use of case managers or lifestyle coaches with university (or equivalent) training in nutrition and dietetics, exercise prescription, and/or behavioural change	3. Frequent contact and ongoing intervention	4. Individualisation through a toolbox of adherence strategies	5. Adapted for culturally and ethnically diverse groups	6. Local and national network of training, feedback and clinical support
<ul style="list-style-type: none"> • Achieve body weight maintenance or a reduction of between 5-7% total body weight • Reduce caloric intake (500-1,000kcal/day below calories needed for weight maintenance and a maximum of 25% of calories from fat), and improve diet quality • Increase minutes of physical activity (achieve recommendations of 150 minutes per week of moderate-vigorous physical activity) • Replace sedentary behaviour with light intensity activity as often as possible • Increase cardiorespiratory fitness • Smoking cessation 	<ul style="list-style-type: none"> • Facilitate individualised program design and delivery • Offer combination of group and one-on-one based sessions • Provide supervised exercise and nutrition sessions at least two times per week (for example community centres, neighbourhood group walks or one-on-one personal training) • Conduct relevant assessments at regular intervals • Ensure lifestyle coaches have training in psychopathology and basic principles of working with people living with mental illness 	<ul style="list-style-type: none"> • Deliver core curriculum on topics including nutrition (modifying energy intake), physical activity (and sedentary behaviour) and behavioural self-management (barrier identification and problem solving) • Provide flexible maintenance program with supplemental group classes • Motivation campaigns and restart opportunities 	<ul style="list-style-type: none"> • Self-monitoring outcomes and behaviours for example weight, physical activity, sedentary behaviour and dietary intake (fat and caloric intake). • Barrier identification 	<ul style="list-style-type: none"> • Translation of documentation to local languages • Identification of culturally appropriate resources and intervention approaches • Cooking groups accounting for dietary restrictions or religious requirements 	<ul style="list-style-type: none"> • Appropriate training and upskilling of relevant staff • Clear referral pathways and integration of lifestyle coaches within standard multi-disciplinary mental health team • Monitoring and evaluation of effectiveness and attendance / engagement

cardiometabolic diseases when used as a preventative strategy in at-risk populations. Importantly, the DPP has also been adapted and delivered successfully through primary care settings.²³⁶

Considering the raised metabolic and lifestyle risk observed across multiple classes of mental disorders (Parts 1 and 2), the DPP could be adapted for people with mental illness to be made available through primary care, on a referral basis. This may present a new, transdiagnostic approach towards the provision evidence-based and cost-effective lifestyle interventions for protecting the cardiometabolic health of those treated for mental illness through primary care settings. Furthermore, there is now increasingly evidence that supervised exercise training (a key component of the DPP) can improve psychiatric symptoms, cognition and functioning across a range of mental disorders²³⁷⁻²³⁹ - thus indicating that integrating the DPP principles into mental health care may confer benefits even beyond metabolic health, to improve overall recovery.

However, it is important to note that the majority of DPP studies to date have allowed the exclusion of individuals with *“major psychiatric disorders which, in opinion of clinic staff, would impede conduct of the DPP”*. Thus, the DPP now requires replication as a transdiagnostic lifestyle intervention for people with mental illness through primary care services and specialised mental health services. While maintaining the core principles of the DPP is imperative to the design and delivery of such lifestyle interventions, it should be acknowledged that the level of support required by people with SMI is likely to be more intensive than what is required to affect change in the general population. Indeed, an RCT of an adapted versions of the DPP for people with SMI observed significant reductions in obesity and other metabolic risk markers associated with antipsychotic treatment.²⁴⁰ Conversely, undesirable adaptation of such evidence-based programs, including the insufficient dosage of the interventional components due to conflicting demands and diagnostic overshadowing,²⁰ is a threat to the effectiveness of lifestyle interventions in mental healthcare. Ultimately, the challenge for policy makers, clinicians and service delivery is applying these established, effective principles of behaviour change to people living with mental illness, particularly with regards to adopting an early intervention and prevention framework.¹³⁴

Adapting and implementing lifestyle interventions for severe mental illness

A 2019 meta-review aggregated data from 27 different meta-analyses of physical health interventions for people with schizophrenia;²⁴¹ showing that exercise, diet and broader lifestyle interventions conferred significant benefits across multiple cardiometabolic outcomes (including bodyweight, waist circumference, blood pressure, and glucose/lipid markers), with comparable efficacy to pharmacological management of metabolic health (which are discussed in [Part 3](#)). However, the inclusion criteria and recruitment strategies of the clinical trials from which this efficacy data is predominantly derived may reduce the generalisability and external validity of their findings.²⁴² Currently, there is a shortage of effectiveness studies, and pragmatic implementation and sustainability research guiding the routine implementation of lifestyle interventions in people with mental illness.²⁴³

Furthermore, there has been a number of null findings in recent years from large-scale clinical trials in people with mental illness. In order to provide guidance regarding best-practice implementation of lifestyle interventions within mental health services, it is important to consider intervention factors associated with negative and positive outcomes of trials. As detailed in [appendix \(page 23:](#)

[Table 4.1](#)) trials of lifestyle interventions in mental healthcare often fail to meet all of the principles of programs such as the DPP. Specific aspects of the DPP that are poorly endorsed from the extant literature are (i) utilising qualified exercise professionals / dietician staff to deliver lifestyle interventions, (ii) providing sufficient access to supervised exercise services, (iii) ensuring existing mental health staff are appropriately familiarised with the lifestyle interventions. Individual summaries of large-scale clinical trials of broad lifestyle interventions addressing multiple risk factors in people living with mental illness, and discussions of the ‘lessons learnt’ from each of these, are presented in the [appendix \(Pages 24-30: Table 4.2.\)](#).

The high acceptability of lifestyle interventions offers a novel method by which to engage typically disengaged service users in more traditional mental health treatment. For example, the provision of gym-based resistance exercise may offer a clinical pathway to care for young people with early psychosis,²⁴⁴ or veterans with posttraumatic stress disorder²⁴⁵. However, an important consideration is how such programs are applied across different clinical and broader public health settings. Flexibility in delivery, a focus on ‘practical’ exercise and dietary instruction and involvement, and support to integrate the lifestyle measures into daily life, are highly recommended.^{246,247} Further research is needed on how interventions are delivered, with greater emphasis on a mixed model involving online delivery and practical face-to-face being a potentially balanced and cost-effective way forward.¹⁰³ The potential benefits of implementing multidisciplinary lifestyle interventions as a preventative strategy for metabolic health in people with SMI is provided by the “Keeping the Body in Mind” (KBIM) study (detailed elsewhere¹³⁷). The KBIM study, along with other examples from studies of lifestyle interventions across different settings/contexts for people with mental illness are provided in the [appendix \(Pages 31-34: Table 4.3\)](#).

4.3. Training health professionals for a culture shift

Consideration of potential core health professionals in multidisciplinary teams in mental health settings is rapidly evolving to include allied health professionals with expertise in nutrition, physical activity, behaviour change, and other aspects such as general lifestyle psychoeducation and mindfulness training. The success of this transition relies on a number of factors.

First, allied health practitioners should receive at least introductory training in psychopathology and in the principles of working with patients experiencing mental illness. This can be achieved by ensuring that the curriculum for health professionals including dietitians, physiotherapists and exercise physiologists is updated to reflect the increasing role for such professionals within mental health teams.²⁴⁸

Second, medical and mental health professionals should receive training on (i) working with allied health professionals in an integrated manner, (ii) understanding the principles of lifestyle interventions. The importance of training medical students in ‘lifestyle medicine’ is increasingly being recognised globally.²⁴⁹ Efforts towards integrating lifestyle interventions within routine mental healthcare should also avoid an isolated focus on individual level behaviour change, in the absence of facilitating adaptations in service structure, delivery and culture (see [Part 5](#)). This approach builds on existing evidence that medical and nursing practitioners who engage in healthy lifestyle behaviours themselves are more likely to recommend and endorse such behaviours for patients.²⁵⁰ Drawing on advances in implementation science will also make lifestyle interventions more likely to meaningfully impact patient outcomes.²⁴³

Barriers, Opportunities and Future Research

Some of the current issues, emerging solutions and research priorities for smoking cessation, physical activity and dietary interventions for people with mental illness are presented in [Panel 4](#). For all aspects of lifestyle interventions, further consideration for a gradient of intervention intensity, or 'stepped care', is required; especially with regards to varying the intensity to individual participants, treatment setting, culture and readiness to provide lifestyle interventions, particularly in low-resource settings.

Even in high-resource settings, providing intensive lifestyle interventions solely through mental health services may cause issues for individuals who attend their mental health centres infrequently, and those who are discharged may struggle to stay engaged with lifestyle changes. A potential solution is the use of primary care referral schemes to facilitate sustained engagement with health behaviour interventions. One such example is 'Exercise on Prescription' or 'exercise referral schemes' for people with mental illness; which typically involve health care providers referring individuals to community-based organisations to provide free (or discounted) access and supervision in a wide range of fitness activities, facilities and expertise readily available through community leisure centres/services. Community based interventions may also offer a less resource intensive strategy to optimise maintenance of physical activity behaviour that compliments and supports clinician led strategies. Exercise referral has already been rolled-out through multiple large-scale implementation projects for sedentary adults in primary care in the UK, although producing only small beneficial effects to date.^{251,252} However, preliminary data indicates community exercise can be beneficial and engaging for young people with mental illness, even for those with severe conditions.^{253,254} Community-based diet programmes, such as 'Weight Watchers' have been found to provide cost effective weight-loss interventions when delivered via primary care to obese individuals. Research is now warranted to determine the suitability and effectiveness of such schemes for psychiatric populations.^{255,256}

Mobile health (or 'mhealth') technologies may also provide new options for applying adapted versions of programs such as the DPP in mental illness. For example, a pilot study found that 'FitBit' activity trackers could potentially be used alongside fitness apps in people with schizophrenia to deliver DPP-based interventions,²⁵⁷ using added features such as daily prompts/motivational messages and self-determined 'step count' goals. Participants in this initial study found this to be engaging, motivating and empowering,²⁵⁷ although small sample size (n=25) makes it difficult to determine efficacy. Although only explored in small scale pilot studies so far, mHealth technologies present a myriad of potential opportunities for delivering novel, scalable and sustainable lifestyle interventions for people with mental illness. Given the potential of such interventions for dissemination even in low-resource settings, more research focusing on the development and evaluation of evidence-based mHealth interventions for improving physical health in people experiencing mental illness is warranted.

In conclusion, the overarching principles of existing gold-standard diabetes prevention programs are advised to be used as a benchmark in the implementation and maintenance of lifestyle interventions as an integrated, routine component of mental healthcare ([Table 4](#)). However, adaptations may be required to translate such an approach to specific care settings, and for particular patient needs. Thus, efforts to translate these principles into both (i) preventative, transdiagnostic lifestyle

interventions available through primary care, and (ii) intensive interventions for specialist services, is likely to bridge the implementation gap and present new, effective programs for protecting the cardiometabolic health of people living with mental illness.

Panel 4 Key Components of Lifestyle Interventions: Smoking Cessation, Exercise and Diet

SMOKING CESSATION

Issue: *General population approaches have not worked for people with mental illness*

- Although smoking rates have dramatically decreased for the general population they have remained high for people with mental illness,²⁵⁸ even in young people (see [Table 2](#)). Resultantly, people with mental illness now consume around half of all cigarettes sold.^{201,259}
- This may be because although people with mental illness are just as motivated to stop smoking, they are more nicotine dependent and less likely to seek out and receive appropriate interventions tailored to their needs^{260,261}
- Smoking-related deaths disproportionality affect people with mental illness, and smoking is a leading cause of the premature mortality observed in this population.^{201,202}

Emerging Solutions: *Bespoke cessation interventions*

- Pharmacological Interventions; have strong efficacy evidence. For instance, a recent meta-analysis showed bupropion and varenicline were the most effective interventions for smoking cessation for people with SMI; both producing a 5-fold odds of smoking cessation compared to placebo treatments.²⁰⁴
- Non-pharmacological Interventions: must take into account the additional barriers people with mental illness face (e.g. cognitive impairments) to be effective²⁶². For instance, the SCIMITAR pilot study was developed with service users, and resulted in a 3-fold increased quit rate compared with usual care.²⁶³
- National / policy level intervention: can also be implemented. For instance, the recent move to ‘Smokefree’ environments by NHS England includes banning smoking on mental health wards and hospital premises while promoting cessation on a service-level throughout community care.²⁶⁴ Initial data suggests that implementing smoking bans and bespoke smoking cessation programs are well-received in inpatient settings, and may even have broader benefits for service culture.²⁶⁵

Future Research Priorities: *Improving access and timing of cessation interventions*

- Smoking cessation training is now freely available for healthcare professionals; which may increase the likelihood of service users receiving access to evidence-based interventions. One such example is the ‘*Very Brief Advice on Smoking*’ e-learning from NHS England / Public Health England,²⁶⁶ which may be useful for supporting the delivery of smoking cessation advice by frontline mental health staff.
- E-cigarettes are already widely used across a wide range of mental health populations,²⁶⁷ may present a novel method to reduce smoking-related deaths. Indeed, the Science and Technology Committee in England, have advised mental health trusts to allow e-cigarette use on their premises. However, e-cigarettes are not authorized or available in many countries, and further research is required to establish the health outcomes of this approach.²⁶⁸
- Early intervention for smoking is feasible,²⁶⁹ may improve quit rates, and long-term physical health outcomes.²⁷⁰

PHYSICAL ACTIVITY

DIET

Issue: *Staying Motivated*

- Weight loss is often the people’s primary motivation factor for physical activity,²⁷¹ but exercise alone is insufficient to reliably reduce bodyweight, particularly over the short term.²⁷² Although exercise can attenuate further weight gain, weight maintenance may not be a strong enough motivator for people with mental illness (particularly if they are overweight beforehand) - resulting in disengagement with exercise.

Emerging Solutions:

Fitness Goals, by Fitness Professionals

- Improving fitness may offer a similarly-motivating²⁷¹, but more achievable,^{279,280} goal for exercise interventions in people with mental illness. This can also produce important health benefits, as even modest improvements in fitness are associated with a 15% decrease in mortality in the general population.²⁸¹
- Using qualified exercise professionals is recommended for delivering exercise interventions in people mental disorders, as such interventions have significantly greater benefits and adherence rates than those delivered using mental health/research staff alone.^{237,282,283} Qualified exercise professionals embedded within mental health services can ensure existing mental health staff are upskilled and equipped to ensure coherent exercise advice regardless of clinical discipline.

Future Research Priorities: *Personalised Pathways to Health and Fitness*

- Whereas much of the research has been conducted on aerobic exercise, increasing amounts of evidence from the general population indicates that strength and resistance training or ‘high intensity interval training can produce a multitude of beneficial effects, for both metabolic and mental health.²⁸⁸⁻²⁹⁰
- Given that enjoyment and satisfaction are central determinants of exercise adherence²⁹¹, providing a range of exercise options, which can accommodate patient preference and goals, is the key to building sustainable and engaging exercise routines.

Issue: *Additive effect of medication and diet*

- Dietary risks are collectively a leading risk factor for the global burden of disease²⁷³ with the risk exacerbated for people with mental illness,^{87,274} due to a combination of psychotropic medication side-effects,^{275,90,276} insensitive reward system and poor cognitive control²⁷⁷ and food insecurity and financial constraints.²⁷⁸

Emerging Solutions:

Dietary Support

- Improving diet quality²⁸⁴ and weight reduction²⁸⁵ are both associated with a decreased mortality rates in the general population.
- Dietary interventions in people with mental illness are more effective if delivered: i) by specialist clinicians such as a dieticians, and ii) early in course of treatment²⁸⁶. Cardiometabolic care and subsequent dietary intervention should be implemented within a multidisciplinary framework.²⁸⁷

- As with exercise, the best dietary regime in people with mental illness is ultimately the one that the person can sustain. Future research may be able to better find strategies to combat the obesogenic effects of psychotropic medications, insensitive reward system and poor cognitive control.
- The growing understanding surrounding the link between dietary intake, microbiome, inflammation and obesity may signify a viable target to improve physical outcomes in people with mental illness.

Part 5: Innovations in Integration for Physical-Mental Healthcare

Introduction

Social determinants including poverty, poor education, unemployment, homelessness and childhood abuse increase the risk for both mental and physical disorders.^{89,292} Relationships between adversity, physical health and mental health are complex, and can operate synergistically to reinforce disadvantage and disability.⁸⁹ For instance, people with mental illness are more likely to experience poverty, cardiometabolic and infectious diseases (see Parts 1 + 2), while chronic physical health conditions and social deprivation are themselves key risk factors for mental illness.^{89,293,294} A 2017 series in *The Lancet* (focusing on the co-occurrence of chronic health conditions) articulated how 'syndemic frameworks' can be used to conceptualise how health risks and comorbidities interact with one another within the broader environmental context.²⁹⁵ For instance, epidemiological research has applied syndemic frameworks to characterise the pervasive relationships between poverty and diabetes with mental illness and infectious diseases in low-income settings.⁷⁴ This approach sheds new insights into how national and local conditions influence the interface between physical-mental health, and emphasizes the importance of accounting for social, political and economic factors when designing public health interventions, or implementing health service change. Further discussion around the potential application of syndemics for understanding the reciprocal associations between chronic physical and mental disorders is provided elsewhere.⁷⁵

While the complexity and magnitude of these issues appears daunting, numerous national and international healthcare and advisory bodies have now turned their attention to these issues, and produced an array of resources on the topic of health inequalities in people with mental illnesses (see [Table 5](#) and [Supplement 5.1](#)). These documents present new ideas and best practice approaches for improving the integration of physical and mental healthcare at the individual, health service and societal levels. Brief details for key recommended resources are presented in [Table 5](#). Additional information and key messages from each resource is detailed in [Supplement 5.1](#). Several key health organisation guidelines^{47,259,296} and academic articles⁷⁵ have included 'real world' examples of how new local and national initiatives (which take into account the surrounding environmental conditions) can be implemented to improve the integration of physical and mental health care. Along with detailing required improvements in healthcare for existing patients, several of these guidelines also discuss approaches to preventing chronic physical and mental health conditions.^{259,296} Wide-scale adoption and implementation of strategies which aim to prevent chronic conditions (physical or mental), multi-morbidity and risk of premature mortality is required if we hope to reduce the magnitude of health inequalities for future patients and generations. Some examples and considerations for prevention at primary, secondary and tertiary levels are presented in [Panel 5](#).

Table 5. Key Resources on the Integration of Physical and Mental Health

Title	Year	Published By	Conditions	Outcomes	Accessible at:
Management of physical health conditions in adults with severe mental disorders: WHO Guidelines	2018	World Health Organisation	SMI	Morbidity and Premature Mortality	https://www.who.int/mental_health/evidence/guidelines_physical_health_and_severe_mental_disorders/en/
Health matters: reducing health inequalities in mental illness	2018	Public Health England	SMI	Morbidity and Premature Mortality	https://www.gov.uk/government/publications/health-matters-reducing-health-inequalities-in-mental-illness/health-matters-reducing-health-inequalities-in-mental-illness#summary
Bringing together physical and mental health A new frontier for integrated care	2016	The Kings Fund	All mental illness	Cardiometabolic Health	https://www.kingsfund.org.uk/publications/physical-and-mental-health
Improving physical healthcare for people living with severe mental illness (SMI) in primary care: Guidance for CCGs	2018	NHS England	SMI	Premature Mortality	https://www.england.nhs.uk/publication/improving-physical-healthcare-for-people-living-with-severe-mental-illness-smi-in-primary-care-guidance-for-ccgs/
Equally Well: The physical health of people with mental health conditions and/or addiction	2017	Te Pou	SMI	Mortality and Morbidity	https://www.tepou.co.nz/resources/the-physical-health-of-people-with-mental-health-conditions-and-or-addiction-evidence-update-december-2017/854
Excess mortality in persons with severe mental disorders: a multilevel intervention framework and priorities for clinical practice, policy and research agendas	2017	World Psychiatric Association	SMI	Premature Mortality	https://onlinelibrary.wiley.com/doi/full/10.1002/wps.20384
Helping people with severe mental disorders live longer and healthier lives	2017	World Health Organization	SMI	Premature Mortality	https://www.who.int/mental_health/evidence/policy_brief_on_severe_mental_disorders/en/
Improving the physical health of adults with severe mental illness: essential actions	2017	Academy of Medical Royal Colleges	SMI	Premature Mortality	http://www.aomrc.org.uk/reports-guidance/improving-physical-health-adults-severe-mental-illness-essential-actions/

Improving integrated care for people with mental illness

Effective management of multimorbidity requires integrated care to be provided in a holistic way;²⁹⁷ so that common risk factors and the bi-directional interaction between physical and mental health and their treatment can be addressed together.²⁹⁶ There is international agreement that primary care is the optimal setting for addressing and coordinating management of multimorbidity.^{298,299} In many countries, most people with mental illness first present to the health system through primary care, and most mental health care is delivered in primary care.⁷⁵ Even patients requiring specialist mental health services need ongoing engagement with primary care to deliver and coordinate other aspects of their health care, including prevention and management of comorbid physical illness. Primary care aspires to provide equitable, accessible, safe, effective, comprehensive, person-centred care, meeting the needs of individuals, families and communities throughout life.³⁰⁰ This presents an ideal environment for managing multimorbidity, which requires an individualised approach towards care provision, not only dealing with the increased burden incurred by multimorbidity, but also managing competing/conflicting treatment needs informed by individuals' preferences and treatment priorities.²⁹⁸ Further discussion on how primary care settings should provide physical healthcare for people with mental illness are presented in the 2018 guidelines from NHS England (see [Table 5](#) and [Supplement 5.1](#)).

At a minimum, frequent and timely communication between providers is necessary to ensure safety and effectiveness of treatment. Ideally, services should seek a greater degree of integration, aiming for multi-disciplinary team based care that is structured, comprehensive and proactive. However, this usually requires overcoming certain bureaucratic barriers which can impede integration at the service level, such as difficulties in sharing medical records, along with governance and funding issue limiting the provision of coordinated health care ([Figure 3](#)). The 2016 report²⁹⁶ from The Kings Fund (UK) puts forth an aspirational approach towards improving integrated care across a broad spectrum of physical and mental health conditions, providing advice for overcoming common barriers towards implementation of integrated care (See [Table 5](#), [Supplement 5.1](#) and Naylor et al.²⁹⁶). Examples of different integrated care models, and their evaluated outcomes, are provided in Panel 6.

Managing Substance Comorbidity and Promoting Smoking Cessation

Across the spectrum of mental disorders, alcohol, tobacco and illicit drug use is more prevalent than in the general population and are associated with poorer physical and mental health outcomes³⁰¹⁻³⁰³. The prevalence of comorbidity is detailed in [Table 2](#). There is a bidirectional relationship between substance abuse and mental illnesses, as substance abuse can cause and exacerbate mental illness, and are often used as a means to reduce symptoms or combat dysphoria.³⁰⁴ Genetic risk factors for schizophrenia also appear to predispose individuals towards illicit drug use³⁰⁵.

Improving the focus on combating substance abuse within mental health services is undoubtedly a high priority.³⁰⁴ Despite this, many services have no standardized screening for substance use, and mental health clinicians are often not trained to address substance abuse.³⁰⁶ As an example, in high income countries people with SMI want to quit smoking as much as the general population, but are unlikely to be supported to do so.^{260,261} Further compounding the problem is a tendency for consumers with comorbid drug or alcohol abuse to be excluded from either drug treatment programs or mental health services due to the presence of the comorbid condition.³⁰⁷

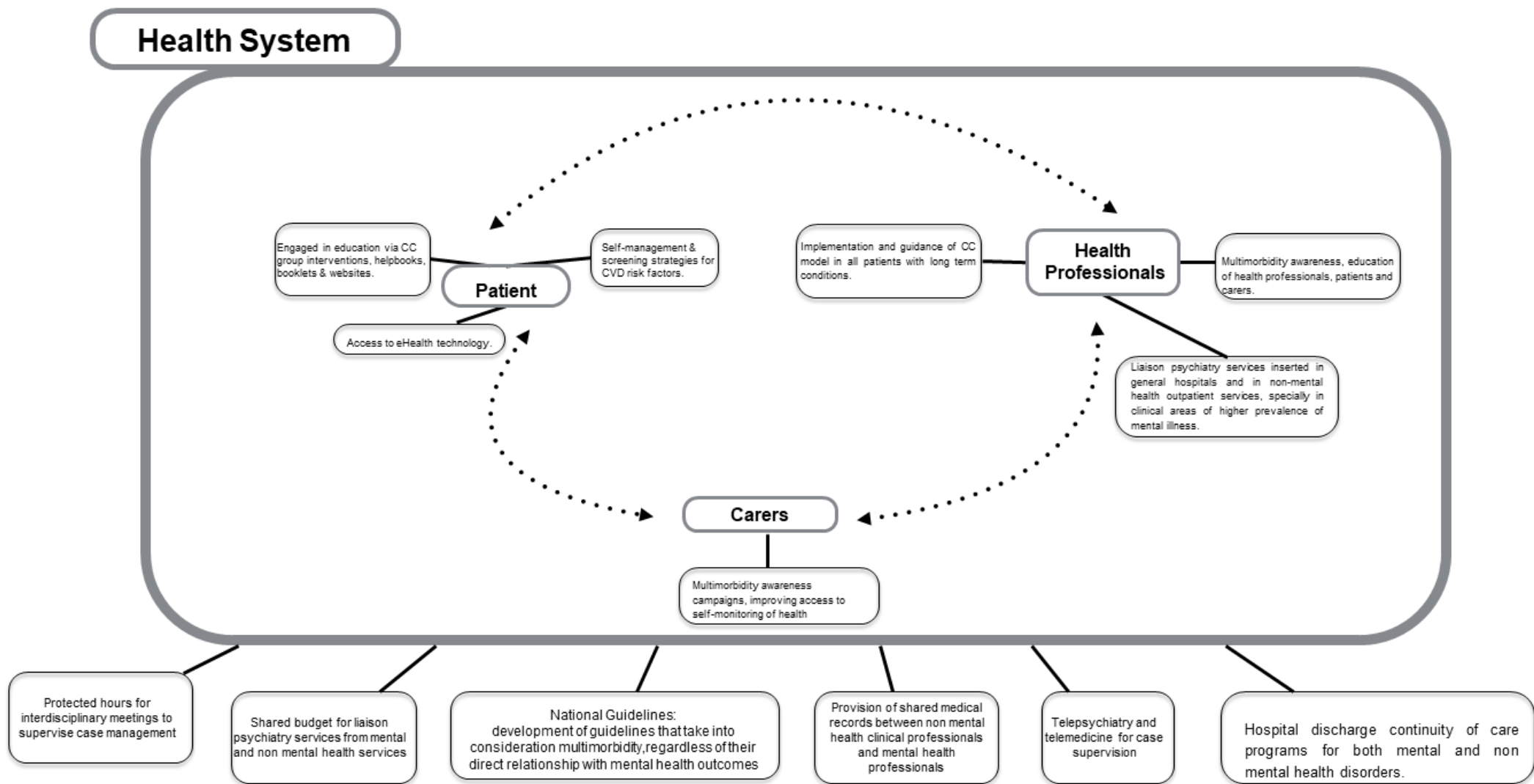


Figure 3. Aspirational model of Collaborative Care for improving continuity and comprehensiveness of care for people living with physical-mental comorbidities.

Due to the complexity of comorbid mental health and substance abuse disorders consumers require individualized treatment developed with an emphasis on overcoming barriers imposed by mental illness and enhancing engagement with evidence-based treatments. This would take into account readiness to change, cognitive ability and cognitive distortions resulting from the mental illness. Treatments with evidence include motivational interviewing (MI), cognitive-behavioural therapy (CBT) and family interventions/therapy.³⁰⁴

Evidence based interventions can be a challenge to implement in already stretched mental health services. Keeping this in mind, it is important to note that there is a paucity of evidence to recommend integrated interventions compared to sequential or parallel treatment programs, particularly in alcohol use disorders.³⁰⁸ Each approach provides advantages and disadvantages. The advantage of an integrated approach is that the consumer does not need to receive care from two services. The disadvantage is that provision of care requires intensive resources and investment from within the mental health system to upskill mental health clinicians in the treatment of substance use. The advantage of sequential or parallel treatments are that the interventions are delivered within a highly specialised substance use program. However the disadvantage is that this approach requires seamless coordination and information-sharing between agencies. A clear referral policy between mental health and substance use treatment services (including those in primary care) should be developed so that services can be held accountable when consumers slip through the gaps.

The considerations around smoking cessation interventions for people with mental illness are presented in [Panel 4](#). However, regardless of how the interventions are provided, and investment in training for screening within mental health services is a priority. Mental health clinicians should be trained to perform regular assessments of co-morbid substance use, assess people's readiness to change and provide motivational interviewing. In high income countries with mature services, an emphasis on a "no wrong door" for accessing substance abuse treatments and developing clear referral policies between mental health and substance use treatment services should be a priority.²⁵⁹

Where cessation isn't possible, harm minimisation strategies should be adopted. This is achieved by switching to alternative, safer forms of the drug (e.g. e-cigarettes, methadone and suboxone) or providing access to safe injecting facilities. As an example for smoking in particular, the Royal College of Physicians (RCP) has recently published a reports on harm minimisation to support smokers who are unable or find it difficult to quit.³⁰⁹

Innovations in Integration for Low- and middle income countries (LMICs)

The importance of integrated care in LMICS

In most LMICs, less than 1% of the health budget is spent on mental health.³¹⁰ This includes government mental health expenditure on specialist mental health services, general health services and social care services.³¹⁰ Hence mental health services are poorly resourced with 90% of people needing treatment not receiving any care.³¹¹ Mental health services rely predominantly on expensive psychotropic drugs, which are seldom available, and are associated with a myriad of side-effects which require close management (see [Part 3](#)).³¹² Until very recently, little attention has been given

to the complex bi-directional relationship between physical and mental health and the relevance of screening in LMIC settings.^{312,313}

The 2018 WHO guideline on “Management of physical health conditions in adults with severe mental disorders” asserted that health inequalities for people with SMI are greatest in LMICs, where ‘the resources are inadequate, the institutions are not well managed and access to quality mental health care and physical care is limited’. Indeed, the largest gaps in life expectancy for people with SMI are observed in low-income settings.^{47,314} There is a clear need to re-orient current mental health care systems in LMICs and focus on a more integrated model. However, an important challenge in many LMICs is the lack of integrated physical-mental health services, and poorly developed community-based services, resulting in an overreliance on institutional psychiatric care.³¹² This is mainly due to outdated mental health legislation and policies.³¹³ Specific barriers towards an integrated mental and physical health policy development and implementation include insufficient coordination across different government levels, shortage of human resources and competences at all levels of care, a need for buy-in, irrelevance of policies to local actors, governmental bureaucracy and shortage of finances and accountability, alongside differing streams of funding - all making shared decisions and shared responsibility more challenging.⁷⁵ As a consequence, in daily clinical practice mental health providers in community settings do not ask about medical issues or test for them because of insufficient consideration of the physical health needs, or shortage or time/resources.³¹⁵

In LMICs, there is an urgent need to increase awareness of the importance of considering the physical health needs of patients with mental health problems and vice versa.³¹² For example, awareness of the links between chronic physical and mental conditions through public health awareness campaigns might be one strategy. A 2016 review exploring the efficacy and effectiveness of interventions at population- and community-levels for mental disorders in LMICs concluded that mass public awareness campaigns are recommended as “*good practice*”; but more research in LMICs is needed. Also increasing awareness of chronic conditions via school-based programmes is considered a “*good practice*” strategy in LMICs.³¹⁶

Another system level approach would involve augmenting the competences of the existing work staff at all levels of care. Although education about the link between chronic physical and mental health conditions is an important tool to support changes in clinical practice, it is rarely a one-off solution to altering knowledge and behaviours. Multiple sessions and top ups are usually required alongside rolling programmes to support staff turnover.³¹⁷ Next to increasing awareness, changing the current mental health policies in LMICs, by making an integrated care model a central focus in mental health care action plans is essential. A review of integrated care across high, middle, and lower-income settings presents clear evidence for the rationale and effectiveness.⁷⁵ The review describes a strong theoretical basis along with multiple ‘real-world’ examples and practical steps towards implementing integrated care in LMIC settings; identifying the ‘Practical Approach to Care Kit’ (PACK) as a particularly successful example of a best-practice approach towards the provision of universal integrated primary health care.³¹⁸ PACK has been successfully implemented in several LMICs, including South-Africa, Botswana, Brazil, Nigeria and Ethiopia.³¹⁹ Development of clinical practice guidelines including best practice examples such as PACK and with consideration of the local context, including staff attitudes and available resources, is crucial in encouraging policy uptake in LMIC settings. In particular, the local context including prevalent knowledge, behaviours and

attitudes towards mental health conditions strongly predicts the success of implementing a clinical practice change.³¹⁷

Harnessing Collaborations and Task Sharing

Clinical practice guidelines should also incorporate strategies aimed at fostering collaboration between formal primary care and mental health services and key community-based providers such as traditional healers. Approximately half of individuals seeking formal health care for mental disorders in LMICs, choose traditional and religious healers as their first care provider, and this choice is associated with delays in accessing formal mental health services.³²⁰ Based on lessons from Uganda,³²¹ strategies should involve, among others, improving clinicians' understanding of traditional healers' explanatory models for illness, and vice versa. Secondly, trust between the two categories of providers needs to be enhanced to improve interaction between the two sectors, which currently operate in isolation. In particular, clinicians' negative attitudes towards traditional healers needs to be addressed. Thirdly, quality of care by traditional healers needs to be addressed to improve hygiene and eliminate unethical practices.

Task sharing involving key community-based providers might be a promising implementation strategy in low resource settings. Task sharing refers to the process of transferring a task usually delivered by a scarce resource such as a physician to a rapidly trained and less scarce resource such as a health care worker (e.g.s^{322,323}). Rigorous implementation research on task shared CC models is underway and the outcome of this research will hopefully improve our understanding of the quality, safety, effectiveness and acceptability of strategies for mental health problems in LMICs.³²⁴⁻³²⁶ Case studies from non-governmental organisations indicate that inefficient health system structures can present barriers to successful task-sharing; indicating a need for more CC services.³²⁴ However, whether such approaches will be successful in reducing premature mortality, improving wellbeing and achieving better social outcomes in LMIC settings has yet to be fully established.³²⁴ Addressing these evidence gaps is essential if task-sharing CC is going to deliver on its promise of improving the mental and physical quality of life of people with mental health problems in low resource settings.

5.5. Digital Technologies for People with Mental Illness

Digital technology plays an increasing role in promoting health, addressing risk factors and managing physical disease, with growing evidence for its effectiveness. Mobile phones provide a particularly convenient platform for digital health care delivery (mobile health or 'mhealth'). The WHO estimates that 95% of the world population lives in an area covered by mobile networks, and there are over 7 billion mobile subscriptions – one for almost every person on the planet.³²⁷ Smartphone technologies are closing the 'digital divide' previously found in LMIC settings.³²⁸ Digital technology is available at a time and place that suit the client, unlike traditional health services which require the person to attend at a set time and location.

Research has demonstrated the effectiveness of simple text messaging to support lifestyle improvement. One important example is the TEXT ME RCT which involved 710 patients with coronary heart disease.³²⁹ The intervention comprised four personalised messages per week for six months providing advice, motivation and support to change lifestyle behaviours. At six months follow up, levels of low-density lipoprotein cholesterol were significantly lower in intervention participants, with concurrent reductions in systolic blood pressure and body mass index, significant increases in physical activity, and a significant reduction in self-reported smoking. Further studies to

assess sustainability of these positive changes, and the effectiveness of text messaging in participants who have not yet experienced a cardiovascular event are underway.³³⁰ Text messaging can support other important health behaviours, such as medication adherence for people with chronic conditions.³³¹

Smartphone apps may promote healthy lifestyle change, although they vary in quality, as does the quality of reported evaluation research.³³² To date few studies have examined clinical or cost effectiveness.³³³ User engagement may be lower in actual clinical care than in trial settings.^{334,335} Key strategies for effective user engagement include co-designing interventions with consumers, personalization of interventions, and just-in-time adaptation.³³⁶ An example is the Australian FoodSwitch app, which uses a smartphone camera to scan the barcode of a food item, and recommends healthier alternatives based on a crowd-sourced database of nutritional information.³³⁷

Valuable smartphone functionalities include the ability to receive and analyse data from sensors measuring activity or biological variables; access health information via the internet; and engage with social media to promote lifestyle change.³³⁸ Increasingly, consumers are able to access elements of their electronic health records via their smartphone or other portable device, providing an important opportunity for consumer partnership and empowerment. However, smartphones are more expensive than basic mobiles and require an internet connection, so text messaging may be required to provide broader population access in some low-income settings.³³⁹

To date, most studies using mhealth to promote healthy behaviours have recruited from the general population. An increasing number of individuals with SMI also want to use technology to manage their health.³⁴⁰ Although there are very few evaluations of mHealth for physical health in mental illness, there is emerging evidence that online peer-support platforms, smartphone apps and fitness trackers can successfully increase walking and physical activity in people with SMI.^{257,341,342} Furthermore, a review of e-Health for people with depression found that online lifestyle interventions can have positive effects on various health behaviours, including alcohol use, sleep, and physical activity.³⁴³ Although the current evidence base remains preliminary, mHealth shows promise for tackling the physical health disparities of people with mental illness globally, and is a promising area for future research (see [Figure 1](#)). However, adoption of mHealth will depend not only on technological advances, but also on rigorous evaluation and overcoming common limitations for digital health interventions, such as consumer perceptions (particularly around safety, reliability and trustworthiness) and ethical risks, such as the potential for intrusion, coercion, and data privacy concerns.^{304,344}

Accountabilities and Responsibilities: Turning Ideas into Actions

In moving from ideas to action, governments, health commissioners, and care providers must acknowledge their respective responsibilities for improving physical health in people with mental illness – and clear accountability must be established. For instance, primary prevention is often regarded as the duty of governments, rather than health services.³⁴⁵ The elevated risk factors for physical diseases among people with mental illness, which appear even prior to first diagnoses, could therefore characterise a failure at public health levels – and perhaps even wilful abandonment of educational and health promotion initiatives to reach this marginalized group. Nonetheless, taking action to address socio-environmental factors which contribute towards relationships between deprivation and health, such as shortage of green spaces and walking routes, the affordability and

accessibility of fast-foods vs healthy foods, and the targeting of tobacco and alcohol advertising (and associated legislation), could all present feasible actions through which local and nation health policy can begin to improve the physical health of people with mental illness.

Furthermore, increasing evidence suggests that obesity,^{346,347} smoking^{348,349} and physical inactivity^{350,351} are dual risk-factors not only for chronic physical conditions, but also mental illnesses. As these risk factors cluster together alongside social deprivation,^{89,352} greater investment in public health schemes and policy to address these proactively in at-risk groups, particularly in young people, could potentially reduce the onset and incidence of both physical and mental illnesses. However, this has yet to be demonstrated, and should be considered a promising area for future research ([Figure 1](#)).

The risk factors consequences of physical diseases in people with mental illness are further compounded by the personal-, service- and social-level barriers to healthcare faced by this population. As a priority action, governments must address the stark inequalities in health insurance and access to care, in order to provide a suitable context for adequate medical and lifestyle interventions. Additionally, health commissioners must acknowledge the shortage of resources in mental health services dedicated towards protection of cardiometabolic health, and the broad neglect of physical health risks in the treatment of mental illness. This is a scandalous situation that would not be tolerated in any other area of healthcare.

Clinical staff should also reflect on the duty of care that they have to people with mental illness, both at an individual level, and through their national associations. Given the foreseeable nature of poor physical health outcomes, protecting the physical health of people receiving treatment for mental illness should be regarded as within the scope of clinical duty of care. Within sufficiently resourced settings, this duty of care must include (i) measuring and addressing the physical health of the patient; (ii) clearly explaining the risks associated with treatment, and (iii) taking appropriate action to mitigate those risks and protect the physical health of the patient. As demonstrated in this Commission, and evidenced in guidelines documents (appendices pp.35-42), opinion is coalescing that good clinical practice in mental healthcare requires attention to the physical health of service users.

Finally, the allocation of research funding presents another pathway through which systemic discrimination impacts on health and well-being of people with mental illness. Major research councils must aspire towards dedicating sufficient funding towards addressing the physical health disparities that affect people with mental illness. As a solely economic justification, the allocation of resources should at least fall in line with demonstrated financial cost of physical-mental comorbidities across the population (see [Panel 2](#)). This economic burden must also be considered alongside the so-far unresolved (and in fact worsening²¹⁻²⁴) personal burden of lifelong health disparities which affect people with mental illness. Substantial research investment in this area is now required in order to reverse the current inequalities, and develop novel methods for preventing these disparities from arising in future generations.

Conclusions

The large disparities in physical health for those with mental illness have persisted over time, and might even be worsening in some regions. Although this inequity is increasingly gaining attention, further investment, intervention, and research are urgently required to address the premature mortality and lifelong burden of poor physical health associated with mental illness.

Nonetheless, our Commission takes an optimistic approach. We have described how disparities could be reduced through evidence-based prescribing and better integration of physical and mental health care. Our priority actions for health policy, clinical services, and future research are presented in [Figure 1](#). Promisingly, multiple national and international guidelines now present feasible actions for improving the integration of physical and mental health, across various health and social care settings. Broader implementation of lifestyle interventions for mental illness is also required to reduce elevated cardiometabolic risk and attenuate medication side-effects. Whenever possible, interventions should maintain the core principles of evidence-based lifestyle programmes (such as DPP) and be made accessible to those who do not have current physical comorbidities, with the aim of protecting cardiometabolic health from the earliest stages of mental-health treatment. From a public health perspective, further exploration of population-scale strategies for primary prevention of co-occurring physical and mental disorders is warranted. Additionally, more government action is required to prevent discrimination and ensure equitable access to all aspects of health care for those with mental illness. Overall, protecting the physical health of people with mental illness should be considered an international priority for reducing the personal, social, and economic burden of these conditions.

Table 6. Innovations in Integration: Conclusions and Directions

Considerations for:	Directions and Rationale	Actioned by
Syndemics & Societies	Examining how broader societal factors influence the interaction between physical and mental health conditions within a given region can shed new light these comorbidities and the conditions which produce them. This, in turn, can inform the development and implementation of preventative strategies and interventions for tackling chronic health conditions within a given socio-economic setting.	Led by public health; developed and implemented by national and local healthcare providers
Preventing Multimorbidity	Multimorbidity is common among people with long-term mental illness, and highly detrimental to health and well-being. Thus, evidence-based integrated care models (i.e. Supplement 5.1) should made available from illness onset. There are also feasible changes which can be made at primary, secondary and tertiary prevention levels which would reduce the prevalence and impact of physical health conditions in people treated for mental illness (Panel 5)	Led by public health; delivered by primary, secondary and tertiary care, community groups
Primary and Parallel Care	Primary care is a first-point of contact for most patients, and also plays a central role in step-down model of care following discharge from a specialist services. Thus, implementing integrated models of mental and physical health care through primary care services appears effective for efficient for the management of physical health comorbidities in people with mental illness (Panel 6). However, the management of comorbid SUDs may depend upon improving access, referral pathways and the quality of dedicated parallel services.	Led by commissioners of healthcare organisations ; developed by culturally sensitizing integrated care models, and implemented by health care practitioners.
LMIC Implementation	Incorporating integrated care models within the emerging mental health services of LMICs is crucial for tackling the health inequalities experienced globally by people with mental illness, and may also provide a more cost-effective approach to health care provision in these settings.	Led by mental health commissioning, developed with community, researchers and industry, and implemented by health care practitioners
mHealth Solutions	mHealth and other digital technologies present a myriad of novel methods for promoting physical health and delivering interventions remotely. The low-cost, scalability and global accessibility of such approaches are highly appealing, particularly in LMIC settings. While the evidence-base is still nascent, this can be considered a high-priority area for future research.	Led by mental health commissioning, developed with community, researchers and industry, and implemented by health care practitioners

Panel 5.1. Levels of Prevention for Physical Health Morbidity and Mortality in Mental Disorders

- Primary prevention of physical illness includes helping people avoid unhealthy habits – eg smoking, alcohol and substance abuse, poor diet, and physical inactivity. Ideally, early in the course of mental illness, preventive measures will provide the tools needed for a healthy lifestyle.³⁵⁴ Primary prevention strategies need to be adapted for people with mental illness, as public health strategies that are effective in the general population do not always translate effectively for those with mental illness. Although “people with mental illness” is not a homogenous group, separation by individual diagnostic categories (e.g. depression vs. anxiety vs. schizophrenia) is equally unhelpful when developing and implementing primary prevention strategies for physical health. Transdiagnostic approaches which better account for individual-level differences (such as gender, cultural and ethnic identity, specific lifestyle factors, medication usage and social circumstances) will lead to provide more suitably tailored and scalable strategies (See [Part 2](#)).
- Secondary prevention involves screening and preventative treatments, which are often underused in people with mental illness. As covered in [Part 1](#), many people with mental illnesses are affected by co-morbid physical diseases, which are present even from illness onset. Population-scale data from NHS England provides strong rationale that it is ‘never too soon’ for implementing secondary prevention of physical conditions in mental health services, as even from the ages of 11 to 19, children with mental illness are three-times as likely to be obese as their mentally healthy counterparts.³⁵⁵ Considerations for improving the preventative focus of screening programs is covered in [Panel 2](#). Recommendations for timely intervention are present in [Part 3](#) (pharmacological) and [Part 4](#) (lifestyle).
- Tertiary prevention encompasses improving treatment and recovery from disease. Engaging and responsive services require flexibility from individual clinicians and service planners. For example, cardiac mortality in severe mental illness is significantly reduced by efficient administration of cardioprotective medications after first cardiac events.³⁵⁶ This confirms assertions in new guidelines (See [table 5](#)) and [Part 3](#) that dissemination of tertiary prevention measures in people with mental illness is often overlooked, despite their potential to improve health and reduce premature mortality.

Within the broad category of 'integrated care', collaborative care (CC) models are emerging as an effective approach, which can simultaneously reduce costs while improving clinical outcomes and treatment adherence, in the management of both mental illness and chronic physical conditions.³⁵⁷⁻³⁶⁰ A core component of CC models is the involvement of several health care professionals working together; with CC teams typically including a physician, a case manager, and a mental health clinician.^{357,358} Although the specifics vary between models, three additional key elements of CC models are structured management plans, scheduled patient follow-ups, and enhanced inter-professional communication.³⁵⁷ [Figure 3](#) displays the potential components and arrangement of CC models for improving health management in people with physical and mental comorbidities.

An example of CC in primary care is the TEAMcare intervention,³⁶¹ designed for adults with depression and diabetes and/or heart disease, comprising integrated pharmacologic care management alongside health behaviour change support, delivered by a nurse. Compared to usual treatment, the TEAMcare intervention produced significant improvements over a 12-month period in metabolic health, with a between-group difference of - 0.56 percentage points for glycated hemoglobin (95% CI=-0.85 to -0.27), - 9.1 mg/dL for LDL cholesterol (95% CI=-17.5 to - 0.8) and - 3.4 mmHg for systolic blood pressure (95% CI= - 6.9 to 0.1). More than 50% reductions in depression scores were also observed over 3 times more often in the CC treatment group compared to control condition (OR 3.37; 95% CI 1.84 - 6.17), alongside improved perceived self-efficacy, and greater patient satisfaction with medical care.³⁶¹⁻³⁶³ After TEAMcare, the COINCIDE trial³⁵⁹ tested a psychological intervention for people with depression comorbid with diabetes or cardiovascular disease (CVD), using behavioural activation, healthy lifestyle, exercise and diet. This integrated approach produced significant improvements in depression and in patient satisfaction, with benefits sustained at 24 months follow up, and was cost-effective.³⁶⁴ Additionally, new evidence from the RAINBOW trial further supports the use of CC models for improving both physical and mental health outcomes in people with common mental disorders and cardiometabolic comorbidities.³⁶⁵ However, it is important to note the above evidence pertains to evaluations of CC models in high-income settings. The importance of further development and evaluation of integrated care approaches for LMIC settings are discussed in [Part 5](#).

Furthermore, although effective for common mental disorders, the evidence for CC models in people with long-standing SMI is equivocal, and optimal models of integrated care in this group have yet to be refined.³⁶⁶⁻³⁶⁸ One example of this provided by the PRIMROSE study;³⁶⁸ which compared integrated primary care to usual care in 327 people with SMI, finding no significant benefits for HDL cholesterol over 12 months. However, The PRIMROSE integrated care did show a 12 month mean health care cost difference of -£824 (95% CI -£568 to £1079) compare to usual care, and proved to be cost-effective due to fewer of hospital readmissions over a 12-month period; thus indicating the enhanced continuity of care afforded by integrated care approaches can confer important benefits even in the absence of changes in cardiometabolic health.³⁶⁸ Nonetheless, in aiming to improve physical health outcomes of SMI, future studies must evaluate benefits of earlier implementation of integrated care for SMI (i.e. providing CC from illness onset), along with providing CC referral to evidence-based lifestyle programs based on DPP principles (See [Figure 3](#)).

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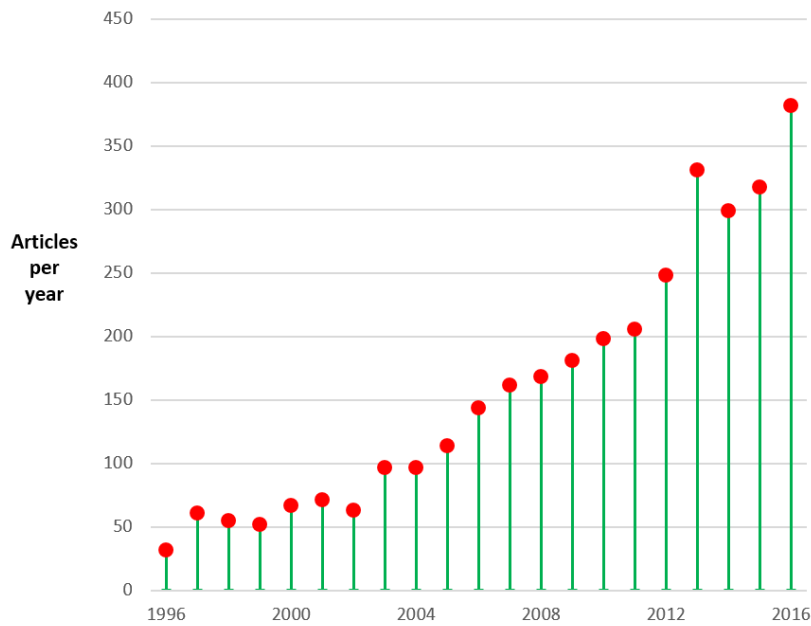
Executive Summary Appendix

Table 1. Parts and Contributors

#	Title	Contributors
-	Executive Summary	<i>Joseph Firth, Najma Siddiqi, Ai Koyanagi, Dan Siskind, Simon Rosenbaum, Cherrie Galletly, Scott Teasdale, Stephanie Allan, Patrick McGorry, Sarah Jackson, Graham Thornicroft, Eoin Killacky, Brendon Stubbs.</i>
1	It's more than premature mortality	<i>Najma Siddiqi*, Johanna Taylor, Lee Smith, Nicola Veronese, Marco Solmi, Brendon Stubbs, Joseph Firth.</i>
2	Modifiable factors in health behaviours and services	<i>Ai Koyanagi*, Steve Kisley, Rebekah Carney, Joseph Firth, Adrian Heald, Alison Yung, Mario Maj.</i>
3	The interplay between psychiatric medications and physical health	<i>Dan Siskind*, Toby Pillinger, Brian O'Donoghue, Shuichi Seutani, Andre F. Carvalho, Fiona Gaughran, Christoph U. Correll.</i>
4	Going multi-disciplinary on multi-morbidity	<i>Simon Rosenbaum*, Scott Teasdale, Stephanie Allan, Erin Hoare, Jacqueline Curtis, Phillip Ward, Jerome Sarris, Felipe B. Schuch, Joseph Firth.</i>
5	Innovations in integration	<i>Cherrie Galletly*, Davy Vancampfort, Tim Usherwood, Constanza Caneo, Joseph Firth, Hannah Myles, Karina Lovell.</i>
-	Multiple Parts / additional contributions	<i>Mary-Lou Chatterton, Jacqueline Curtis, David Shiers, Cathrine Mihalopoulos, Sarah Jackson, John Torous.</i>

*Represents lead author

Part 1 Appendix: 'Its more than Premature Mortality'



Appendix Figure 1. Increases in published research on physical health in mental disorders between 1996-2016. Bars show number of PubMed articles published per year on “Physical Health” in MeSH topic of ‘Mental Disorders’ (updated from earlier article¹).

Evidence Synthesis Details

In determining the scope and focus of the commission, we sought to examine the prevalence and impact of both non-communicable diseases (e.g. obesity, hypertension, cardiovascular, metabolic syndrome) and infectious diseases (e.g. TB, HIV) across a broad range of mental health conditions (including CMDs, SMIs, SUDs, along with personality and behavioural disorders).

We searched Embase to identify meta-analyses, systematic reviews or overviews of systematic reviews of the burden of physical illness in mental illness published in peer-reviewed journals in the English language from 2000 to 2018. Two authors independently screened titles and abstracts, and subsequently full text articles of potentially relevant articles to identify studies for inclusion, resolving disagreements through consensus. Experts in the field were consulted to check for any additional reviews or large seminal studies, particularly where gaps in the literature had been identified. Predetermined selection criteria for studies included:

Population: people with mental illness, with, or at risk of physical illness. Controls could include the general population or people without mental illness. Studies without control populations were also included. Reviews that were restricted to studies from a single country were excluded because of limited generalisability.

Mental illness: one or more mental illness diagnoses made according to DSM(R) or ICD(R) criteria, or using screening tools based on these, and reporting a cut-off for diagnosis. We excluded studies in which only symptoms or changes in symptoms were reported.

We included studies of:

- Common mental disorders (CMD) (e.g. mild to moderate depression, anxiety disorders)
- Severe mental illness (SMI) (e.g. schizophrenia, schizoaffective disorder, bipolar disorder, first episode psychosis, major depressive disorder)
- Alcohol and substance use disorders
- Other (e.g. personality disorders, behavioural disorders, pervasive developmental disorders)

We excluded studies of neurological disorders.

Physical illness: one or more physical illness diagnoses, including non-communicable diseases (e.g. obesity, hypertension, cardiovascular, metabolic syndrome) and infectious diseases (e.g. TB, HIV).

Outcomes: reporting either prevalence or incidence of physical illness, or one or more of the following outcomes: physical health, mental health, quality of life, years lived with disability, mortality, employment, economic and healthcare use.

Study design: For prevalence: Systematic reviews of retrospective or prospective cohort (period prevalence) and cross-Partial (point prevalence) studies.

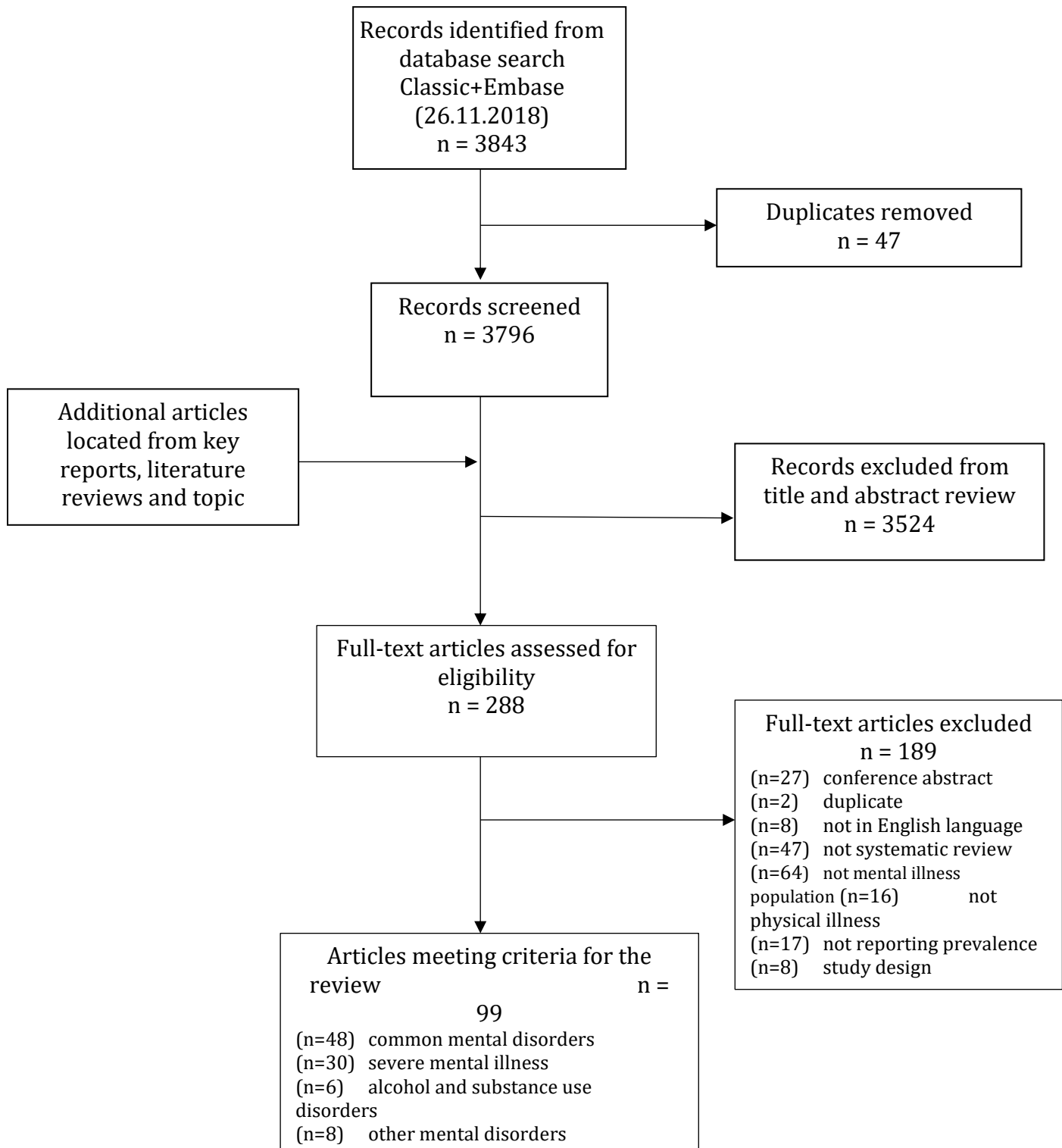
For incidence: Systematic reviews of retrospective or prospective cohort studies; control arms of trials.

For outcomes: Systematic reviews of cohort studies, case-control studies and controlled trials.

Two authors extracted data on type of mental illness, type of physical illness, number of studies and participants, prevalence, incidence and relative risk (or hazard ratios, odds ratios) and outcomes as described above.

We organised studies meeting the selection criteria by type of mental disorder and physical disorder, and reported the number of studies and where there were gaps in the evidence for specific mental and physical disorders. Where there were multiple reviews on the same comorbidity or multimorbidity, we selected the most comprehensive and recent (according to search date) meta-analyses with 'within study' control populations, and reported data from these. Where meta-analyses were not available, we reported data from systematic reviews, or large population-level epidemiological studies, again selecting the most comprehensive and recent. For each type of mental illness, we reported prevalence, incidence or risk of developing a physical illness compared to the general population or control population without mental illness.

Study Flow Diagram



Systematic Search Terms (# Returned Results in Brackets) -Updated on 26th October 2018 of OVID Embase

- 1 exp mental disease/ (2099410)
- 2 (mental or mentally or psychiatr* or psycho* or depressi* or depressed or MDD or anxi* or phobia or phobic or schizo* or hebephrenic*).ti. (790133)
- 3 (somatoform or somatiz* or somatis* or hysteri* or briquet or multisomat* or multi somat* or MUPs or medically unexplained).ti. (5899)
- 4 ((dissociative adj3 (disorder* or reaction*)) or dissociation).ti. (18958)
- 5 (affective* adj (disorder? or disease? or illness* or symptom?)).ti. (6737)
- 6 (PTSD or post-trauma* or posttrauma* or combat disorder? or war disorder?).ti. (37586)
- 7 ((Cognitive or cognition or personality or impulse control or eating or mood) adj (disorder? or illness* or disease?)).ti.
- 8 ((bipolar or behavio?ral or obsessive or compulsive or panic or mood or agrophobi* or phobic or delusional) adj (disorder? or illness* or disease?)).ti. (37801)
- 9 (OCD or obsess*-compulsi* or GAD or acute stress or neuros#s or neurotic).ti. (21823)
- 10 exp *drug abuse/ (44635)
- 11 ((Alcohol* or amphetamin* or cannabis or cocaine or heroin or methadone or substance* or drug*1) adj2 (addict* or depend* or disorder* or syndrome*)).ti. (36380)
- 12 or/1-11 [Mental disorders] (2429079)
- 13 *comorbidity/ (12122)
- 14 *multiple chronic conditions/ (540)
- 15 (Comorbid* or co-morbid*).ti. (27353)
- 16 (Multimorbid* or multi-morbid*).ti. (1850)
- 17 (Multidisease? or multi-disease? or (multiple adj (ill* or disease? or condition? or syndrom* or disorder?))).ti. (396)
- 18 ((Cooccur* or co-occur* or coexist* or co-exist* or multipl* or concord* or discord* or long-term or physical*) adj3 (disease? or ill* or care or condition? or disorder* or health* or medication* or symptom* or syndrom*)).ti. (46864)
- 19 exp *asthma/ or asthma*.ti. (165863)
- 20 exp *chronic obstructive lung disease/ (59441)
- 21 ((pulmonar* or lung* or respiratory) adj2 disease*).ti. (65044)
- 22 exp *emphysema/ or emphysema*.ti. (24557)
- 23 exp *bronchitis/ or bronchit*.ti. (30861)
- 24 exp *arthritis/ or arthriti*.ti. (303370)
- 25 exp *diabetes mellitus/ or diabet*.ti. (523983)
- 26 exp *cerebrovascular disorders/ or ((cerebrovascular or vascular or carotoid* or arter*) adj (disorder? or disease?)).ti.
- 27 exp *bacterial infection/ or (tuberculosis or TB or conjunctivitis).ti. (666673)
- 28 exp *Human immunodeficiency virus infection/ or (hiv or acquired immune* deficiency syndrome? or (aids adj (associated or related or arteritis))).ti. (327226)
- 29 exp *kidney disease/ or (kidney adj (disease? or disorder?)).ti. (492310)
- 30 exp *liver disease/ or (liver adj (disease? or disorder?)).ti. (581784)
- 31 exp *heart disease/ or (((heart or cardiac or cardiovascular or coronary) adj (disease? or disorder? or failure)) or arrythmia?).ti. (1090279)
- 32 exp *hypertension/ or (hypertens* or "high blood pressure?").ti. (367548)
- 33 exp *hyperlipidemia/ or (hyperlipidem* or hypercholesterolemia* or hypertriglyceridemia*).ti. (54084)
- 34 exp *neoplasms/ or (neoplasm* or cancer?).ti. (3534461)
- 35 exp *osteoporosis/ or osteoporosis.ti. (62339)
- 36 exp *thyroid disease/ or ((thyroid adj (disease? or disorder)) or hyperthyroid* or hypothyroid*).ti. (154791)
- 37 exp *Motor Neuron Disease/ or (Motor Neuron Disease or Motor Neurone Disease or amyotrophic lateral sclerosis).ti.
- 38 exp *Multiple Sclerosis/ or Multiple Sclerosis.ti. (82607)
- 39 exp *Parkinson Disease/ or parkinson*.ti. (106624)
- 40 exp *metabolic disorder/ or metabolic syndrome X/ or (metabolic adj (disorder* or disease* or syndrome*)).ti. (1600405)
- 41 exp *Obesity/ or obes*.ti. (246913)
- 42 exp *pain/ or pain.ti. (435445)
- 43 or/13-42 [Physical conditions or multi-morbidity] (9416770)
- 44 12 and 43 [Mental conditions and physical conditions or multi-morbidity] (431282)
- 45 prevalence/ (614803)
- 46 incidence/ (330147)
- 47 (Prevalen* or incidence*).ti,kw. (308926)
- 48 epidemiology/ (222445)
- 49 Epidemiolog*.ti,kw. (213477)
- 50 Frequency/ (2367)
- 51 Frequency.ti. (102276)
- 52 Risk factor/ (903036)
- 53 Risk factor*.ti. (142622)
- 54 Outcome*.ti. (427782)
- 55 or/45-54 [Prevalence or incidence or outcomes] (2506037)
- 56 44 and 55 [Mental conditions and physical conditions or multi-morbidity and prevalence or incidence or outcomes] (75606)
- 57 "systematic review"/ (181694)
- 58 meta analysis/ (150660)
- 59 (review or meta-analysis or metaanalysis or synthes?s or overview?).ti. (985846)
- 60 or/57-59 [Systematic review or metanalyses] (1094412)
- 61 56 and 60 (4044)
- 62 limit 61 to yr="2000 -Current" (3843)

Results

Our search identified 3796 unique records. Following title and abstract screening, 288 full text articles were retrieved, of which 99 met our selection criteria for reviews of prevalence/incidence of physical illness in mental disorder (see Study flow diagram).

We identified 99 reviews, 48 for CMD, 30 for SMI, five for alcohol and one for substance use disorders, and eight for other mental illness. Seven reviews included several categories or did not differentiate between types of mental disorder.

Focusing on the most recent reviews, as described above, the majority of the evidence was for cardiovascular (n=30) or metabolic conditions (n=40) in common mental disorder (predominantly in depression) or in schizophrenia. For all other categories of mental and physical illness, there were either only a handful or no reviews. The few reviews examining infectious diseases (n=8) were limited mostly to severe mental illness. Of particular note, given the high prevalence of tobacco use in mental illness,² we identified no reviews of chronic lung disease meeting our selection criteria.

Most studies reported associations or relative risks of developing physical disorders in mental illness. Very few reported physical, emotional or socio-economic outcomes of mental and physical multimorbidity.

Tables 2a-e give the prevalence, incidence or risk of developing physical illness for each category of mental illness.

Common mental disorder

In depression, the risk of developing all non-communicable diseases- cardiac diseases, hypertension, stroke, diabetes, metabolic syndrome, obesity, cancer, parkinson's, osteoporosis, is increased compared to the general population. There is most evidence for cardiovascular disorders, with 13 meta-analyses or systematic reviews, followed by diabetes, with seven. As noted above, the magnitude of the increased risk is remarkably similar for most physical health conditions, with around a 40% increase in prevalence (Table 2a). However, for asthma, Jiang et al³ report a threefold increased prevalence, although incident adult-onset asthma has a more comparable relative risk of 1.4⁴. The risk of Parkinson's is doubled.⁵

The evidence for cancer risk is more equivocal. Depression is associated with a small increase in overall cancer risk, but there are significant differences by cancer type, with increased risk for lung and liver cancer, but no significant associations found for breast, prostate, or colorectal/colon cancer.⁶

We found no reviews of infectious diseases in common mental disorders.

Severe mental illness

Non-communicable diseases

The 30 reviews of physical illness in severe mental illness again focused predominantly on cardio-metabolic disorders (n=18), with clear evidence of an increased risk across all categories of a magnitude of 1.5 to 2. Asthma and autoimmune disorders are also increased,^{7,8} with the risk of osteoporosis being particularly high (OR 2.86).⁹ Conversely, a review including 10 studies reported the risk of rheumatoid arthritis in schizophrenia to be half that seen in the general population or controls without schizophrenia.¹⁰

As for common mental disorders, the evidence for the risk of cancer is mixed. Li et al¹¹ report a small significant decreased overall risk of cancer incidence among patients with schizophrenia, with decreased risks for colorectal and prostate cancer but a higher risk of lung cancer in women (RR=1.2). Catala-Lopez et al found no association between schizophrenia and cancer risk.

Infectious diseases

Three reviews reported the risk of infectious diseases in severe mental disorders, but did not include a control population. Ayano et al reported prevalence of hepatitis B, C and HIV to be 15.63%, 7.21% and 7.59% respectively.¹² and Campos et al¹³ reported the prevalence of syphilis to range from 1.1% to 7.6% in 4 studies.

Alcohol and substance use disorders

The limited number of reviews examining physical illness in alcohol or substance use disorders nevertheless showed a similar pattern of increased risk. Rates of diabetes and metabolic syndrome are similar to those seen in severe mental illness.^{14,15} The risk of tuberculosis is notably increased, by around three times.

Other mental disorders

The evidence for other mental disorders is extremely patchy. In ADHD, asthma and obesity are increased.^{16,17} Risk of asthma is also increased in autism.¹⁸ In bulimia, there is a marked increase in risk of diabetes (OR 3.45) and in anorexia, the risk is significantly decreased (OR 0.71).¹⁹ The risk of osteoporosis is increased over twelve-fold in the latter.²⁰ Finally, people with personality disorder are at twice the risk of obesity.²¹

Appendix Table 2a Common mental disorders

Physical illness	Study	Setting /population	Prevalence/incidence/relative risk
Asthma	Depression 4	People with and without depression in the general population; 2334 incident cases of asthma	Depression predicted incident adult-onset asthma RR= 1.43 (95% CI, 1.28–1.61, P<0.001) N=6; n=83,684
	3	People with and without depression in the general population	Prevalence of asthma in depressed people higher than in the general population OR 3.17 (95% CI, 2.82–3.56, p<0.00001) N=3; n=20,001
Cardiovascular disease	Depression Heart disease 22	General population with and without pre-existing cardiovascular disease	Risk of sudden cardiovascular death in depression RR= 1.62 (95% CI, 1.37– 1.92, p < .001) N=4; n= 83,659 VT/VF RR=1.47 (95% CI, 1.23– 1.76; p < .001) N=8; n= 4,048 AF RR=1.43 (95% CI, 0.99– 2.05; p = .056) N=5; n=31,247
	Hypertension 23	People with depression and healthy controls	Pooled RR for incident hypertension = 1.42 (95% CI, 1.09 to 1.86, P. 0.009) N=9; n= 22,367
	Stroke 24	General population 11,350 cases of stroke	Depression significantly increased risk of stroke RR= 1.45 (95% CI, 1.31–1.61) adjusted for established cardiovascular risk factors. N=36; n=399,791
	Anxiety Heart disease 25	General population; 222,253 subjects with anxiety	Anxiety significantly increased risk of cardiovascular mortality RR= 1.41 (95% CI,1.13 -1.76); coronary heart disease RR= 1.41 (95% CI, 1.23 -1.61); stroke RR 1.71 (95% CI, 1.18 -2.50); and heart failure RR=1.35 (95% CI, 1.11-1.64). N=46; n=2,017,276
	Stroke 26	General population; 2,394 subjects with hypertension	Anxiety increased risk of stroke OR= 1.18 (95% CI, 1.02– 1.37, P<0.001) N=13 cross Partal studies; n=151,389 OR=1.55 (95% CI, 1.24–1.94, P<0.001) N= 8 prospective cohort studies; n=80,146

Cancer	Depression 6	General population 89,716 incident cases of cancer	Depression significantly associated with overall cancer risk RR= 1.15 (95% CI, 1.09-1.22) N=25; n=1,469,179 Liver cancer RR= 1.20 (95% CI, 1.01-1.43) Lung cancer RR= 1.33, 95% CI, 1.04-1.72) No significant associations found for breast, prostate, or colorectal/colon cancer.
Diabetes	Depression 27	General population controls	Prevalence of T2DM in MDD = 8.7% (95% CI, 7.3–10.2%) Significantly increased risk of diabetes in MDD RR = 1.49 (95% CI, 1.29-1.72; P < .001) N=16; n=158,834
	Anxiety 28	Any study population aged 16 years and above	Baseline anxiety associated with incident diabetes OR=1.47, 95% CI,1.23–1.75) N=14; n=1 760 800
Metabolic syndrome	Depression 29	Interview defined depression population in any setting (community, outpatient, inpatient)	Prevalence of MetS = 30.5% (95% CI, 26.3–35.1) n= 5531 Compared with age- and gender-matched control groups (N=5, n=3297), individuals with MDD (N=5, n=3118) had a higher MetS prevalence OR= 1.54, 95% CI 1.21–1.97, p=0.001]. Antipsychotic use (p<0.05) significantly explained higher MetS prevalence estimates in MDD but no effect of age, gender, geographical area, smoking, antidepressant use or presence of psychiatric co-morbidity.
	Anxiety 30	Any setting.	Anxiety associated with MetS OR=1.07 (95% CI, 1.01–1.12). N=18; n=41168
Obesity	Anxiety 31	Community samples (N=9); veterans (N=10; primary care/health center sample (N=4); clinical (inpatient psychiatric) settings (N=2); military service members or policemen (N=5)	Increased risk of obesity, pooled adjusted OR=1.31 (95% CI,1.25 -1.38) N=21; n=973,003
Osteoporosis/bone loss	Depression 32	Adult men and women; 9/14 studies in women only; and 2/14 in men only. 10/14 with subjects >50 years	Increase in risk of osteoporosis RR= 1.52 (95% CI, 1.26–1.85; P<0.001). May be mediated by antidepressants. N=4; n=33,428
Parkinson's disease	Depression 5	Subjects with and without depression	Depression increases risk of Parkinson's disease RR=2.20, (95% CI, 1.87–2.58)N=11; n=483,071

Appendix Table 2b Severe mental illness

Physical diseases	Study	Setting/population	Prevalence/incidence/relative risk
Asthma	Bipolar disorder 7	Subjects with/without bipolar disorder	Significantly higher prevalence of asthma in BD ES=1.86 (95% CI, 1.40–2.47, P<0.001) N=6; n=5750 patients with bipolar disorder and 139,529 healthy controls
Autoimmune disorders	Mixed SMI 33	Population based and healthcare settings	Psychosis associated with non-neurological autoimmune disorders OR = 1.43, (95% CI, 1.04–1.95), N=10
Cardiovascular disease	Schizophrenia 34	People with and without schizophrenia. 422,698 CVD outcomes	For incidence of CVD , pooled RR=1.53 (95% CI, 1.27, 1.86) For coronary heart disease RR=1.20 (95% CI, 0.93,1.53) For stroke RR=1.71 (95% CI, 1.19,2.46) N=13; n= 3,549,950
	Bipolar disorder 35	People with (n=27,092) and without bipolar disorder	No evidence for a significant increase in the risk of myocardial infarction , RR=1.09, 95% CI 0.96– 1.24, p = 0.20) Risk of stroke increased RR= 1.74 (95% CI, 1.29– 2.35, p = 0.0003) N=5 ; n=13 115 911
	Mixed SMI 36	3,211,768 patients with SMI and 113,383,368 controls	CROSS-PARTIAL STUDIES Pooled CVD prevalence in SMI =9.9% (95% CI, 7.4-13.3) N=38) Adjusted pooled OR for CVD =1.53 (95% CI, 1.27-1.83, p<0.001) N=11 LONGITUDINAL STUDIES Incidence of CVD event in SMI= 3.6% (95% CI, 2.7-5.3%) during median follow-up period of 8.4 years (range 1.8-30.0) N=65 Increased risk for CVD, HR=1.78 (95% CI, 1.60-1.98) N=31

	Hypertension 37	Population and healthcare settings	Increased risk of hypertension, Incidence Rate Ratio =1.27 (95% CI, 1.15–1.40) N=5
Cancer	Schizophrenia 11	480,356 participants with schizophrenia and 41,999 cases of cancer	Small significant decreased overall risk of cancer incidence among patients with schizophrenia (RR = 0.90, 95% CI 0.81–0.99). N=16 Significant decreased incidence risk rates of colorectal cancer , RR = 0.82 (95% CI, 0.69–0.98) and prostate cancer RR = 0.55 (95% CI, 0.42–0.71) colorectal cancer in male patients RR = 0.89 (95%, CI 0.81–0.98) lung cancer increased significantly in female patients RR = 1.12 (95% CI, 1.01–1.25)
Diabetes	Schizophrenia 38	145,718 individuals with schizophrenia (22.5– 54.4 years) and 4,343,407 controls	Prevalence of T2DM = 9.5% (95% CI, 7.0 -12.8) N=25; n=145 718 Pooled RR = 1.82 (95% CI, 1.56– 2.13) n= 4,489,125.
	Bipolar disorder 39	6,595 people with bipolar disorder and 783,049 age and gender matched controls.	Prevalence of T2DM = 9.4% (95% CI, 6.5%–12.7%) n = 18,060 RR= 1.98 (95% CI, 1.6–2.4, P < .001) N=19
	Mixed SMI 40	9612 people with SMI (1166 with diabetes) and 3449677 people without SMI (534248 with diabetes).	Pooled risk ratio for diabetes in SMI= 1.70 (95% CI, 1.21 to 2.37) N=26
Metabolic syndrome	Schizophrenia 41	Patients with schizophrenia	Prevalence of MetS= 32.5% (95% CI, 30.1%- 35.0%) N=77 n=525 692 No population rate for comparison.
	Bipolar disorder 42	People with bipolar disorder and general population	Prevalence of MetS= 37.3% (95% CI, 36.1–39.0) Higher rate in bipolar disorder, OR= 1.98 (95% CI, 1.74– 2.25) N= 37; n=6,983

Obesity	Bipolar disorder 43	Euthymic outpatients with bipolar disorder and age and sex matched community control.	Patients with bipolar disorder appear to be at greater risk than general population. N=4
Osteoporosis	Schizophrenia 9	n = 3038 with schizophrenia	Prevalence of osteoporosis in schizophrenia= 13.2% (95% CI = 7.8– 21.6%) N=19 Increased risk of osteoporosis OR= 2.86 (95% CI, 1.27– 6.42, p = 0.01) N=8; n= 1824
Rheumatoid arthritis	Schizophrenia 10	145901 patients with schizophrenia and 4,485,088 controls (general population or people without schizophrenia)	Prevalence of RA in schizophrenia significantly reduced, OR=0.48 (95% CI, 0.34–0.67, p< 0.000) N=10 studies; n=4,630,989
	Mixed SMI 33	Population based and healthcare settings	OR = 0.65 (95% CI, 0.50–0.84) N=4
Hepatitis B	Mixed SMI 12	People with severe mental disorder	Prevalence of hepatitis B = 15.63% (95% CI, 7.19–30.69) N=4
Hepatitis C	Mixed SMI 12	People with severe mental disorder	Prevalence of hepatitis C= 7.21% (95% CI, 4.44–11.50) N=5
HIV	Mixed SMI 12	People with severe mental disorder	Prevalence of HIV = 7.59% (95% CI, 4.82–11.75) N=13
Syphilis	Mixed SMI 13	Psychiatric inpatients and outpatients	Prevalence rates varied from 1.1% to 7.6%. No pooling of data. N=4
Mixed physical illness/comorbidities	Schizophrenia 44	Unclear settings	Increased with good evidence: HIV, CVD, obesity Increased: TB, hepatitis B/C, osteoporosis, poor dental status, diabetes, MetS, thyroid dysfunction, impaired lung function, sexual dysfunction, obstetric complications Decreased: Cancer in general, prostate cancer, rheumatoid arthritis

Appendix Table 2c Alcohol disorders

Physical diseases	Studies	Setting/ population	Prevalence/Incidence/Relative risk
Diabetes	14	3998 people with alcohol use disorders	Pooled T2DM prevalence = 12.4% (95% CI, 11.8–13.9%) N=7 (No healthy control data, but pooled prevalence similar to people with severe mental illness)
Metabolic syndrome	33	Hospital inpatient settings (N=3); outpatients and community settings (N=4) outpatient or community settings.	The pooled MetS prevalence =21.8% (95% CI, 19.1%–24.8%) N studies = 5; n = 865 (Due to the lack of data not able to compare rates with age- and gender-matched healthy controls)
Hepatitis C	(33)	Representative samples from community-based surveys (N= 8); high-risk groups (N=11); mixed group (N=1).	HCV prevalence ranging from 2.1 to 51% and an average weighted prevalence of 16.32%. N=24 n= 9,861
HIV	33	Problem drinkers. Studies only from Africa	Adjusted pooled risk estimate = 1.57 (95% CI, 1.42–1. 72). N=11
Tuberculosis	45	Mix of community, hospital inpatient and outpatient settings; TB registers and clinics; contacts of TB cases; prison inmates.	Pooled RR= 2.9 (95% CI,1.9–4.6 N=21

Appendix Table 2d Other mental illness

Mental illness/physical illness	Studies	Setting/population	Prevalence/Incidence/Relative risk
ADHD			
Asthma	³³	Population based and healthcare settings. 210,363 participants with ADHD and 3,115 168 without.	Pooled adjusted OR =1.53 (1.41–1.65) N=49
Obesity	¹⁶	48,161 ADHD subjects; 679,975 comparison. Adults and children. Population based and clinical studies.	OR=1.55 (95% C, 1.32–1.81) in adults with ADHD OR= 1.20 (95% CI, 1.05–1.37) in children with ADHD The association remained when limited to studies reporting ORs adjusted for possible confounding factors. N=42; n=728,136
Autism			
Asthma	¹⁸	8,809 cases of ASD	Prevalence of asthma in ASD = 20.4%, and in controls =15.4% (p < 0.001). N=10; n=175,406 Pooled OR= 1.26 (95% CI, 0.98–1.61, p = 0.07) for prevalence of asthma in cross-Partial studies. In case-control studies, pooled OR= 0.98 (95% CI, 0.68–1.43, p = 0.94)
Eating disorders			
Diabetes	¹⁹	Clinic-based (N=4); population-based (N=3); mixed settings (N=3).	In bulimia nervosa , increased risk of diabetes, OR=3.45 (95% CI, 1.92–6.1) in cross Partial studies, N= 2. RR= 1.7 (95% CI, 1.2–2.5), N=1 cohort study. In anorexia nervosa , decreased risk of T2D, RR=0.71 (95% CI, 0.52–0.98) in N=1 cohort study. OR= 0.87 (95% CI, 0.40–1.88) in cross-Partial studies, N = 2.
Osteoporosis	²⁰	People with anorexia and healthy controls.	In anorexia nervosa increased risk of osteoporosis, OR = 12.59 (95% CI, 3.30–47.9, p < 0.001) N= 4. Increased risk of fractures, OR =1.84, 95% CI, 1.17–2.89) N=6.
Personality disorders			
Obesity	²¹	Clinical and population-based studies.	Personality disorder in young adulthood was a significant predictor of obesity (OR=1.95) up to the age of 33 years, even after controlling for age, gender and axis I mental disorders N=1; n=658.

Appendix Table 2e Mixed mental illness studies

Physical illness	Study	Setting/population	Prevalence/incidence/relative risk
Cancer	⁴⁶	General population and/or health care settings.	No association between schizophrenia and cancer (ES = 0.98; 95% CI, 0.90–1.07; with substantial between-study heterogeneity). N= 16; n= 427,843
Diabetes type 2	⁴⁷	People with SMI compared with general population.	Pooled prevalence in SMI 11.3% (95% CI, 10.0%-12.6%). People with SMI significantly more likely to have T2DM than matched controls RR=1.85 (95% CI, 1.45-2.37; p<0.001) N=118; n=438,245
Metabolic syndrome	⁴⁸	People with SMI compared with general population.	Pooled prevalence in SMI 32.6% (95% CI, 30.8% - 34.4%). People with SMI at significantly increased risk for MetS compared with matched control RR=1.58 (95% CI, 1.35-1.86 p<0.001) N=198; n=52,678
Obesity	⁴⁹	People with SMI compared with general population.	OR for obesity in depression= 1.18–3.76; stronger association observed in women. In anxiety disorders, evidence mostly cross-Partial, OR: 1.27–1.40. In eating disorders, OR: 4.5. N=21
HIV	⁵⁰	Psychiatric in-patients with no comparator population. Africa	Prevalence from 9% to 23%. No pooled estimate. N=15

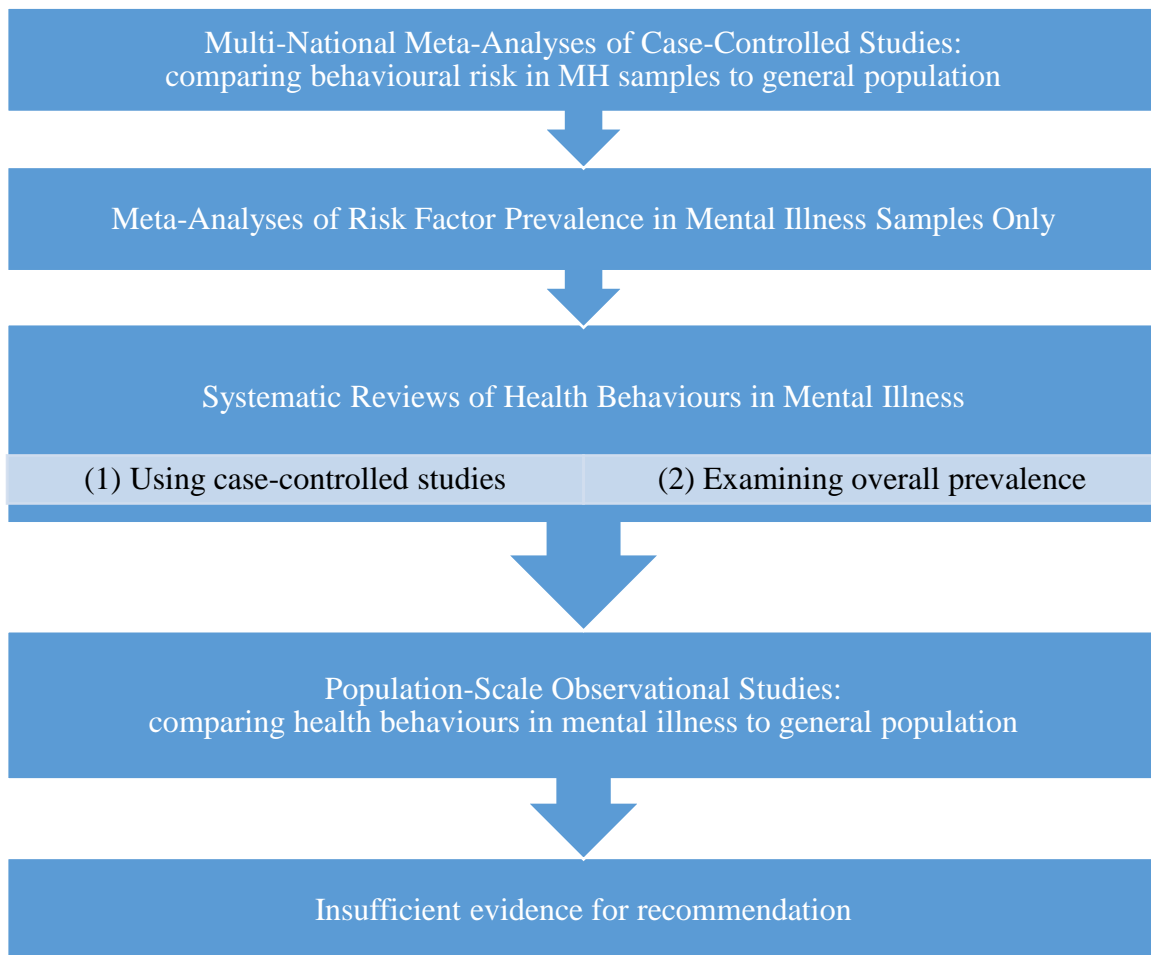
Key

- AF: Atrial fibrillation
- ASD: Autism spectrum disorders
- CVD: cardiovascular disease
- ES: Effect size
- MDD: Major depressive disorder
- MetS: Metabolic syndrome
- N: Number of studies
- n: Number of participants
- OR: Odds ratio
- RA: Rheumatoid arthritis
- RR: Relative risk
- SMI: Severe mental illness
- TB: Tuberculosis
- T2DM: Type 2 diabetes mellitus
- VT/VF: Ventricular tachycardia/fibrillation

Appendix Part 2: Key Modifiable Factors in Health Behaviours and Health Services

Hierarchical Evidence Gathering for Lifestyle Risk Factors in Mental Illness

Due to the broad scope of our research question (in terms of both the different lifestyle factors and mental health conditions covered) it was not feasible to gather all available data from every existing individual study in the field. Therefore, we used a systematic approach towards data gathering, favoring the top-tiers of evidence synthesis (i.e. meta-analyses combined pooled data on lifestyle factors in mental disorders compared to control conditions, followed by systematic reviews aggregating all individual study findings on a specific topic, followed by population-scale epidemiological studies (searched for separately) where no recent meta-analyses/systematic reviews existed. The process is displayed below. The top level of the diagram represents the top-tier of evidence search for (and, where available, used). Subsequent levels were sought, in the following order, only where higher tiers of evidence were not available.



Only recent evidence syntheses (meta-analyses and systematic reviews published since 2000 onwards) were used. In cases where an older meta-analysis/systematic review had later been covered by a newer, larger meta-analysis/systematic review on the same topic, the more recent study was used instead.

Part 2 - Primary Search (conducted in April 2018)

Databases Searched: Cochrane Central Register of Controlled Trials; Cochrane Database of Systematic Health Technology Assessment; NHS Economic Evaluation Database' AMED (Allied and Complementary Medicine); Embase; HMIC Health Management Information Consortium; Ovid MEDLINE; PsycINFO

Search Algorithm: [applied to all databases]

<i>Category</i>	Search words used ('OR' terms)
<i>Population</i>	schizo* OR mental illness OR mental disorder* OR psychiatr* OR depress* OR bipolar OR anxiety OR substance abus* OR eating disorder* OR psychosis OR psychotic
<i>Study type</i>	"meta-analys*" OR "systematic review*" OR metaan* [in title]
<i>Comparator</i>	Randomised; Randomized; Controlled; Control Group; Intervention; Adjunc*; Adjuvant; Augmentation; Supplement*; open label; single arm; feasibility; pilot; prospective; trial;
<i>Outcomes</i>	(All)

Further searches were also conducted of Google Scholar in September 2018, using similar search terms, to update and supplement the original searches and retrieve any additional articles.

Part 3 Appendix

Appendix Table 3.1. Side effects risk profile of commonly used antipsychotic medications

	Weight gain	Dyslipidaemia	Glucose abnormalities	QTc prolongation	Orthostatic hypotension	Hyper-Prolactinemia	Anticholinergic side effect	Extrapyramidal side effect	Sedation
<i>Mechanism</i>	H1, D2, 5HT _{2c} blockage	Weight gain, over-eating, direct effects	Weight gain, over-eating, direct effects	Cardiac ion channel effects	Alpha-1 blockage	D2 blockage	Anticholinergic	D2 blockage	H1 blockage
<i>Dose dependence</i>	Low	Low	Low	Moderate	High	High	Low	Moderate/High	High
<i>First generation</i>									
Chlorpromazine	Moderate/High	High	High	Moderate	High	Moderate/High	High	Moderate	High
Flupenthixol	Moderate	Limited data	Moderate	Low	Low	High	Moderate	Moderate	Low
Fluphenazine	High	Low	Moderate	Low	Low	High	Low	High	Low
Haloperidol	Low/Moderate	Low	Low/Moderate	Moderate	Low	High	Low	High	Low
Pericyazine	Moderate	Limited data	Low	Limited data	Moderate	High	High	Low	High
Zuclopenthixol	Moderate	Limited data	Low	Limited data	Low	High	Moderate	Moderate	High
<i>Second generation</i>									
Amisulpride	Low	Low	Low	Moderate	Low	High	Low	Low	Low
Aripiprazole*	Low	Low	Low	Low	Low	Low	Low	Low	Low
Asenapine	Low	Low	Low/Moderate	Low	Low	Low	Low	Low	Low
Clozapine**	High	High	High	Low	High	Low	High	Low	High
Lurasidone	Low	Low	Low	Low	Low	Moderate	Low	Low	Low
Olanzapine	High	High	High	Low/Moderate	Low	Low	Moderate	Low	Moderate
Paliperidone	Moderate	Moderate	Low/Moderate	Low	Moderate	High	Low	Low	Low
Quetiapine	Moderate	Moderate/High	Moderate/High	Moderate	Moderate	Low	Low	Low	Moderate
Risperidone	Moderate	Moderate	Moderate	Low	Moderate	High	Low	Low	Low
Ziprasidone	Low	Low	Low	Moderate	Low	Moderate	Low	Low	Low

* Increased risk of akathesis

** specific ADRs associated with clozapine including agranulocytosis are discussed in the main text

Sources: ⁵¹⁻⁵⁷

Appendix Table 3.2 – Mood Stabilisers – Risk of ADRs

	Metabolic		Neurological			Other	
Mood Stabiliser	<i>Weight gain</i>	<i>Dyslipidaemia</i>	<i>Movement</i>	<i>Tiredness</i>	<i>Cognitive impairment</i>	<i>Thyroid</i>	<i>Renal</i>
Valproate	High	Low	Moderate for tremor	Moderate	Moderate	Low	Moderate
Lamotrigine	Low	Low	Low	Low	Low	Low	Low
Carbamazepine	Moderate	Low	Dose dependent for akathisia and ataxia	Moderate	Moderate for diplopia	Low	Moderate
Lithium	Moderate	Low	Moderate for tremor	Low	Moderate	Moderate	High with long term treatment

Adapted from “Malhi GS, Bargh DM, Cashman E, Frye MA, Gitlin M. The clinical management of bipolar disorder complexity using a stratified model. *Bipolar Disorders*. 2012 May;14:66-89.”

Appendix Table 3.3 Adverse Effects associated with Antidepressants

(Adapted from "Taylor, D., Young, A. and Barnes, T. (2018). The Maudsley Prescribing Guidelines in Psychiatry. Wiley-Blackwell.

Antidepressant	Gastrointestinal	Sedation	Anticholinergic	Cardiac	Sexual	Postural hypotension
SSRI/SNRI						
Citalopram	Moderate	Low	Low	Low	High	Low
Duloxetine	Moderate	Low	Low	Low	Moderate	Hypertension
Escitalopram	Moderate	Low	Low	Low	High	Low
Fluoxetine	Moderate	Low	Low	Low	High	Low
Fluvoxamine	High	Low	Low	Low	High	Low
Levomilnacipran	Moderate	Low	Low	Low	Moderate	Hypertension
Paroxetine	Moderate	Low	Low	Low	High	Low
Sertraline	Moderate	Low	Low	Low	High	Low
Venlafaxine	High	Low	Low	Low	High	Hypertension
Vilazodone	Moderate	Low	Low	Low	Moderate	Low
Vortioxetine	Moderate	Low	Low	Low	Low	Low
Other						
Agomelatine	Low	Low	Low	Low	Low	Low
Mianserin	Low	Moderate	Low	Low	Low	Low
Mirtazepine	Low	High	Low	Low	Low	Low
Reboxetine	Low	Low	Low	Low	Low	Low
Trazodone	Low	High	Low	Low	Low	Low
TCA						
Amitriptyline	Low	High	High	High	High	High
Clomipramine	Moderate	Moderate	Moderate	High	High	High
Doxepin	Low	High	High	High	Low	Moderate
Imipramine	Low	Moderate	High	High	Low	High
Nortriptyline	Low	Low	Low	Moderate	Low	Moderate
Trimipramine	Low	High	Moderate	Moderate	Low	High
MAOI/ RIMA						
Isocarboxazid	Low	Low	Moderate	Low	Low	Moderate
Moclobemide	Low	Low	Low	Low	Low	Low
Phenelzine	Low	Low	Low	Low	Low	Low
Tranylcypromine	Low	Low	Low	Low	Low	Low

Appendix Table 3.4 Treatment algorithms for type 2 diabetes mellitus in the general population.

Guidelines	Summarized Recommendations
American Diabetes Association⁵⁸	1 st Line: metformin 2 nd Line: dual therapy metformin plus one of: DPP4i, TZD, SU, GLP1RA, SGLT2i, or insulin. 3 rd Line: triple therapy Metformin + SU + TZD/DDP4i/SGLT2i/GLP1RA/insulin Metformin + TZD + SU/DDP4i/SGLT2i/GLP1RA/insulin Metformin + DPP4i + SU/TZD/SGLT2i/Insulin Metformin + SGLT2i + SU/TZD/DPP4i/GLP1RA/insulin Metformin + GLP1RA + SU/TZD/SGLT2i/insulin Metformin + Insulin + TZD/DDP4i/SGLT2i/GLP1RA 4 th Line: combination insulin therapy
National Institute of Clinical Excellence⁵⁹	1 st Line: metformin 2 nd Line: dual therapy metformin plus one of: DPP4i/pioglitazone/SU/SGLT2i. 3 rd Line: triple therapy: Metformin + DPP4i + SU Metformin + TZD (pioglitazone) + SU Metformin + (pioglitazone/SU) + SGLT2i 4 th Line: Option for introduction of GLP1RA alongside metformin and SU if certain criteria met: -BMI>35kg/m2 and obesity-related medical/psychological complications -BMI <35kg/m2 and insulin therapy has significant occupational implications -If weight loss would benefit obesity-related comorbidities After exhausting first 4 steps consider insulin therapy

SU: sulphonylurea; TZD: thiazolidinedione; DPP4i: dipeptidyl peptidase-4 inhibitor; GLP1RA: glucagon-like peptide-1 receptor agonist; SGLT2i: sodium-glucose cotransporter 2 inhibitor; AGi: α-glucosidase inhibitor.

Appendix Table 3.5 Pharmacological treatments for weight gain in SMI

Drug	Comment	Risk/side effects
Metformin (500mg – 2000mg/day)	First-line for psychotropic-induced weight gain. ⁶⁰⁻⁶⁴	Lactic acidosis (very rare, increased risk if renal hypofunction), B12 deficiency, GI disturbance
Glucagon-like peptide-1 receptor (GLP1R)-agonists e.g. liraglutide 3mg/day, subcutaneously	Effective in patients treated with olanzapine or clozapine. ^{65,66 67} Weekly formulations available.	Nausea/vomiting, possible increased pancreatitis risk.
Aripiprazole (5-15mg/day)	Evidence for use in conjunction with clozapine or olanzapine. ^{61,68}	Sleep disturbance, akathisia, GI disturbance.
Amantadine (100-300mg/day)	Low-level evidence for use in olanzapine-induced weight gain. ^{69,70}	Theoretical risk of exacerbating psychosis.
Bupropion (150mg twice daily)	Evidence for use in the general population, including combination therapy with naltrexone. ⁷¹ Data lacking in SMI/psychotropic-induced weight gain, although some evidence in depression alongside calorie restriction. ⁷²	GI side effects reported. Potent inhibitor of cytochrome P450 isoenzyme CYP2D6, ⁷³ so may alter other psychiatric medication levels.
Betahistine (48mg/day, although trial data suggests doses up to 144mg/day)	Low-level evidence for use in olanzapine-induced weight gain. ^{74,75}	Reports of headache and hypersensitivity reactions.
Orlistat (120mg thrice daily with meals)	Low-level evidence for use in clozapine and olanzapine induced weight gain. ⁷⁶⁻⁸¹	A fatty diet will result in steatorrhea and potential malabsorption of oral medication.
Topiramate (up to 300mg daily)	Second-best evidence for use in psychotropic induced weight gain after metformin, also for preventing weight gain. ^{82,83}	Sedation, cognitive impairment, paraesthesia
Zonisamide (100-600mg/day)	Limited evidence for use in in second-generation antipsychotic induced weight gain. ⁸⁴	Sedation, diarrhea, cognitive impairment

EPSE: extrapyramidal side effects; GI: gastrointestinal.

Appendix Table 3.6 Non-pharmacological and pharmacological interventions for postural hypotension

Strategy	
Lifestyle modification	<ul style="list-style-type: none"> a. Sitting up slowly in stages from supine to standing b. Maintain hydration c. Raise head of bed 10-20 degrees: this reduces renal perfusion activating the renin-angiotensin-aldosterone system decreasing nocturnal diuresis thereby increasing intravascular volume.⁸⁵ d. Increased salt and water intake: a target daily ingestion of 1.5 to 3L of water per day and 6-10g of sodium per day have been recommended.⁸⁶⁻⁸⁹ e. Meal modification may be suggested if there is a clear post-prandial association to hypotensive episodes. Advice includes reducing meal size, reducing/eliminating alcohol intake with meals, and increasing water intake with meals.
Anti-embolism elastic stockings	<p>These should extend to the waist to reduce peripheral blood pooling.⁹⁰ These are contraindicated in patients with peripheral vascular disease: if unsure, an ankle brachial pressure index measurement should be sought first.</p>
Physical manoeuvres	<p>Isometric handgrip when standing.⁹¹</p>
Pharmacological interventions	<p>Fludrocortisone is a synthetic mineralocorticoid, which may be considered for patients whose postural hypotension does not respond to lifestyle modification⁹². (100micrograms/d titrated (if necessary) by 100micrograms per week, to a maximum of 400micrograms/d). Monitor for peripheral oedema, hypertension, and hypokalaemia. Because fludrocortisone is a steroid, if it is taken for more than 3 weeks, the dose should be gradually reduced when it is stopped. People taking fludrocortisone should carry a steroid treatment card. If the patient remains symptomatic or does not tolerate fludrocortisone, a sympathomimetic agent, such as midodrine (a selective alpha-1 agonist) can be added/substituted.⁹³⁻⁹⁵ Midodrine increases arterial resistance thereby increasing blood pressure. It does not cross the blood brain barrier, which means the sympathomimetic side effects that can accompany the use of adrenergic agents e.g. anxiety and tachycardia, do not occur. The dose should be increased from 2.5mg three times daily up to 10mg three times daily at weekly intervals. Midodrine should not be used in patients with heart disease, urinary retention or uncontrolled hypertension. Monitor for hypertension, urinary retention, gastroesophageal reflux, and pruritis. Avoid administration at night. There is evidence for the use of pyridostigmine⁹⁶, non-steroidal anti-inflammatories⁹⁷, caffeine⁹⁸ and erythropoietin⁹⁹ as adjunctive agents in patients who remain symptomatic with the above regime.</p>

Part 4 Appendix: Multidisciplinary approaches to Multimorbidity

Appendix Table 4.1. Assessment of recent lifestyle interventions in SMI against key aspects of the DPP

	Included both exercise and dietary modification?	Used BCTs; including specific + measurable behavioural goals, and self-monitoring?	Delivered by staff with professional qualifications in exercise or nutrition and dietetics?	Offered supervised exercise sessions ≥ 2 per week?	Mental health staff familiarised with the lifestyle intervention?	Used Peer-support?	Improved primary outcome?
IMPACT ¹⁰⁰	Yes	No	No	No	Yes	No	No
CHANGE ¹⁰¹	Yes	Yes	Yes	No	No	No	No
INTERACT ¹⁰²	Yes	No	No	No	Yes	No	No
In SHAPE ¹⁰³	Yes	Yes	Yes	Yes	No	No	Yes
ACHIEVE ¹⁰⁴	Yes	Yes	No	No	Yes	No	Yes
CAPiCOR ¹⁰⁵	Yes	Yes	No	Yes	Yes	No	No
KBIM ¹⁰⁶	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix Table 4.2. Large Scale Trials of Lifestyle Interventions in Mental Illness: Lessons from Key Studies

<i>IMPACT</i> ¹⁰⁰			
Aims	Study Design	Results	Lessons
<p>Determine the effectiveness of a modular health promotion intervention (IMPACT Therapy) in improving health and reducing cardiovascular risk in psychosis</p>	<p>Type: Parallel, cluster controlled RCT across 5 sites</p> <p>Setting & Participants: Community care coordinators were randomly assigned to training and supervision in delivering the intervention or TAU.</p> <p>Intervention: IMPACT practitioners underwent a 4-day training programme. Therapy involved motivational interviewing, and CBT, drawing key principles from the “Wellbeing Support Program” and the “Managing Mental Health and Drug Use”. IMPACT was delivered over 9 months.</p> <p>Adherence: Defined as at least 6 sessions each of at least 30 minutes duration in addition to routine care.</p> <p>Primary outcome: Physical and mental health component scores of SF-36.</p> <p>Power calculation: 70 care coordinators each with 4 patients (280 patients), allowing for 20% loss of care coordinator and 30% loss of patients to follow up, was needed to detect a reduction of 5 points on both physical (d = 0.5) and mental health scale (d = 0.42) with at least 80% power using an alpha level of 0.05 and two-tailed assumptions.</p> <p>Secondary outcomes: Metabolic biochemistry, CRP, anthropometry, blood pressure, substance use, lifestyle factors and mental health status.</p>	<p>Recruitment: 104 community care coordinators (with 213 patients) were randomised to either the IMPACT intervention or TAU.</p> <p>Adherence & Retention: Of 406 patients, 318 (78%) and 301 (74%) completed 12-month and 18-month follow-up respectively. 19 patients (9%) met minimums for adherence (47 patients or 22% reached at least 180 minutes of IMPACT Therapy irrespective of number of sessions).</p> <p>Primary outcome: No significant difference between IMPACT and TAU</p> <p>Secondary outcomes: HDL cholesterol improved more in IMPACT group compared to TAU [effect = 0.085 (0.007 to 0.16), p = 0.034, d = 0.2]. No other between group differences in secondary outcomes</p>	<p>Strengths of the IMPACT trial are that it focused on staff training and indirectly, staff culture. Identified limitations include focusing on existing staff without the provision of additional services or dedicated practitioners. For example, only 17-36% of care-coordinators managed to deliver the minimum dose of IMPACT therapy.</p> <p>The authors highlight the need for an integrated approach to the provision of lifestyle interventions and provide evidence that in the absence of dedicated practitioners, systemic culture change within services or the provision of additional resources, solely focussing on the training and supervision of front-line mental health workers is insufficient to change therapeutic practice at a level required to reverse cardiometabolic risk indicators in patients with established psychosis</p> <p>Authors conclude that “it may be that widening mental health teams to include specialists in exercise and nutrition is necessary”</p>

CHANGE¹⁰¹			
Aims	Study Design	Results	Lessons
<p>Explore whether a 12-month lifestyle coaching plus care coordination plus TAU, compared to care coordination plus TAU, and TAU alone, can reduce the 10-year risk of CVD in people with SCZ and abdominal obesity.</p>	<p>Type: 3-arm, randomized, parallel-group superiority trial</p> <p>Setting and population: Participants were obese people with schizophrenia. Coaches were health professionals (occupational therapists, physiotherapists or dieticians)</p> <p>Intervention: <i>Lifestyle coaching plus care coordination:</i> Coaches received training in motivational interviewing (5 days), smoking cessation (5 days), treatment of lifestyle disorders (1 day), and health eating (2 days). Lifestyle coaching included tailored, manual-based intervention targeting physical inactivity, unhealthy dietary habits and smoking, and facilitating contact to the patient's general practitioner. Lifestyle coaching was based on the theory of the stages of change, motivational interviewing and an assertive approach (adapted from the assertive community treatment), delivered via home visits, of at-least one weekly meeting. Additional support available via text messages, phone calls and email messages. <i>Care coordination plus TAU:</i> Manual-based intervention added to usual care. Care coordinator (psychiatric nurse) facilitated contact to primary care to ensure optimal treatment of physical health problems.</p> <p>Adherence: Intended sessions with coach were 42 per participant</p> <p>Primary outcome: 10-year risk of cardiovascular disease</p> <p>Power calculation: Allowing a power of 90%, we estimated to recruit 150 participants to each intervention group, a total of 450 participants. This calculation was based on a standard deviation of 5.9% of the Copenhagen risk score as found in the Inter99-trial</p> <p>Secondary outcomes: CRF, FEV, WC, BP, metabolic biochemistry, self-reported PAL.</p>	<p>Recruitment: 428 participants randomised: 138 to CHANGE, 142 to care coordination plus TAU, and 148 to TAU.</p> <p>Adherence/Retention: 86% retention in whole program, no difference between groups. Change participants had a mean 24.6 ± 14.5 sessions. 60% of participants attended 21 of the intended 42 sessions.</p> <p>Primary outcome: No difference between CHANGE intervention plus care-coordination, care-coordination plus TAU, or TAU alone.</p> <p>Secondary outcomes: No significant difference was found for secondary outcomes.</p>	<p>Within this high-income setting, usual care includes mandatory screening through primary care, and therefore the quality of standard care is considerably higher in comparison to other settings and countries which is likely to have impacted the outcomes.</p> <p>The conclusion from CHANGE is that future interventions should consider the environmental/structural changes necessary to achieve sustainable change, rather than individually anchored health interventions, taking into account the special needs of patients with schizophrenia</p>

INTERACT¹⁰²			
Aims	Study Design	Results	Lessons
<p>To determine the uptake, adherence, and clinical effectiveness of a 12-month healthy living intervention designed to reduce weight gain in people with a first-episode of psychosis in the last 3 years, who were overweight/obese.</p>	<p>Type: RCT Setting and population: Participants were overweight/obese people with first-episode psychosis. Intervention was delivered by support, time, and recovery workers who attended a 3-day training program. Intervention: Healthy living intervention drew on the Leventhal's Common Sense Model and contained both motivational and behavioural components. Sessions included patient-centered goals and implementation of and review of patient-led action plans. Optional group activities included football, walking, cycling, cooking groups. Booklets and a Web site were included to provide educational advice, action plans, goals and healthy-eating recipes. TAU received some level of support from their case manager to undertake physical health activities. Adherence: 7-individual sessions over 6 months, and a booster session at 9-10 months. Primary outcome: BMI Power calculation: To achieve 90% power at $p < 0.05$ using a t-test, 39 participants required in each group (based on a systematic review giving effect size of 0.75). Secondary outcomes: WC, dietary intake, PAL, depression scale, health status (SF-36), QOL, medication adherence, health and social care costs</p>	<p>Recruitment: 105 participants randomised: 54 INTERACT and 51 TAU</p> <p>Retention/adherence: 93 participants were followed-up at 12-months. 78% completed 6-8 sessions, 96% had at least 1 session.</p> <p>Primary outcome: No between group difference found. For participants taking clozapine/olanzapine at time of randomisation, mean weight change was -1.1kg in the intervention group (n=15), compared to 3.7kg in TAU (n=10), ($p = 0.19$, effect size 0.55).</p> <p>Secondary outcomes: No secondary variables assessed were associated to change in BMI.</p> <p>Overall costs of health and social care services were lower in the intervention group, but this was not statistically significant.</p>	<p>Larger effect found in people taking clozapine/olanzapine at time of randomisation.</p> <p>More intensive intervention may be indicated.</p> <p>May be less effective in people who are already overweight at time of intervention.</p>

<i>In SHAPE</i> ¹⁰³			
Aims	Study Design	Results	Lessons
<p>Conduct a pragmatic clinical trial to determine whether an 12-month healthy coaching program can increase fitness and reduce weight in people with serious mental illness.</p>	<p>Type: RCT Setting and participants: Participants were people with Major Depressive Disorder, Schizophrenia or Bipolar Affective Disorder and a BMI > 25kg/m². In SHAPE delivered by health mentors in community mental health centres. Intervention: <i>In SHAPE</i> Fitness club membership and a health mentor (fitness trainer who may also be a case manager) who had received instruction on healthy eating and nutrition and tailoring individual wellness plans to SMI. Coaches received 2x 60min supervision calls per week with a range of experts. Personalised were developed for participants at start of intervention and met with health mentor weekly at YMCA (for 45-60mins) for support. Nutrition component was included as individualized instruction during each meeting (focussed on healthy eating). <i>Control condition</i> Control group received fitness membership with an introductory session of safe use of exercise equipment. Primary outcomes: CRF, WT and BMI Power calculation: Not reported Secondary outcomes: PAL, dietary behaviour</p>	<p>Recruitment: 210 participants: 67 In SHAPE and 66 fitness club membership and education.</p> <p>Retention/Adherence 78% retention in both groups (n = 53 in each group). Mean gym visits was more than 2.5 times greater in intervention group (mean 28.5 ± 36.9) compared to control (10.7 ± 2.4).</p> <p>Primary outcomes: In SHAPE improved CRF more than fitness club membership and education alone (F = 5.6, p = 0.020, ES = 0.37) No between group difference for WT and BMI</p> <p>Secondary outcomes: In SHAPE had greater improvements in exercise minutes (F = 11.6, p = 0.001, ES = 0.28) and vigorous activity (F = 12.0, p = 0.001, ES = 0.48), compared to fitness club membership and education. In SHAPE resulted in greater self-reported improvements in dietary fat score (F = 13.0, p < 0.001, ES = 0.69) and portion size (F = 4.0, p = 0.047, ES = 0.15). In SHAPE participants had a trend to statistical significance for greater improvements in fruits and vegetable consumption (F = 3.7, p = 0.055, ES = 0.17).</p>	<p>Incorporation of a health mentor (fitness trainer) with gym membership results in greater fitness club attendance, greater engagement in overall physical activity and specifically vigorous activity, and improvements in dietary behaviours compared to only providing greater access to physical exercise opportunities.</p> <p>The health mentor may assist in overcoming barriers to behaviour change such as motivational challenges.</p> <p>The absence of a difference in weight between groups may be explained in part by nutrition education focussing on healthy eating and improved nutrition whereas other weight management interventions incorporate caloric restriction and daily food diaries.</p> <p>The In SHAPE program has undergone a pragmatic replication trial, using the same conditions, delivering In SHAPE over a 12-month period with an added 18-month follow-up time point. The In SHAPE program was again superior in achieving greater weight loss and improving fitness compared to control condition.¹⁰⁷</p>

<i>ACHIEVE</i> ¹⁰⁴			
Aims	Study Design	Results	Lessons
<p>Determine the effectiveness of an 18-month tailored behavioural weight-loss intervention in adults with serious mental illness.</p>	<p>Type: RCT Settings and participants: Recruitment from 10 community psychiatric outpatient programs. Participants were living with schizophrenia, bipolar affective disorder or major depressive disorder. Intervention was delivered in outpatient rehabilitation programs. Intervention: <i>ACHIEVE</i> Rehabilitation programs routinely provided breakfast and lunch to all program attendees. To facilitate the availability of reduced-calorie food choices, healthier options were offered to program participants. Three intervention components were: i. group weight-management sessions, ii. individual weight-management sessions, and iii. group exercise sessions. Intervention aimed to reduced calorie intake by avoiding sugar-sweetened beverages and junk food, eating 5 servings of fruit and vegetables daily, choosing smaller portions and healthy snacks, and participating in moderate-intensity aerobic exercise. <i>Control</i> Control group received standard nutrition and physical activity information at baseline, and health classes were offered quarterly (unrelated to weight). Primary outcome: Weight Power calculation: The original enrollment target was 320 participants. The initial study design assumed a 20% loss to follow-up, resulting in an effective sample size of 256. This study design provided 86% power to detect a between-group difference in weight change of 2.0 kg (4.5 lb) at 18 months. Secondary outcomes: WC, BP, blood biochemistry</p>	<p>Recruitment: 291 participants were randomised: 144 <i>ACHIEVE</i> intervention and 147 controls.</p> <p>Retention and adherence: 18-month follow-up data were collected on 279 participants (96%). Median number of contacts in <i>ACHIEVE</i> were 2.5 per month. Participants attended 46 of 82 sessions offered (56%) in months 1-6 and 31 of 161 sessions offered (19%) in months 7-18.</p> <p>Primary outcome: Weight change was significantly higher in the intervention group at 6, 12 and 18 months. At 18 months, mean intervention group weight loss was 3.4kg versus 0.2kg in the control group (MD = 3.2kg, 95%CI -5.1 to -1.2, p = 0.002). At 18 months, 64% of intervention group were at, or lower than, their baseline weight, compared to 49% in the control group. 38% in the intervention group lost at least 5% of their baseline weight, compared to 23% in the control group.</p> <p>No significant changes in secondary outcomes</p>	<p>Standardised procedures and materials promoted fidelity of the study, and ongoing training and quality assurance included regular observation of intervention staff.</p> <p>Weight loss achieved at 18 months in this trial compares favourably with lifestyle interventions in the general population.</p> <p>Patients continued to lose weight after 6 months, contrary to previous studies where weight-loss peaks at 6 months then weight regain occurs.</p>

<i>CApiCOR</i> ¹⁰⁵			
Aims	Study Design	Results	Lessons
<p>Evaluate the effectiveness of a 3-month educational intervention with a focus on diet and physical activity to improve PAL, BMI and waist circumference in people with severe mental illness.</p>	<p>Type: RCT Setting and participants: 10 recruitment centres. Participants were overweight/obese people with schizophrenia/schizoaffective disorder or major depressive disorder, and had been receiving antipsychotic medication treatment for at least 3 months.</p> <p>Intervention: <i>CApiCOR</i> Intervention group went through an educational program and followed a PA program and engaged in dietary intervention in groups of no more than 15 people. 24 session intervention in total (twice weekly). Participants given pedometers and routes to walk to reach 10,000 steps/day. Dietary intervention was 16 sessions for 20 minutes each, delivered by a nurse, based on basic healthy eating (Med Diet). 1-day food diaries were reviewed to check knowledge acquired and adherence.</p> <p><i>Control</i> Control group had routine check-ups with their psychiatrist (every 2 months).</p> <p>Primary outcomes: PAL, BMI, WC</p> <p>Power calculation: Not reported, although states that 478 was the calculated sample size target.</p> <p>Secondary outcomes: BP, metabolic biochemistry, dietary habits, QOL</p>	<p>Recruitment: 322 participants were randomised: 169 CApiCOR and 163 controls.</p> <p>Retention and adherence: 87% remained engaged at 3 months (84% CApiCOR and 89% controls). 49% of participants attended at least 60% of the sessions. 6.3% did not attend any sessions. Attendance at sessions within the centre (diet education and group exercise) was 58%, compared to external walking sessions 42.6% (p = 0.006).</p> <p>Primary outcomes: Intervention group increased in walking METs compared to control (MD = 266, 95% CI 16.86 to 515.25, p = 0.036). BMI decreased more in the control group (Mean = -0.23) compared to the intervention group (Mean = 0.04), (MD = 0.26, 95% CI 0.02 to 0.51, p = 0.038). No between group difference for WC.</p> <p>Secondary outcomes: Glucose also reduced more in the control group (mean = -2.43) compared to intervention (mean = 1.36), (MD = 3.79, 95% CI 0.27 to 7.30, p = 0.035). No between group difference for other metabolic biochemistry parameters or dietary habits.</p>	<p>‘Professional participants’ underwent training to deliver the intervention.</p> <p>Participants were given a pedometer and individual walking routes to reach goal based on participants residence.</p>

<i>STRIDE</i> ¹⁰⁸			
Aims	Study Design	Results	Lessons
Assess whether a lifestyle intervention, tailored for individuals with serious mental illnesses, reduced weight and diabetes risk in comparison to usual care	<p>Type: RCT</p> <p>Setting and participants: Community mental health centres. Participants were adults over 18 years of age, taking antipsychotic medication for at least 30 days with a body mass index of ≥ 27.</p> <p>Intervention: <i>STRIDE</i> Based on the PREMIER lifestyle intervention with the DASH diet. Focused on dietary change, moderate calorie restriction and increased energy expenditure through physical activity. Intervention was adapted for SMI through additional facilitators (mental health counsellor and nutritionist), repetition, sessions on psychiatric medications and planning for symptom exacerbation, sleep, budgeting and stress management. Intervention group attended weekly 2-hour group meetings with 20 minutes of physical activity over 6 months. Participants were taught to keep records of 1) food, beverages, and calories consumed; 2) servings of fruits, vegetables, and low-fat dairy products; 3) fibre and fat intake; 4) daily minutes exercised; and 5) nightly hours slept.</p> <p><i>Control</i> Usual care</p> <p>Primary outcomes: BMI</p> <p>Power calculation: Based on a two-tailed alpha level of 0.05, and a target sample size of 252 participants, study had 96% power to detect a time-by-group effect on weight at 6 months and 87% power at 12 months</p> <p>Secondary outcomes: Metabolic biochemistry, waist circumference, blood pressure</p>	<p>Recruitment: 200 participants were randomised: 104 STRIDE and 96 controls.</p> <p>Retention and adherence: Follow-up data available for 91% of participants (N=181) at 6 months and for 85% (N=170) at 12 months, The average number of sessions attended was 14.5 (SD=7.2) out of 24 (60.2%) among intervention participants.</p> <p>Primary outcomes: The intervention group lost 4.4 kg more than the control group (95% CI= -6.96 kg to -1.78 kg) at 6 months and 2.6 kg more than the control group (95% CI= -5.14 kg to -0.07 kg) at 12 months. Among participants with complete data at baseline and the 6-month follow-up, the intervention group lost an average of 3.9% and the control group gained an average of 0.9% of baseline weight. No significant change in blood pressure, blood lipids,</p> <p>Secondary outcomes: Glucose also reduced more in the control group (mean = -2.43) compared to intervention (mean = 1.36), (MD = 3.79, 95% CI 0.27 to 7.30, p = 0.035). No between group difference for other metabolic biochemistry parameters or dietary habits.</p>	Greater engagement as measured by food logs kept and sessions attended was positively correlated with weight change.
RCT = randomised controlled trial, TAU = treatment-as-usual, CBT = cognitive behaviour therapy, CRP = C-reactive protein, CRF = cardiorespiratory fitness, FEV = forced expiratory volume, WT = weight, BMI = body mass index, WC = waist circumference, BP = blood pressure, PAL = physical activity level, QOL = quality of life.			

Appendix Table 4.3. Examples across different settings: Recent / Ongoing Lifestyle Interventions for People with Mental Illness

Setting + Study	Intervention aims	Key Components	Pilot Evaluation	Initial Findings	Future Plans / Next Steps
<p>Community Mental Health Service (early psychosis):</p> <p>Keeping the Body in Mind (KBIM)^{106,109} study (Sydney, Australia)</p>	Preventing weight-gain and associated cardiometabolic decline in youth with first-episode psychosis commencing antipsychotics	<p>A pragmatic, individualised lifestyle and life-skills intervention:</p> <p>a) Specialist-delivered intervention (dietitian, exercise physiologist, clinical nurse consultant and peer support worker)</p> <p>b) Individualised and group lifestyle and life-skills components</p> <p>c) Mindful prescribing of APM with regards to propensity for cardiometabolic side-effects.</p>	<p>Non-randomised, controlled intervention; Intervention site versus treatment-as-usual site.</p> <p>^{106,109}</p>	<p>Specialist clinicians are acceptable to youth with psychosis, and effective in delivering the dietary and exercise interventions.</p> <p>Short term (12 weeks)¹⁰⁶ and long term (2 year)¹⁰⁹ weight-gain (and associated cardiometabolic decline) was prevented by the early lifestyle intervention and mindful APM prescribing.</p>	<p>Expansion of KBIM intervention to all early psychosis services in the local health district, delivered as routine care, with ongoing evaluation for program refinement.</p> <p>Pilot specialist-delivered smoking cessation intervention to young people with first-episode psychosis.</p> <p>Delivery of specialist-driven intervention (diet, exercise & smoking cessation) to those receiving clozapine or a long-acting injectable antipsychotic (high metabolic risk groups).</p>
<p>Early Intervention Service (Psychosis)</p> <p>PHAsTER study (Melbourne, Australia).</p>	To evaluate whether the addition of a physical health nurse into the treating team can prevent the onset of weight gain or other metabolic factors in young people with a first episode of	A number of interventions for physical health have been introduced – including exercise physiologists, dieticians, gym group, yoga group and boxing group. The role of the physical health nurse will co-ordinate the young person in engaging with these interventions and conduct metabolic	Intervention and selected components were selected on basis of service user consultations and feedback on other initiatives to maximize	Recruitment commencing August 2018 and will continue until December 2019.	Study will evaluate whether a service model of case-manager, doctor and physical health nurse will be effective to prevent weight gain and metabolic factors. If demonstrated then a multi-site RCT will be conducted. A number of secondary outcomes are being examined – including symptoms severity, sleep, satisfaction

	psychosis	monitoring.	acceptability		with services.
<p>Outpatients from Private Psychiatric Hospital (severe mental illness):</p> <p>Healthy Body, Healthy Mind (HBHM) study¹¹⁰ (Melbourne, Australia)</p>	Reducing weight, abdominal obesity and improving metabolic parameters & enhancing mental wellbeing in people with SMI and comorbid metabolic syndrome, using a weekly group program delivered through outpatient psychiatric hospital.	A group lifestyle intervention: a) Exercise instruction (weekly via a qualified exercise physiologist) b) Dietary instruction (practical) and education (via a qualified dietician) c) Psychoeducation (on a range of healthy lifestyle practices) d) Mindfulness training (meditation, mindful eating etc.) e) Motivation and goal setting training.	Mixed-methods evaluation of participant's and clinician's experiences of the program and reported changes	The most beneficial/useful components of the program reported by the majority of participants were the cooking and exercise 'practical' elements After 12-weeks, significant reductions of bodyweight, waist circumference and BMI had occurred. ¹¹⁰ There were no significant changes in mental health or on any other biometrics including blood levels.	Study replication is now required using a controlled design in a larger sample. HBHM can still be further fine-tuned to provide the best method of delivery: format, intensity, and duration of the program for people with SMI. Especially in integrating in online components to reduce cost and potentially improve patient compliance.
<p>Community Leisure Services (transdiagnostic referrals, from primary care, addiction and mental health services):</p> <p>The Take Charge! Project (Sydney, Australia)</p>	Using community leisure services and fitness centres to improve physical and mental health outcomes in people with mental illness	'Referral Scheme' from CMHTs and primary care to local authority-linked leisure providers (Belgravia Leisure): a) Leisure centre access and free personalised health & fitness programs to people with diagnosed mental illness (transdiagnostic). b) Delivered by personal trainers and exercise physiologists who have received specialist training in 'Understanding Mental Health' and 'Mental Health	<i>Take Charge!</i> is based on non-randomized pilot studies evaluating community leisure exercise referral for people with psychosis (the iBEEP study ¹¹¹⁻¹¹³)	Previous evaluation of community-based exercise schemes for young people with mental illness show this approach is feasible, highly accepted, and may be beneficial for improving both physical activity, waist circumference, psychiatric symptoms and functioning ¹¹¹⁻¹¹³ As of Dec 2018, ~350 people have completed the 8-	The Take Charge! scheme is undergoing translation into more youth-friendly formats (for young people with mental illness), while also aiming to be rolled out across up to 60 leisure centres throughout Australia by 2020. Alongside this, 6000 leisure centre staff with undergo the aforementioned mental health training.

		<i>First Aid'</i>		<i>weeks Take Charge!</i> program	
<p>Outpatients from Private Psychiatric Hospital (severe mental illness):</p> <p>Healthy Body, Healthy Mind (HBHM) study¹¹⁰ (Melbourne, Australia)</p>	<p>Reducing weight, abdominal obesity and improving metabolic parameters & enhancing mental wellbeing in people with SMI and comorbid metabolic syndrome, using a weekly group program</p>	<p>A group lifestyle intervention:</p> <p>a) Exercise instruction (weekly via a qualified exercise physiologist)</p> <p>b) Dietary instruction (practical) and education (via a qualified dietician)</p> <p>c) Psychoeducation</p> <p>d) Mindfulness training</p> <p>e) Motivation and goal setting training.</p>	<p>Mixed-methods evaluation of participant's and clinician's experiences of the program and reported changes</p>	<p>The most useful components reported by participants were cooking and exercise 'practical' elements. After 12-weeks, reductions of bodyweight, waist circumference and BMI had occurred.¹¹⁰ No significant changes in mental health or any other biometrics</p>	<p>Study replication is now required using a controlled design in a larger sample. HBHM can still be further fine-tuned to provide the best method of delivery: format, intensity, and duration of the program for people with SMI.</p> <p>Especially in integrating in online components to reduce cost and potentially improve patient compliance.</p>
<p>Residential Rehabilitation Units (Severe Mental Illness)</p> <p>GO HEART¹¹⁴ study (Brisbane, Australia)</p>	<p>The GO HEART project aims to offer a lifestyle (diet plus exercise) intervention for people with severe and persistent mental illness in a residential rehabilitation facility in Brisbane Australia</p>	<p>a) a 10-week exercise physiology student led circuit mixed aerobic and resistance exercise intervention provided 3 times per week on site for residents</p> <p>b) an interactive dietary training program led by a dietitian.</p>	<p>Single arm, prospective pilot study evaluating outcomes pre- and post- a 10 week intervention</p>	<p>The program was well accepted with recruitment, retention and participation rates around 80%. There were promising improvements in functional exercise capacity, amount of time spent exercising and reduction of negative symptoms.</p>	<p>This program has been extended to other residential rehabilitation facilities in Brisbane, with ongoing evaluation.</p>
<p>Community Mental Health Services (Severe Mental Illness)</p> <p>Walk this Way¹¹⁵ study (London, England)</p>	<p>Using health coaching in community dwelling people with SMI to increase physical and reduce sedentary behaviour.</p>	<p>Intervention from self-efficacy theory consists of:</p> <p>1) Educational session on benefits of active lifestyle, addressing common barriers</p> <p>2) Provision of digital objective devices to self-monitor PA</p> <p>3) Fortnightly health coaching intervention for</p>	<p>Feasibility RCT to consider acceptability of the intervention and outcomes.</p>	<p>Target recruitment (N=40) were reached. The intervention was reported to be feasible and acceptable to participants and staff delivering the coaching. There was an indication of an increase in objective (accelerometer) PA</p>	<p>We are currently refining the intervention and applying for funding for a larger RCT.</p>

		16 weeks. 4) Weekly walking group.		and reduced SB.	
<p>Homeless Population in central London, UK (Alcohol addiction, drug addiction and a range of mental health complications).</p> <p>‘Promoting physical activity in vulnerable adults “at risk” of homelessness: A Randomised Controlled Trial’</p>	<p>The aim of this study is to evaluate the impact of a group exercise intervention on activity levels, mental health, and physical health in people who are homeless or at risk of homelessness in central London, UK.</p>	<p>A group exercise intervention:</p> <p>a) Participants recruited through a London-based homeless charity</p> <p>b) Allocated to intervention (exercise classes) or control (usual care), then followed up at 3, 6, 9, and 12 month.</p> <p>c) All exercise sessions (one per week for 12 months) will be run by qualified fitness instructors or sport coaches.</p> <p>d) All sessions will be designed to cater for the participants needs after conversations between participants and programme lead at the start and throughout the intervention.</p> <p>e) Conversations will be unstructured and participant-led.</p>	<p>Exercise sessions were run across four cites over a period of nine months and all data to be collected in the main were collected.</p>	<p>The intervention and data collection method were deemed acceptable in this high risk population and no adverse events were encountered. No substantial changes will be made to the intervention or the protocol and data collected may be used in the main analyses.</p>	<p>The intervention and evaluation procedures will be delivered to a further 900 patrons of the homeless charity. The study is expected to be completed in 2022.</p>

Appendix Table 5.1. Key Recommended Resources for Integrating Physical Healthcare at Individual, Health Service, and Population Levels for People with Mental Illness

	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:	
	World Health Organisation 2018	Management of physical health conditions in adults with severe mental disorders: WHO Guidelines	Severe Mental Illness	Mental health practitioners	Reducing morbidity and premature mortality.	https://www.who.int/mental_health/evidence/guidelines_physical_health_and_severe_mental_disorders/en/
Context	<p>“In addition to causing a large proportion of morbidity, mental disorders – especially severe mental disorders (SMD) – are linked with poorer health outcomes and increased mortality... The objective of these guidelines is to improve the management of physical health conditions in adults with SMD and support the reduction of individual health behaviours constituting risk factors for these illnesses, with the aim of decreasing morbidity and premature mortality amongst people with SMD.”</p> <p>“Furthermore, people with SMD are more likely to engage in lifestyle behaviours that constitute risk factors for non-communicable diseases (NCDs) such as tobacco consumption, physical inactivity and consuming unhealthy diets.”</p>					
Content Guide	<p>Part 1: Introduction Part 2: Guideline development process Part 3: Evidence and recommendations Part 4: Implementation considerations Part 5: Publication, dissemination, and evaluation</p>					
Key Message/ Findings	<p>Page 42 – Implementation considerations</p> <p>“The recommendations in these guidelines must be implemented using a person-centred and integrated approach to address factors associated with excess mortality in persons with SMD. This integration is needed at four levels – screening and early detection of physical health conditions, counselling for behavioural risk factors, assessment and management of cardiovascular disease risk and management of established physical and mental health conditions.”</p> <p>“We propose a multilevel intervention framework that will be useful for designing, implementing and evaluating interventions and programmes to reduce excess mortality in persons with SMD (Liu et al., 2017). The first level is individual focused interventions. The second and third levels of the framework consist of strategies focussed on the health systems and socio-environmental context, respectively, which provide the enabling environment for implementation of the recommendations”</p>					

	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:
Public Health England 2018	Health matters: reducing health inequalities in mental illness	SMI	Public Health authorities and Health Services	Reducing morbidity and premature mortality.	https://www.gov.uk/government/publications/health-matters-reducing-health-inequalities-in-mental-illness/health-matters-reducing-health-inequalities-in-mental-illness#summary
Context	“People with severe and enduring mental illness are at greater risk of poor physical health and reduced life expectancy compared to the general population....This edition of Health matters sets out the scale of the problem and presents actions that local areas can take to reduce health inequalities, improve physical health and life chances of people living with mental illness... Although the focus is on adults with more severe and enduring mental illness, many of the actions will be of benefit to all people experiencing mental illness.”				
Content Guide	Part 1: Summary Part 2: Scale of the problem Part 3: Inequalities experienced by people with mental illness Part 4: Local actions to reduce inequalities in mental illness Part 5: Resources				
Key Message/ Findings	<p>A range of preventative actions that local areas can take to reduce inequalities and improve health outcomes and the lives of people with mental illness:</p> <ol style="list-style-type: none"> 1. Understand local population need 2. Address the social determinants of poor health 3. Build stronger communities and social connections 4. Early detection and intervention for physical health risks 5. No wrong door: support available through every contact point 6. Build a confident, competent and committed public mental health workforce 				

	Document Name	Conditions Focus	Target Audience/Settings	Primary Outcomes	Accessible at:										
<i>The Kings Fund (London, U.K.) 2016</i>	Bringing together physical and mental health A new frontier for integrated care	- All mental illness - Prevention - MH caused by Chronic Cond	- Public Health - Primary Care - Hospital Care - Community Care - Psychiatric Care	Cardiometabolic Health	https://www.kingsfund.org.uk/publications/physical-and-mental-health										
Context	The importance of the third of these components has been further emphasised in the report of the independent Mental Health Taskforce to the NHS in England, which called for the development of integrated care spanning people’s physical, mental and social needs (Mental Health Taskforce 2016). The purpose of our report is to explore in greater detail what this should involve.														
Content Guide	<ul style="list-style-type: none"> • Part 1: Introduction to the report and importance of tackling physical ↔ mental health co-morbidities • Part 2: Analysis of what integrated care for mental and physical health would look like from a patient or service user perspective • Part 3: Overview of 10 areas where integrated care is most needed, highlighting existing evidence for each • Part 4: Examples of innovative service models currently being developed and deployed in England • Part 5: Analysis of the barriers to change and suggestions as to how these can be overcome 														
Key Findings	<p>Table 2 Ten priority areas for improvement</p> <table border="1"> <tbody> <tr> <td>Prevention/public health</td> <td>1. Incorporating mental health into public health programmes 2. Health promotion and prevention among people with severe mental illnesses</td> </tr> <tr> <td>General practice</td> <td>3. Improving management of ‘medically unexplained symptoms’ in primary care 4. Strengthening primary care for the physical health needs of people with severe mental illnesses</td> </tr> <tr> <td>Chronic disease management</td> <td>5. Supporting the mental health of people with long-term conditions 6. Supporting the mental health and wellbeing of carers</td> </tr> <tr> <td>Hospital care</td> <td>7. Mental health in acute general hospitals 8. Physical health in mental health inpatient facilities</td> </tr> <tr> <td>Community/social care</td> <td>9. Integrated support for perinatal mental health 10. Supporting the mental health needs of people in residential homes</td> </tr> </tbody> </table>					Prevention/public health	1. Incorporating mental health into public health programmes 2. Health promotion and prevention among people with severe mental illnesses	General practice	3. Improving management of ‘medically unexplained symptoms’ in primary care 4. Strengthening primary care for the physical health needs of people with severe mental illnesses	Chronic disease management	5. Supporting the mental health of people with long-term conditions 6. Supporting the mental health and wellbeing of carers	Hospital care	7. Mental health in acute general hospitals 8. Physical health in mental health inpatient facilities	Community/social care	9. Integrated support for perinatal mental health 10. Supporting the mental health needs of people in residential homes
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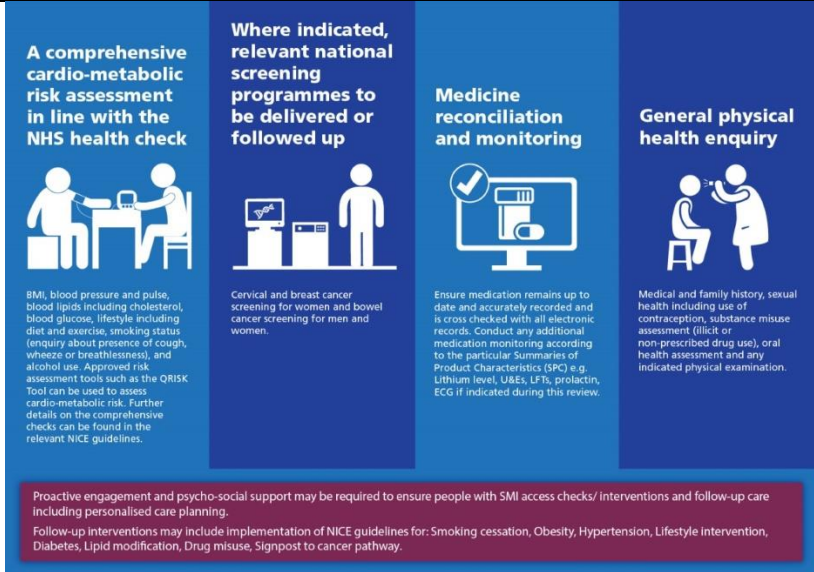
	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:
NHS England 2018	Improving physical healthcare for people living with severe mental illness (SMI) in primary care: Guidance for CCGs	Severe Mental Illness	Commissioners of Mental Health and Primary Care services	Reducing Premature mortality gap	https://www.england.nhs.uk/publication/improving-physical-healthcare-for-people-living-with-severe-mental-illness-smi-in-primary-care-guidance-for-ccgs/
Context	This guidance highlights the responsibilities of CCGs in England to commission services that deliver comprehensive physical health assessments and follow up care to people on the severe mental illness (SMI) register in primary care, addressing the premature mortality experienced by people with SMI compared to the general population.				
Content Guide	Part 1: Introduction Part 2: Purpose of the guidance Part 3: Priority actions for improving physical healthcare for people with SMI Part 4: Commissioning comprehensive physical healthcare for people with SMI Part 5: Preparing for implementation				
Key Message/ Findings	 <p>A comprehensive cardio-metabolic risk assessment in line with the NHS health check BMI, blood pressure and pulse, blood lipids including cholesterol, blood glucose, lifestyle including diet and exercise, smoking status (enquiry about presence of cough, wheeze or breathlessness), and alcohol use. Approved risk assessment tools such as the QRISK Tool can be used to assess cardio-metabolic risk. Further details on the comprehensive checks can be found in the relevant NICE guidelines.</p> <p>Where indicated, relevant national screening programmes to be delivered or followed up Cervical and breast cancer screening for women and bowel cancer screening for men and women.</p> <p>Medicine reconciliation and monitoring Ensure medication remains up to date and accurately recorded and is cross checked with all electronic records. Conduct any additional medication monitoring according to the particular Summaries of Product Characteristics (SPC) e.g. Lithium level, UAEs, LFTs, prolactin, ECG if indicated during this review.</p> <p>General physical health enquiry Medical and family history, sexual health including use of contraception, substance misuse assessment (licit or non-prescribed drug use), oral health assessment and any indicated physical examination.</p> <p>Proactive engagement and psycho-social support may be required to ensure people with SMI access checks/ interventions and follow-up care including personalised care planning. Follow-up interventions may include implementation of NICE guidelines for: Smoking cessation, Obesity, Hypertension, Lifestyle intervention, Diabetes, Lipid modification, Drug misuse, Signpost to cancer pathway.</p>				<p>This guidance does not recommend one specific model for how physical healthcare for people with SMI should be commissioned and delivered in primary care but sets out what good quality physical healthcare provision in primary care must include in terms of:</p> <ol style="list-style-type: none"> 1. Completion of recommended physical health assessments 2. Follow-up: delivery of or referral to appropriate NICE-recommended interventions 3. Follow-up: personalised care planning, engagement and psychosocial support <p>Best practice evidence indicates that where primary care teams deliver care collaboratively with secondary care services outcomes are improved. The lead responsibility for assessing and supporting physical health will transfer depending on where an individual is in their pathway of care.</p>

Figure 1. The recommended physical health assessments for people on the SMI register

	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:
<i>Te Pou</i> <i>New Zealand Equally Well collaborative</i> <i>2017</i>	Equally Well : The physical health of people with mental health conditions and/or addiction	Severe mental health conditions and/or addiction	Mental health, addiction and disability sectors	Reducing mortality and morbidity	https://www.tepou.co.nz/resources/the-physical-health-of-people-with-mental-health-conditions-andor-addiction-evidence-update-december-2017/854
Context	<p>“This report is a summary of the 2017 evidence update, which follows on from an earlier literature review <i>The physical health of people with a serious mental illness and/or addiction: An evidence review</i> (Te Pou o te Whakaaro Nui, 2014).”</p> <p>“In summary, it found that: people living with serious mental health problems are at a greater risk of many chronic health conditions and have a much shorter life expectancy than their general population counterparts; the disparities are due to greater exposure to known risk factors including low socioeconomic status, high rates of smoking, alcohol and other drug use, reduced physical activity and poor nutrition, the side effects of psychotropic medication, and reduced access to physical healthcare; a comprehensive approach involving collaboration across the health and social sectors, and including interventions at policy, healthcare service and individual behaviour change levels, is needed to address these inequities (Te Pou o te Whakaaro Nui, 2014).”</p>				
Content Guide	<p>Page 4: Findings: How does recent evidence advance our understanding of the higher rates of premature mortality and its causes?</p> <p>Page 5: Findings: What does a more in-depth investigation of the literature on psychotropic medications tell us about their impact on physical health?</p> <p>Page 6: Findings: What does recent evidence tell us about priorities for interventions at systems, health services, and individual levels?</p> <p>Page 12: Recommended priorities for action</p> <p>Page 13: Proposed research agenda</p> <p>Page 15: Conclusions</p>				
Key Message/Findings	<p>Conclusions – page 15</p> <p>“Research summarised in this review indicates that the widening inequities may also be due to structural socioeconomic factors. This includes increasing income inequalities in many countries which are associated with a range of social and economic challenges – loss of employment, poor quality accommodation and homelessness – all of which have been exacerbated in many countries following austerity measures after the 2008 global financial crisis. Other contributing factors are the relatively high rates of tobacco smoking, an international trend of increased prescribing of psychotropic medications, and difficulties in co-ordinating between primary care and secondary mental health service”</p> <p>“Recent review studies summarised in this report identify possible interventions across health, social and economic policy, healthcare service delivery, and at individual behaviour change levels. The evidence base is growing in strength, and certainly provides a good steer on where limited resources may be targeted to impact most effectively on the health disparities.”</p>				

	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:
	<i>World Psychiatric Association (in collaboration with WHO)</i> 2017	SMI (MDD, BPD, SZ)	Researchers, Clinicians and Policy-Makers	Premature Mortality Gap	https://onlinelibrary.wiley.com/doi/full/10.1002/wps.20384
Context	Despite known risk factors for premature mortality, evidence for effective interventions in persons with SMD is limited. In this paper we proposed and described models to better understand the complex relationships among risk factors and correlates of mortality, and to conceptualize interventions at the individual, health system and socio-environmental levels. These models guided us to outline key action points for clinical practice, policy and research agendas to move towards health equity for those with SMD				
Content Guide	page 1. Introduction page 2. Multilevel model of risk for excess mortality page 3. Multilevel intervention framework to reduce excess mortality page 7. Priorities for clinical practice, policy and research agendas				
Key Message/Findings	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 5px; width: 30%;"> <p>Individual-focused interventions</p> <p><i>Mental health disorder management</i></p> <ul style="list-style-type: none"> • Early detection and appropriate treatment • Interventions delivered at critical time points (e.g., within first year of discharge from hospital) • Recovery-oriented treatment (e.g., service-user involvement, informed choice) <p><i>Physical health treatment</i></p> <ul style="list-style-type: none"> • Early detection and appropriate treatment <p><i>Lifestyle behaviour interventions</i></p> <ul style="list-style-type: none"> • Tobacco cessation • Behavioural weight management programmes, including healthy diet, physical activity • Interventions addressing substance abuse and risky sexual behaviour </div> <div style="border: 1px solid black; padding: 5px; width: 30%; text-align: center;"> <p>Health system-focused Interventions</p> <p><i>Service delivery</i></p> <ul style="list-style-type: none"> • Screening for medical conditions • Care coordination or collaborative care strategies (e.g., nurse care manager) • Guidelines for integrated delivery of mental and physical health care </div> <div style="border: 1px solid black; padding: 5px; width: 30%;"> <p>Community level and policy-focused Interventions</p> <p><i>Social support</i></p> <ul style="list-style-type: none"> • Peer support programmes • Family support programmes • Mental health and consumer advocacy groups <p><i>Stigma reduction interventions</i></p> <ul style="list-style-type: none"> • Directed toward communities with SMD and general public <p><i>Policy level interventions</i></p> <ul style="list-style-type: none"> • Comprehensive health care packages, insurance parity and quality • Public health programmes (tobacco cessation, HIV prevention, suicide prevention) • Employment, housing, and social welfare sector involvement </div> </div>				

	Document Name	Conditions Focus	Target Audience/Settings	Primary Outcomes	Accessible at:
	World Health Organization (Geneva, Switzerland) 2017	SMI (MDD, BPD, SZ), particularly in LMIC Settings	Policy-makers, health programmers/ services, NGOs, service users, carers – particularly in LMICs.	Premature Mortality Gap, particularly in LMICs	https://www.who.int/mental_health/evidence/policy_brief_on_severe_mental_disorders/en/
Context	People with SMI experience a large gap in life-expectancy, which is worst in LMIC settings. “There are concrete actions that different stakeholder groups can take to ensure that people with severe mental disorders live healthier and longer lives. Government, health-care managers, care providers and nongovernmental organizations need to work in a coordinated way with people with severe mental disorders and their families in order for progress to be made. This policy document provides different stakeholder groups including policy-makers, health-programme managers, health-service providers, NGOs and service users and carers with concrete steps they can take to ensure that people with severe mental disorders live healthier and longer lives.”				
Content Guide	Page 4: Actions for Policy Makers Page 5: Actions for health-programmes managers Page 6: Actions for Health Care Services Page 7: Actions for NGOs Page 8: Actions for service users, carers				
Key Message/ Findings	<p>INDIVIDUAL LEVEL</p> <ul style="list-style-type: none"> • Management of mental disorder • Physical health checks and treatment • Advice on healthy lifestyle <p>SOCIETAL LEVEL</p> <ul style="list-style-type: none"> • Access to social services • Efforts to reduce stigma <p>HEALTH SYSTEM LEVEL</p> <ul style="list-style-type: none"> • Integrated care for physical and mental health <p>INTERVENTIONS AT THE INDIVIDUAL LEVEL</p> <p>People with severe mental disorders require early detection and appropriate treatment of their mental health condition. Suicide prevention interventions such as reducing access to means and problem-solving strategies are an important part of the mental health treatment plans for people with severe mental disorders.</p> <p>INTERVENTIONS AT THE HEALTH SYSTEM LEVEL</p> <p>Strengthening health systems for example by providing guidelines for integrated delivery of physical and mental health care will improve outcomes for people with severe mental disorders. These guidelines incorporate screening for physical health conditions, care coordination among mental health and primary care providers and delivery of medical services in mental health settings. Examples of such evidence-based guidelines from WHO are Mental Health Gap Action Programme (mhGAP) guidelines and Package of essential NCD interventions for primary health care (PEN) guidelines for non-specialist care in low resource settings.</p> <p>INTERVENTIONS AT THE SOCIETAL LEVEL</p> <p>Certain policies, for example, policies to provide mental health insurance coverage, find suitable work with on-the-job support and provide affordable and safe housing may enhance the ability of people with severe mental disorders to fully integrate into society.</p> <p>Programmes to reduce stigma including those that encourage social contact with people with severe mental disorders can improve attitudes and reduce discrimination. Peer-support programmes, family support programmes and mental health consumer groups can provide added value to health interventions for people with severe mental disorders.</p>				

	Document Name	Conditions Focus	Target Audience/ Settings	Primary Outcomes	Accessible at:
	<i>Academy of Medical Royal Colleges</i> 2017	Severe Mental Illness	Organisations, services and professionals involved in health services	Reducing Premature Mortality Gap, and co-morbidity gap	http://www.aomrc.org.uk/reports-guidance/improving-physical-health-adults-severe-mental-illness-essential-actions/
Context	<p>“The physical health of people with severe mental illness (SMI) is significantly worse than the health of the general population. People with SMI: have a life expectancy that is shortened by 10–20 years (Davies, 2013); have higher rates of physical ill-health than the general population; have higher rates of health-risk behaviours, including obesity and tobacco smoking (approximately twice as high than the general population) (Davies, 2013) ; are likely to have a long-term physical condition (Naylor et al, 2012). This report recommends practical ways to improve physical healthcare services for people with SMI.”</p>				
Content Guide	<p>Overview and Introduction Part 1. Recommendations for action Part 2: Key areas for service improvements</p>				
Key Message/ Findings	<p>Page 6</p> <p>“There are major differences in the life expectancy of people with severe mental illness”</p> <p>“...This report highlights these differences and sets out clear recommendations for action. It recommends establishing an expert group to set priorities and national standards, improve training standards and promote research in this important area. There are many other important recommendations, not least that there should be the same level of physical healthcare available to people with severe mental illness as is available to members of the general population. This will be helped by activity driven by the Five Year Forward View for Mental Health recommendation for improvement in this area, and should be ensured through inspection by the Care Quality Commission”</p>				

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