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Evidence Check

Mental wellbeing risk & protective factors

Executive Summary

Background

This Evidence Check was undertaken for VicHealth to review the recent, high-level evidence on risk and protective factors for mental ill health and mental wellbeing. The findings of the review will be used to support the development of VicHealth's submission to the Royal Commission into Victoria's Mental Health System.

Scope of review

The Evidence Check identified risk and protective factors by addressing the question – *What is the recent evidence on risk factors and protective factors for mental health and wellbeing?*

The Evidence Check focused on the risk and protective factors associated with positive mental health and wellbeing, or the primary prevention of mental ill health, specifically anxiety and depression. It excluded complex mental illnesses, such as psychosis, as well as suicide prevention. Treatment and individually-focussed interventions were also excluded.

Methods

We searched Medline, PsycINFO, CINAHL, Science Direct, Web of Science, EMBASE, Proquest Health & Medical Collection, Joanna Briggs Institute and the Cochrane Database of Systematic Reviews in April/May 2019. Searches were limited to peer-reviewed systematic reviews published in the English language between January 2014 and April 2019 from Australia, Canada, New Zealand, United Kingdom, United States, and Western and Northern European countries. Searches were undertaken by one reviewer and independently checked by another. A quality assessment using the JBI critical appraisal checklist for systematic reviews was undertaken of each systematic review, which was again checked for reliability. Information from the selected reviews was entered into a template developed apriori.

Summary: Risk and protective factors for mental health and wellbeing

There were 92 systematic reviews that met the inclusion criteria for question 1; 40 were of high quality, 25 were of moderate quality and 27 were of low quality.

For children, risk factors were being a refugee, homelessness and out of home care, screen time and sedentary behaviour, chronic illness, obesity and maternal illness. Protective factors were positive family functioning and supportive communities, and there was some evidence for physical activity.

For teenagers, risk factors were high screen time and cyberbullying, poor family functioning, chronic illness and obesity, out of home care, factors related to refugee status, and high demand academic environments. Protective factors were positive family functioning, social support (including online), community support, and physical activity.

For young adults, risk factors were social isolation and loneliness, homelessness, being a sexual minority, migration and cyberbullying. Protective factors were physical activity and strong social relationships (include supportive integrated online networks for same-sex attracted young people).

For adults and the general population, risk factors were social isolation and loneliness, insecure employment and unemployment, unsupportive work conditions, economic inequality, migration, homelessness, caregiving, physical health conditions, stressful events (including intimate partner violence

and drought), and being a sexual minority. Protective factors were employment, physical activity, strong social relationships and networks, diet and alcohol reduction, and green space.

Several reviews had a specific focus on women in the perinatal period. Risk factors were childhood and lifetime abuse, chronic medical conditions, stress and unsupportive relationships, disturbed sleep and multiple births. Protective factors were social support and physical activity.

The few reviews of studies of older adults showed that death of a partner, social isolation and loneliness, and being a caregiver for someone with dementia were risk factors. Protective factors were social support and physical activity.

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Glossary of terms, abbreviations and acronyms

Indigenous – Refers to people who were native to a territory prior to it being incorporated into a national state, and who are politically and culturally separate from the majority ethnic identity of the state that they are a part of. Indigenous peoples are inheritors and practitioners of unique cultures and ways of relating to people and the environment. They have retained social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live. The term Aboriginal and Torres Strait Islander peoples is preferred for indigenous Australians. However, the terms employed in the reviews and studies being reported are used throughout this Evidence Check.

LGBTIQ – Refers to people's sexuality and gender identity, including people who are lesbian, gay, bisexual, transsexual or transgender, intersex, queer or questionining. Note, however, that this Evidence Check uses whichever terms are used in the reviews and studies being reported. This means that the terms and acronyms used to refer to people's sexuality or gender identity vary throughout the report, as necessary to be consistent with the information being reported (ie, LGB, GLBT, LGBTQ).

Meta-analysis – A statistical analysis that combines the results of multiple scientific studies addressing a similar question, with each individual study reporting measurements that are expected to have some degree of error.

PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses: an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses.

US – United States of America

Background

VicHealth has commissioned a review of the recent, high-level evidence on risk and protective factors for mental ill health and mental wellbeing. The review will be used to support the development of VicHealth's submission to the Royal Commission into Victoria's Mental Health System. The primary audience for the review will be senior staff within VicHealth, who will use it to develop a submission to be read by the Royal Commissioners and senior policy-makers.

Scope of review

The review considers the risk and protective factors associated with positive mental health and wellbeing, or primary prevention of mental ill health, specifically anxiety and depression.

Review questions

The review addresses the evidence for risk and protective factors for mental health and wellbeing. The review question is:

1. What is the recent evidence on risk factors and protective factors for mental health and wellbeing?

Key definitions

Some key definitions relevant to the review are provided below.

Risk and protective factors
Mental wellbeing and mental ill health result from a complex combination of events and conditions that take place in biological, individual-psychological, social-psychological and structural domains (Commonwealth Department of Health and Aged Care, 2000). The interplay between the individual and the environment is critical. The population health model encompasses the full range of risk and protective factors that determine health (at the individual; family, friend, peer; organisation, community; sector/system and society levels).

Positive mental health and wellbeing
"Mental wellbeing is a 'dynamic state in which the individual is able to develop to their potential, work productively and creatively, build strong and positive relationships with others and contribute to the community' (Foresight Mental Capital and Wellbeing Project, 2008). Conversely, mental illness occurs when a person's thoughts, feelings or behaviour cause ongoing suffering or an inability to cope with everyday life. Both mental wellbeing and mental illness result from complex interactions between the mind, body and environment" (VicHealth, 2015).

Primary prevention of mental ill health, specifically anxiety and depression
"Prevention refers to 'interventions that occur before the initial onset of a disorder' to prevent the development of disorder (Mrazek & Haggerty, 1994). The goal of prevention interventions is to reduce the incidence and prevalence of mental health problems and mental disorders. Prevention interventions may be classified according to their target group as: universal, provided to whole populations; selective, targeting those population groups at increased risk of developing a disorder; and indicated, targeting people showing minimal signs and symptoms of a disorder. Together, the universal, selective and indicated categories of intervention correspond to the concept of 'primary prevention' in the model of prevention applied to mental health by Caplan (1964)" (Commonwealth Department of Health and Aged Care, 2000).

Universal interventions are those that are implemented in a population that is not identified on the basis of potential risk or symptoms (Mrazek & Haggerty, 1994). For example, in a school setting, universal programs

have been defined as ‘school-based mental health promotion programs delivered to all students within a class, grade, or the entire school’ (Fenwick-Smith, Dahlberg, & Thompson, 2018).

Risk and protective factors

What is the recent evidence on risk factors and protective factors for mental health and wellbeing?

Methods

Search strategy

A search of literature in Medline, PsycINFO and CINAHL databases, and the Cochrane Database of Systematic Reviews was conducted in late April 2019, to identify systematic reviews that examined risk and protective factors associated with positive mental health and wellbeing or primary prevention of mental ill health, specifically anxiety and depression. Keywords used in the search were:

> mental*, risk, prevention, promotion, protective, well-being/wellbeing, systematic review.

In addition, keywords for factors known to be associated with mental health and wellbeing were searched, in combination with the above terms, including:

> hous*, home*, employ*, education, social determinant, inequit*, sport, physical activity, loneliness, isolation, social inclusion and social capital.

Searches were limited to peer-reviewed systematic reviews published in the English language between January 2014 to April 2019 from Australia, Canada, New Zealand, United Kingdom, United States, and Western and Northern European countries.

Review exclusions included:

- complex mental illness, such as schizophrenia or psychosis
- primary goal is suicide prevention
- identify or treat mental ill health
- individually focussed
- within therapeutic and clinic services (e.g. arts therapy; psychological treatments; counselling)
- grey literature

Searches were performed in the Medline, PsycINFO and CINAHL databases, entering combinations of keywords into the Subject and Abstract search fields to identify potentially relevant articles. Keywords were also searched in the Cochrane Database of Systematic Reviews using the Title/Abstract/Keyword search fields.

For each search, the titles of the articles were screened by one reviewer to identify articles that referred to risk or protective factors for mental health or mental wellbeing. Articles that were obviously irrelevant were excluded at this stage. A sample of excluded articles (10%) was checked by a second reviewer as a reliability check and there were no inconsistencies.

The full-text of articles that were potentially relevant were then accessed and examined. Additional articles that were irrelevant were identified at this stage by one reviewer. Again a sample of these (10%) was checked by a second reviewer as a reliability check and there were no inconsistencies.

Details of the articles that fulfilled the review criteria were entered into a template developed a priori. The template included source, quality rating, study type, level of evidence, population/setting, number of studies, outcomes measured, risk or protective factors investigated, and direction of or magnitude of effects. One reviewer extracted relevant data into the template and another reviewer independently checked all of the template table entries. Any differences were discussed and resolved.

Quality assessment

To determine quality, the systematic reviews were assessed according to the Joanna Briggs Institute (2017) *Checklist for Systematic Reviews and Research Syntheses* (see Appendix 1). This evaluates scientific quality against 11 questions, where each question must be answered positively to gain a point, resulting in a score ranging from 0-11. Scores of 0–5 were deemed low quality, 6–8 moderate quality, and 9–11 high quality. One reviewer assessed the reviews for quality and another checked 10% of the assessments. Only minor discrepancies were noted and these were resolved by discussion between the reviewers.

Search results

After duplicates were removed 1928 articles were reviewed. There were 92 reviews that met the inclusion criteria. A flowchart of the literature selection process is included at Appendix 2. Of the 92 reviews, 40 were of high quality, 25 were of moderate quality and 27 were of low quality.

The high-quality reviews that did not achieve a full score of 11 generally did not assess publication bias and/or were not able to use methods to combine the results of studies due to heterogeneity. The moderate-quality studies had these limitations and also tended to not have independent review of critical appraisals or ways to minimise data extraction errors. The low-quality studies had these limitations and were also likely to not conduct a critical appraisal and it was often not stated whether there was an independent review of study selection and data extraction.

Findings

Appendix 3 provides summaries of the reviews. Key details for each of the 92 reviews are provided in Table 1. Table 2 summarises the risk and protective factors for VicHealth priority groups. Table 3 summarises the risk and protective factors by age groups.

Risk factors

Individual factors. These were lifestyle factors (alcohol, cigarette, and other substance use; screen time; and sedentary behaviours), sexual orientation and obesity.

Lifestyle factors. Smoking was shown to be a risk factor for later development of depression and anxiety in a high-quality review of studies of adults, although mental health was also a risk factor for smoking in some studies (Fluharty, Taylor, Grabski, & Munafò, 2017). A low-quality review of studies of Asian American, native Hawaiian, and Pacific Islander youth found that cigarette use and alcohol consumption were associated with depression (Wyatt, Tien, Park, Kwon, & Trinh-Shevrin, 2015). Substance use was found to be a factor associated with poor mental health and wellbeing for indigenous young people 20 years and under, from high-income countries (Young, Hanson, Craig, Clapham, & Williamson, 2017) and for homeless youth aged between 10 and 24 (Medlow, Klineberg, & Steinbeck, 2014).

Three reviews found a relationship between screen time and mental health and wellbeing. In a high-quality umbrella review, Stiglic and Viner (2019) identified one review that found moderate evidence for an

association between children and adolescent's screen time and the duration and severity of anxiety symptoms, and one review that found social media screen time, and more than two hours of screen time a day, were associated with higher depressive symptoms. Two other included reviews found that screen time was also associated with poorer psychological wellbeing. The authors discuss the possibility that the negative impact of screen time is partly caused by these activities displacing physical activity. Hoare, Skouteris, Fuller-Tyszkiewicz, Millar, and Allender (2014) found that more hours of screen time were associated with more symptoms of depression for obese adolescents, and Hoare, Milton, Foster, and Allender (2016) found that higher daily screen time and higher Internet use for adolescents were associated with higher depression symptoms, with the association for Internet use higher for female adolescents. This review also found an association between more TV viewing per week and higher depression symptoms in one study, but this relationship was not found in another study. Both of these reviews were assessed as low-quality. Hinkley and colleagues' (2014) high-quality review found an inverse relationship between sedentary behaviour and psychosocial wellbeing for children from birth to five years.

Sexual orientation. In a low-quality review of studies examining the relationship between anxiety and depression prevalence for homosexual and bisexual adolescents and adults, Plöderl and Tremblay (2015) found that male and female adolescents and adults have elevated levels/rates of depression and anxiety, and that bisexual individuals have higher rates of depression than homosexual individuals.

Obesity. Two reviews focussed on factors associated with obesity and depression. Sutaria, Devakumar, Yasuda, Das, and Saxena (2019) found, in a high-quality review, that obese children had an increased risk of depression, with females more likely to develop depression than males. A low-quality review identified more hours of screen time and a diet high in meat, meat alternatives and extras (e.g. pizza, chips) were related to higher depression symptoms (Hoare et al., 2014).

Family factors. These were lack of support, partner loss, out-of-home care, and the perinatal period.

Lack of support. Family conflict and violence for African American children under the age of 18 (Washington et al., 2017) and poor family relationships for indigenous children aged between 4 and 18 in high-income countries (Young et al., 2017), are associated with higher levels of anxiety and depression. Several parenting styles have been identified as risk factors for anxiety and depression, including higher levels of authoritarian parenting, aversiveness, inconsistent discipline, inter-parental conflict, over-involvement and withdrawal (Yap, Pilkington, Ryan, & Jorm, 2014). These three reviews were of high methodological quality.

Widowhood. One review examined the mental health impacts of widowhood and found high rates of depression and anxiety, with similar levels of depression for widowed men and women (22%) and for people aged under 65 (28.2%) and over 65 (27.9%) (Blanner Kristiansen, Kjær, Hjorth, Andersen, & Prina, 2019).

Out of home care. A high-quality review of prevalence studies for children in the welfare system found a pooled prevalence estimate (combining the estimates from multiple population studies) of 12% for depression and 18% for anxiety (Bronsard et al., 2016).

Perinatal period. Nine reviews examined factors associated with mental wellbeing and the development of anxiety and depression in the antenatal and postnatal period (Alvarez-Segura et al., 2014; Biaggi, Conroy, Pawlby, & Pariante, 2016; Brown, Qazilbash, Rahim, Dennis, & Vigod, 2018; Lawson, Murphy, Sloan, Uleryk, & Dalfen, 2015; Leach, Poyser, & Fairweather-Schmidt, 2017; Nakamura et al., 2019; Wenze, Battle, & Tezanos, 2015; Xavier, Benoit, & Brown, 2018; Yim, Tanner Stapleton, Guardino, Hahn-Holbrook, & Schetter, 2015). These studies identified a range of risk factors, including chronic medical conditions (Brown et al., 2018), sleep problems (Lawson et al., 2015), lack of social support (Biaggi et al., 2016), abuse (Alvarez-Segura et al., 2014), not living with partner (Leach et al., 2017), multiple births (Wenze et al., 2015) and

alcohol, cigarette, and substance use (Biaggi et al., 2016). The majority of studies were low quality, one of moderate quality (Lawson et al., 2015), and three of high quality (Brown et al., 2018; Nakamura et al., 2019; Xavier et al., 2018).

Social relationships. Lack of social support, loneliness, social media and cyberbullying have been identified as risk factors for the general population but also, in particular, for LGBTQI people.

Perceived social support and loneliness. In a high-quality review of people with a mental illness, elevated levels of depression symptoms were found in people who reported they were lonely and had poor social support (Wang, Mann, Lloyd-Evans, Ma, & Johnson, 2018). McDonald (2018) found that sexual minority adolescents experienced lower levels of social support and a more hostile living environment than heterosexual youths, and that lower social support was associated with depression and anxiety. The methodological quality of this review was low.

Social media and cyberbullying. Abreu and Kenny (2018) found that depression levels were higher in young sexual minority youth who were exposed to cyberbullying, compared to those who had not been exposed, and Escobar-Viera et al. (2018) found that LGB people exposed to cyberbullying reported feelings of depression. The methodological quality of these reviews varied with Abreu and Kenny assessed as low quality and Escobar-Viera et al. providing stronger evidence with high methodological quality. Other aspects of social media that were found to be associated with higher rates of depression were use of gay hook-up apps by males, and the stress of monitoring and maintaining an online profile (Escobar-Viera et al., 2018). Bottino, Bottino, Regina, Correia, and Ribeiro (2015), a review with low methodological quality, reported an association between cyberbullying and increased symptoms of depression and anxiety for adolescents. Another review with adolescent samples found that increased time online on social networks was associated with depression, because this increased the potential exposure to cyberbullying, which is associated with depression (Best, Manktelow, & Taylor, 2014). However, this review presented mixed findings regarding the relationship between online social networking and wellbeing, with some studies indicating that social media is associated with reduced anxiety and increased emotional support. Length of time using social media was also found to be related to higher depressive symptoms for children and adolescents, with higher symptoms reported when screen time exceeded two hours a day (Stiglic & Viner, 2019). Best and colleagues and Stilig and Viner's studies were both of high methodological quality.

Adverse life events. Adverse or stressful life events included migration, refugee status, exposure to violence, chronic illness, caring for someone with a chronic or critical illness, homelessness and drought.

Migration. Two reviews found that immigrants have higher levels of depression and anxiety symptoms compared to the native population of the country they settled in, and one review did not find this association. (Bas-Sarmiento, Saucedo-Moreno, Fernández-Gutiérrez, & Poza-Méndez, 2017), in a study of moderate quality, found that in about half the studies they reviewed immigrants, and in particular female immigrants, have a higher prevalence of mental disorders than the native population of the new country, and report other factors associated with higher levels of mental health problems for people settling into a new country as unemployment, job dissatisfaction, low income and economic difficulties. Close et al. (2016) in a high-quality review, found that most studies showed that first generation migrants had a higher prevalence of depression, particularly refugees. However, Foo et al. (2018), in a review assessed as low quality, found that depression prevalence rates for first generation migrants varied considerably across studies and was not significantly different to native population rates.

Refugees/Asylum seekers. Seven reviews investigated the mental health impact of seeking asylum and being a refugee, with all studies concurring that asylum seekers have poorer mental health and wellbeing than other migrants or the general population. Although prevalence of anxiety and depression rates varied considerably depending on country of origin and host country, Bogic, Njoku, and Priebe (2015) found that

war refugees have a high prevalence of depression and anxiety. This review found Australia to have comparatively low prevalence rates for refugee depression (ranging from 2.5% to 16%), compared to other host countries. Self-reported levels of depression for detained immigrants tend to be higher than those reported by non-detained refugees or migrants from a similar background (von Werthern et al., 2018). Close et al. (2016) also identified higher rates of depression for refugees and asylum seekers, with their sample including children and adults, noting that young refugees report high levels of depression. Unaccompanied minor refugees and asylum seekers have higher rates of depression and anxiety symptoms than accompanied children and adolescents (Kien et al., 2018). Housing has a significant impact on the mental health of asylum seekers. For example, unaccompanied female minors housed in highly restrictive reception centres (Mitra & Hodes, 2019) or living alone (O'Higgins, Ott, Shea, & O'Higgins, 2018) have higher anxiety and depression symptoms than girls in routine reception centres or in foster care with a family or with other dedicated support. Housing is also a significant risk factor for adult refugees and asylum seekers, with poor housing conditions and insecure tenure associated with higher levels of depression and poorer mental wellbeing (Ziersch & Due, 2018). The reviews by Bogic et al., Close et al., von Werthern et al., and Kien et al., were assessed as high quality, and the remaining three studies as moderate quality.

Exposure to violence. Both reviews that examined the association between violence and anxiety and depression found a significant relationship. Intimate partner violence, including psychological, physical and sexual abuse, is associated with higher levels of depression and anxiety, and exposure to multiple types of abuse is associated with increased risk of depression (Lagdon, Armour, & Stringer, 2014). Perry, Tabb, and Mendenhall (2015) found an association between depression and anxiety rates and violence for African American adolescent males living in neighbourhoods with high exposure to violence and crime. Both reviews were assessed as moderate quality.

Chronic illness/impairment. Several reviews were identified that examined the relationship between chronic illness and mental health and wellbeing, one review that examined hearing impairment, and one with a focus on facial scarring. In a review of moderate quality, adolescents with a current chronic illness, particularly asthma and also diabetes, were found to have a higher risk of developing depression or anxiety; when symptoms of asthma were no longer present the association with depression and anxiety was no longer evident (Brady, Deighton, & Stansfeld, 2017). In a high-quality review, Secinti, Thompson, Richards, and Gaysina (2017) found that the higher risk of anxiety and depression symptoms carries into adulthood for those who experienced a chronic illness in childhood, including but not limited to cancer. Friend, Feltbower, Hughes, Dye, and Glaser (2018), in a review of low quality, also found that survivors of childhood cancer had a higher risk of developing anxiety or depression in adulthood. Also relating to early life, Simanek and Meier (2015), in a moderate-quality review, found a relationship between maternal prenatal exposure to the influenza virus and depressive symptoms in offspring from that pregnancy. Hashem et al. (2016) found, in a low-quality review, that adults who have experienced a critical illness have a higher risk of experiencing anxiety or depression symptoms and poorer wellbeing. A high-quality review found that hearing impairment is associated with a higher prevalence of anxiety; surgical intervention to correct the hearing problem is associated with a lowering of anxiety levels (Shoham, Lewis, Favarato, & Cooper, 2018). In a high-quality review, facial scarring was found to be associated with higher levels of depression and anxiety, compared to the general population; prevalence declines over time (Gibson, Ackling, Bisson, Dobbs, & Whitaker, 2018).

Carers. Two reviews examined the association between being a carer and anxiety and depression. Haines, Denehy, Skinner, Warrillow, and Berney (2015) found an association between caring for a critically ill survivor of intensive care and higher levels of depression for the carer; in particular, female and younger

carers are likely to experience depression symptoms. Carers of a family member with dementia are also at risk of experiencing anxiety and depression; in particular, female carers are more likely to experience depression or poorer wellbeing, and carers who are younger, or have a low socio-economic background, have children, or have low education (Watson, Tatangelo, & McCabe, 2018). These reviews were assessed as moderate quality.

Homelessness. A review of studies of adult homeless people in Germany, assessed as moderate quality, found that anxiety and depression were the second and third most prevalent mental health problems (respectively), with substance use being the most common problem (Schreiter et al., 2017). Bassuk, Richard, and Tsertsvadze (2015), in their high-quality review, found that homeless pre-school and school-aged children had higher rates of mental health problems (but not depression) and behavioural problems than children living in the same neighbourhoods. A low-quality review found homeless young people, aged between 10 and 24, had higher rates of depression compared to other young people at school, with prevalence rates ranging between 8% and 61%, and GLBTQ homeless people were more likely to experience depression symptoms than other homeless young people (Medlow et al., 2014).

Drought. One low-quality review found that drought is associated with higher levels of depression and anxiety (Vins, Bell, Saha, & Hess, 2015). Particular risk factors identified in the review include rural and remote people, exposure to an extended period of drought, people dependent on farming, indigenous people, having a perceived stigma regarding mental health issues, a lack of knowledge of support services, previous mental health problem, and experience of adverse life events.

Cultural factors

Ethnicity. Wyatt and colleagues (2015), in their low-quality review, examined cultural factors associated with depression for Asian American, native Hawaiian, and Pacific Islander youth living in the US and found that discrimination, ethnic marginalisation, greater acculturation and acculturative stress are associated with higher levels of depression. Discrimination was also a factor associated with poorer mental health and wellbeing for indigenous young people, 20 years and under, from high-income countries, reported in Young and colleagues' (2017) high-quality review.

Work and school environment

Work conditions. Seven reviews examined factors associated with work conditions and mental health and wellbeing. Battams et al. (2014) high-quality review identified four categories of the work environment that are each associated with poorer mental health and wellbeing: individual factors, such as poor health and sleep patterns, young, middle-aged, female, and stressful life events; team environment factors include workplace bullying, low levels of social support, poor human relations and interpersonal conflict; work conditions include low skill discretion, low skill occupation, low decision latitude, job overload and high job demands; and work-home interference comprised time pressure and conflict between role demands. Harvey et al. (2017), in a review of moderate quality, also identified a range of work conditions associated with anxiety and depression, including low job control, high psychological demands, low social support, procedural or relational justice problems, workplace bullying, and working more than 40 hours a week. Workplace bullying was identified as a risk factor in the previous two reviews, and also by Lever, Dyball, Greenberg, and Stevelink (2019) in their high-quality review of health care workers. Roche et al. (2016) report, in their moderate-quality review, that employment in male-dominated industries, such as agriculture, mining, and manual work, is associated with higher levels of depression for all workers studied, compared to comparator groups or population norms. Two reviews concluded depression was associated with an imbalance between effort at work and reward received (Battams et al., 2014; Rugulies, Aust, & Madsen, 2017), with both studies of high methodological quality.

School environment. One high-quality study found that a high-demand academic environment was associated with increased prevalence of mental health issues (Aldridge & McChesney, 2018).

Economic factors

Job insecurity. Seven reviews identified an association between job insecurity and poor mental wellbeing, anxiety and depression. This included non-secure work, such as temporary agency employment (Hergenrather, Zeglin, McGuire-Kuletz, & Rhodes, 2015; Hünefeld, Gerstenberg, & Hüffmeier, 2019) and job insecurity (Glonti et al., 2015; Harvey et al., 2017; Kim & von dem Knesebeck, 2015; Llosa, Menéndez-Espina, Agulló-Tomás, & Rodríguez-Suárez, 2018; Mucci, Giorgi, Roncaioli, Perez, & Arcangeli, 2016). These studies ranged in methodological quality, with Llosa et al's review of high quality; Hergenrather et al., Glonti et al., and Harvey et al. of moderate quality; and the remaining studies being low quality.

Low income. Several reviews examined the relationship between low income and anxiety and depression symptoms. In a review of country-wide or regional populations, Patel et al. (2018) found a relationship between income inequality and depression, with regions with greater inequality also having higher depression symptoms. An inverse relationship between income level and level of depression and other mental health problems was found by Bas-Sarmiento et al. (2017) for migrants. Bruening, Dinour, and Chavez (2017) found, in the majority of studies in their review, a relationship between food insecurity and poor emotional wellbeing, including depression. Having fewer economic resources was found to be associated with higher levels of anxiety (Moreno-Peral et al., 2014). Job loss, underemployment (Hergenrather et al., 2015) and unemployment were also associated with poorer mental wellbeing (Hergenrather et al., 2015; Kim & von dem Knesebeck, 2015; Modini et al., 2016). The majority of these reviews were appraised as moderate quality, with only Hergenrather et al. assessed as high quality and Kim & von dem Knesebeck as low quality.

Economic crisis. Two studies reviewed research on large-scale economic crises and their association with anxiety and depression. Glonti et al. (2015), in a moderate-quality review, found that people with low income and precarious employment were at greater risk of developing depression. Mucci et al. (2016) found that employees affected by an economic crisis had a higher risk of depression and anxiety and, in particular, married or partnered workers were more at risk of depression. This low-quality review also found that economic slowdown is associated with higher rates of depression and anxiety for older people.

Living environment

Reviews examining the living environment either focussed on housing architecture or location. A low-quality review of urban living found an association between newly constructed dwellings (post 1969), access along a long corridor, and other environmental features with higher depression symptoms (Gong, Palmer, Gallacher, Marsden, & Fone, 2016). A high-quality review of urban environment elements associated with depression had mixed findings. For example, 7 out of 17 studies found that living in a metropolitan area was associated with a depressive mood and 3 out of 4 studies found higher population density associated with depressive mood. All five studies included in the review that examined noise pollution found an association between urban noise levels and depressive symptoms (Rautio, Filatova, Lehtiniemi, & Miettunen, 2018).

Protective factors

Individual factors. Individual protective factors included resilience, physical activity, Internet use, and diet.

Resilience and self-esteem. In a review of moderate quality examining the relationship between mental wellbeing and resilience, several protective individual factors were identified (Fritz, de Graaff, Caisley, van Harmelen, & Wilkinson, 2018). High self-esteem, high distress tolerance, low aggression and low expressive

suppression were found to be resilience factors associated with low anxiety and depression symptoms, for children who had faced childhood adversity. High self-esteem was also identified as a protective factor for positive wellbeing and adaptive psychosocial functioning for refugee children (Marley & Mauki, 2018), with this review appraised as moderate quality. Wyatt et al. (2015) in their low-quality review of studies of Asian American, native Hawaiian and Pacific Islander youth, found that self-esteem and collective-self-esteem were associated with lower levels of depression. Similarly, in their high-quality review, Young et al. (2017) identified high self-esteem and optimism as protective factors for mental wellbeing for indigenous youth in high-income countries.

Physical activity. In a high-quality review of studies of children from birth to 5 years old, Hinkley et al. (2014) found a trend that physical activity was positively associated with psychosocial wellbeing. Dogra et al. (2018) reviewed the relationship between physical activity and depression symptoms in undergraduate university students and, although findings were inconsistent, most studies included in this high-quality review found that higher levels of physical activity were associated with lower levels of depression. Similar findings were reported by Pascoe and Parker (2018), with physical exercise found to be protective against depression and associated with improved wellbeing for secondary and university students, with a broad range of physical activity including yoga, aerobic exercise and resistance training. In their low-quality review of studies of obese adolescents, Hoare et al. (2014) found that regular exercise was related to fewer symptoms of depression, although one study found this relationship only for females. Nakamura et al. (2019) showed in a high-quality review that ante-natal physical activity was associated with lower rates of postnatal depression. Chan et al. (2019) conducted a high-quality review of studies on the relationship between exercise and depression and anxiety in young adult, adult, and older people, and report mixed results depending on the intensity of the exercise. The majority of studies examining duration of exercise found improvements in mood with 10-15 minutes and up to 30 minutes of exercise, and thereafter only little additional improvement. Walking was also found to be beneficial for mental health and psychological wellbeing, with Kelly et al. (2018) finding a positive relationship between walking and lower depression and also anxiety, and in particular walking in natural environments rather than treadmill-based walking. Eigenschenk et al. (2019) also found that being active in the outdoor environment had positive general mental health benefits, including increased self-esteem, self-efficacy, and a better self-concept. This review also found that being active in the natural environment, particularly in green and blue environments, is positively associated with wellbeing, with reductions in depression and anxiety symptoms for people participating in outdoor sports. These last two reviews were assessed as low methodological quality.

Internet use. For older people (aged 60+), Internet use was associated with positive wellbeing and high self-efficacy, with a high-quality study finding lower depressive and anxiety symptoms among Internet users, compared to non-users (Forsman & Nordmyr, 2017).

Diet and alcohol: In a low-quality review of popularly-consumed drinks, García-Blanco, Dávalos, and Visioli (2017) reported that the two studies that examined coffee found a relationship between consumption of coffee and lower levels of anxiety and depression. The findings were mixed for the consumption of tea and cocoa, but for both beverages the majority of studies found a relationship between consumption of these and lower depression and anxiety. A high-quality review found that higher intake of fruit and vegetables is also a protective factor, reducing the risk of depression (Saghafian et al., 2018). Alcohol has been identified as a risk factor for mental health problems and, while not being identified as a protective factor, a reduction in alcohol consumption was found, in a review of moderate quality, to be associated with improvements in adult wellbeing and mental health symptoms (Charlet & Heinz, 2016).

Family factors. Protective family factors include positive parent and family relationships and kinship care.

Positive parent and family relationships. Immediate and extended family support, high family cohesion, a positive family climate and parental involvement are key factors that contribute to resilience in children who

have faced childhood adversity, according to Fritz et al. (2018), in their moderate quality review, with these authors highlighting resilience as a protective factor against the development of depression and anxiety. In a high-quality review of studies of pre-school and school aged children and adolescents, a positive parent-child relationship was associated with more positive wellbeing and lower depression and anxiety (McPherson et al., 2014). Family factors associated with more positive mental wellbeing included eating meals together, and a high value of trust and fairness in the family. In another high-quality review, higher levels of parental warmth were associated with lower anxiety in adulthood, and higher levels of autonomy granting, monitoring and warmth in childhood were associated with lower levels of depression in adolescence (Yap et al., 2014). Family environment has also been identified as a protective factor for people who have been maltreated as a child, with a moderate-quality review reporting that living with parents, positive parenting, parental care, and good family functioning are protective (Meng, Fleury, Xiang, Li, & D'Arcy, 2018). Positive parenting practices, including parental support, positive role models and maternal closeness, and a positive and functioning family environment, were found in a high-quality review to be associated with lower levels of depression and anxiety in African American children and adolescents (Washington et al., 2017). Young et al. (2017) also found positive family relationships to be a protective factor for mental health and wellbeing for indigenous young people living in high-income countries. A low-quality review found that for female heads of households, family support has a positive association with mental health and wellbeing (Khazaeian, Kariman, Ebadi, & Nasiri, 2017). Supportive family was a protective factor for wellbeing and psychosocial functioning for refugee children in the moderate-quality review by Marley and Mauki (2018).

Out of home care. Winokur, Holtan, and Valentine (2014), in a high-quality review, found that children placed in kinship care have better mental wellbeing and fewer mental health problems than those placed in non-kinship care

Social relationships

Social support. In a review of studies of adolescents, adults, and older people, Leigh-Hunt et al. (2017) found a positive relationship between high quality social relationships (variously defined) and subjective wellbeing, with studies showing that the quality of relationships are more important than the quantity. This review also found large and diverse social networks are positively associated with lower levels of depression. Positive social relations are a protective factor for psychosocial wellbeing for secondary school students, with positive relationships with teachers and peers being important factors (Aldridge & McChesney, 2018). Similar findings were found in the review of children and adolescents by McPherson et al. (2014), with wider and good quality social networks associated with lower mental health problems. In particular, peer support was found to be associated with lower anxiety and depression for rural adolescents. This review also found that positive perceptions of belonging and school safety were related to decreased mental health problems and higher levels of psychosocial wellbeing. For young Asian American, native Hawaiian and Pacific Islander youth living in the US, peer support is associated with lower levels of depression (Wyatt et al., 2015). Although aspects of social media use have been identified as a risk factor for poor mental health and wellbeing, Best et al. (2014) found that the social support available through online social networks was also associated with increased emotional support and belonginess. Escobar-Viera et al. (2018) found that LGB people who have a tightly integrated social network with more friends who know each other have lower depression scores. McDonald (2018) also found that higher levels of social support were a protective factor for psychosocial wellbeing for LGBTQ adolescents. Social support is also a protective factor for LGB adults aged over 60, with higher social support associated with lower depression scores (McParland & Camic, 2016). High social support was also found to be a resilience-building factor for adolescents who had experienced childhood adversity (Fritz et al., 2018) and a protective factor for people

who had been maltreated as a child (Meng et al., 2018). Social support is an important protective factor against mental health problems for people living in drought (Vins et al., 2015). Social support is also a protective factor for female heads of households, with higher levels of social support associated with higher levels of mental health and lower levels of depression (Khazaeian et al., 2017). The majority of reviews examining social support were of high-quality, with two studies assessed as moderate quality (McParland & Camic, 2016; Meng et al., 2018), and two studies low quality (McDonald, 2018; Wyatt et al., 2015).

Work and school factors

Employment. Three systematic reviews found support for the mental health benefits of work. Hergenrather et al. (2015), in their moderate-quality review, found employment to be a protective factor for mental health and wellbeing, for school leavers and adults, with people who are employed having more positive psychological wellbeing and lower rates of depression and anxiety. Similalrly, van der Noordt, Ijzelenberg, Droomers, and Proper (2014), in a high-quality review, found strong evidence that employment was protective for mental health and wellbeing and reemployment associated with improvements to mental wellbeing and lower risk of depression. Having supportive supervision at work was also found, in a moderate-quality study, to be associated with reduced levels of anxiety and depression, improved wellbeing, and also contributes to a greater sense of autonomy and mental health promotion (Modini et al., 2016). Employment also has a protective effect on first generation migrants, with a low-quality review reporting lower depression levels associated with employment (Foo et al., 2018).

School. Two high-quality systematic reviews explored the relationship between the school environment and adolescents' mental health and wellbeing. Aldridge and McChesney (2018) found that positive relationships with teachers and peers, positive perceptions of school safety, and positive perceptions of belonging and connectedness were associated with positive mental wellbeing. McPherson et al. (2014) found that pre-school, primary, and secondary students who attended schools with higher quality social environments had lower internalising behaviours, including anxiety and depression. One low-quality review also found school involvement to be a protective factor against depression for Asian American, native Hawaiian and Pacific Islander youth living in the US (Wyatt et al., 2015).

Cultural factors

Ethnic density, belonging, and identity. Living in a community with a high rate of own ethnic density was found in a high-quality review to be a protective factor against depression and anxiety (Bécares, Dewey, & Das-Munshi, 2017). O'Higgins et al. (2018), in their review of moderate quality, found connection with people from own ethnic background to be important for unaccompanied refugee minors, who are less likely to develop depressive symptoms if they are placed in foster care with people from the same ethnic background. Wyatt et al. (2015) found in their low-quality review ethnic marginalisation to be a risk factor for Asian American, native Hawaiian, and Pacific Islander youth, and conversely, ethnic belonging and bicultural identity to be associated with lower levels of depression. For child refugees, a moderate-quality review found that having a positive attitude toward own culture and host culture to be associated with positive adaptive functioning and wellbeing (Marley & Mauki, 2018).

Living environment

Housing and residential environment. Location and type of housing are associated with anxiety and depression symptoms, with particular design features and settings more conducive to positive mental health. Gong et al. (2016) found, in their low-quality study, that people living in houses with entrances that promote visibility have less depression and anxiety than people living in other types of housing, such as in apartments with deck access. People living with more green space around their home also have lower levels of depression and anxiety (Gong et al., 2016; Rautio et al., 2018). Living near coastal or inland water areas was found to be associated with better mental health and lower depression rates in some studies included

in a moderate-quality review by Gascon, Zijlema, Vert, White, and Nieuwenhuijsen (2017). McCormick (2017) in their review assessed as low-quality, found access to high quality and quantity of green space is associated with positive mental wellbeing for children and adolescents. In a high-quality review by Rautio et al. (2018), a minority of included studies reported walkability and accessibility to be associated with lower depression for older people, and that access to health and cultural services, and healthy and fast food stores, were associated with lower levels of depressive mood.

Community factors

Social capital. A low-quality review of studies examining mental health factors associated with female heads of households found that high social capital was associated with more positive mental health and wellbeing (Khazaeian et al., 2017). In this review, social capital included social trust, a sense of belonging, and social participation. McPherson et al. (2014) also found, in their high-quality review, that children and adolescents benefit from community social capital, including a wider social support network of peers and high-quality social networks, as well as high quality school and neighbourhood environments. Children also benefit from their parents having a wide and good quality social support network. This review also found that regular attendance at religious services was related to better mental health. Strong social capital was found to be, in a low-quality review, a protective factor for people affected by drought, including a sense of community and informal support networks (Vins et al., 2015). For refugee children, a moderate-quality review found a sense of belonging and community support are protective factors (Marley & Mauki, 2018).

Summary

This umbrella review of systematic reviews evaluating risk and protective factors for mental health and wellbeing identified 92 reviews, with almost half being of high quality and a quarter being lower quality reviews. Most of the reviews concluded that there was large heterogeneity in the studies reviewed, particularly in relation to measurement of relevant factors, but also in the outcomes reported. This generally meant that the reviews seldom reported strong and consistent evidence. Nevertheless, most concluded that there was generally supportive evidence of associative relationships between the individual, family, social, environmental, cultural, and community factors identified that were related to mental wellbeing and/or common mental health problems of depression and anxiety.

The reviews are summarised in Table 2 according to priority groups identified by VicHealth. This shows there were no reviews related to people with low education, six of people with low income, four of people who were unemployed, four of people who work in low-status occupations, one of Aboriginal or Torres Strait Islander peoples, two of people from culturally and linguistically diverse backgrounds, 10 of people with migrant and refugee backgrounds, five of people who are LGBTQ, one of people with a disability, and one of people living in rural or remote areas.

Table 3 summarises the reviews by age group. This reveals that there were 17 of children aged 0-11, 19 of teenagers, 8 of young adults, 43 of adults, 7 of perinatal women, and 6 of older adults.

Overall, the reviews revealed that:

The risk factors for children were factors associated with being a refugee, homelessness and out-of-home care, screentime and sedentary behaviour, chronic illness, obesity and maternal illness. Protective factors were primarily positive family functioning and supportive communities, and some evidence for physical activity.

For teenagers, risk factors were high screen time and cyberbullying, poor family functioning, chronic illness and obesity, out of home care, factors related to refugee status, and high demand academic environments. Protective factors were positive family functioning, social support (including online), community support, and physical activity.

For young adults, risk factors were social isolation and loneliness, homelessness, being a sexual minority, migration and cyberbullying. Protective factors were physical activity and strong social relationships (including supportive integrated online networks for LGB young people).

For adults and the general population, risk factors were social isolation and loneliness, insecure employment and unemployment, unsupportive work conditions, economic inequality, migration, homelessness, caregiving, physical health conditions, stressful events (including intimate partner violence and drought), and being a sexual minority. Protective factors were employment, physical activity, strong social relationships and networks, diet, alcohol reduction, and green space.

Many reviews had a specific focus on women (mostly) in the perinatal period. Risk factors were childhood and lifelime abuse, chronic medical conditions, stress and unsupportive relationships, disturbed sleep and multiple births. Protective factors were social support and physical activity.

The few reviews for older adults showed that death of a partner, social isolation and loneliness, and being a caregiver for someone with dementia were risk factors. Protective factors were social support and physical activity.

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APPENDIX 1: Critical appraisal checklist for systematic reviews and research syntheses

All questions rated □ Yes □ No □ Unclear □ Not applicable

1. Is the review question clearly and explicitly stated?

2. Were the inclusion criteria appropriate for the review question?

3. Was the search strategy appropriate?

4. Were the sources and resources used to search for studies adequate?

5. Were the criteria for appraising studies appropriate?

6. Was critical appraisal conducted by two or more reviewers independently?

7. Were there methods to minimize errors in data extraction?

8. Were the methods used to combine studies appropriate?

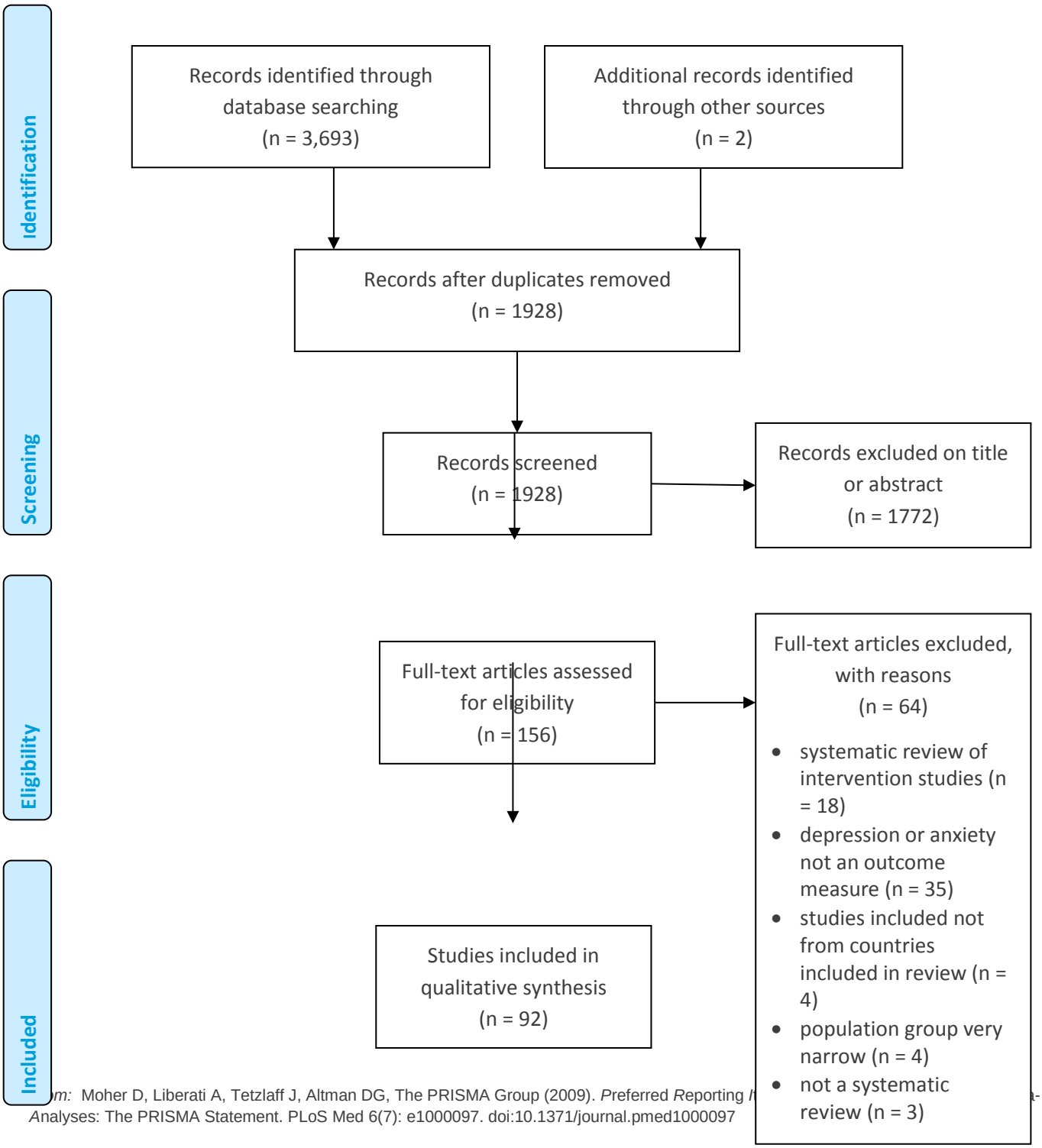
9. Was the likelihood of publication bias assessed?

10. Were recommendations for policy and/or practice supported by the reported data?

11. Were the specific directives for new research appropriate?

Source: Joanna Briggs Institute. (2017). Checklist for systematic reviews and research syntheses. Retrieved from http://joannabriggs.org/assets/docs/critical-appraisal-tools/JBI_Critical_Appraisal-Checklist_for_Systematic_Reviews2017.pdf

APPENDIX 2: PRISMA diagram of selected reviews



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APPENDIX 3: Review summaries - Evidence

Table 1. Tabulation of included reviews

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Abreu & Kenny, 2018	5 Low	Systematic review	Not reported	LGBT youth, ranging from 11 to 25 years	27 studies Total participant N = 99,485 Sample sizes ranging from 18 – 20,406	Depression	Cyberbullying	Risk Cyberbullying associated with higher levels of depression Cyberbullying among LGBTQ youth 10.5% - 71.3%	Depression levels are higher for LGBT youth who have been exposed to cyberbullying, compared to sexual minority youth who have not been exposed. Self-esteem is lower in sexual minorities who have been exposed to cyberbullying, compared to sexual minority youth who have not been exposed

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Aldridge & McChesney, 2018	9 High	Systematic review	Mixed Methods Appraisal Tool (Pace et al. 2012) 32 studies met 100% of the quality criteria 3 studies met 83% of the criteria 11 studies met 67% of the criteria 2 studies assessed as meeting 50% of the criteria or lower	Adolescents in secondary school	48 studies Total participant N = 118,804 Sample sizes ranging from 40 – 11,835	Well being and mental health	School environment	Protective and risk Positive relationships with teachers and peers, school safety and connectedness associated with better psychosocial wellbeing High demand academic environment associated with higher prevalence of mental health issues	Positive relationships with teachers and peers associated with higher levels of psychosocial wellbeing and decrease in mental health issues Positive perceptions of school safety associated with improvements in psychosocial wellbeing and reductions in the prevalence of mental health issues Positive perceptions of belonging and connectedness at school associated with higher levels of psychosocial wellbeing and a decreased prevalence of mental health issues High-demand academic environment associated with increased prevalence of mental health issues

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Alvarez-Segura et al. 2014	5 Low	Systematic review	Newcastle-Ottawa Scale (Wells et. al. 2008) 14 studies assessed as high quality 26 assessed as moderate quality 3 assessed as low quality	Antenatal and postnatal women	43 studies Total participant N = 35,544 Sample sizes ranging from 38 – 6421	Depression	Maternal history of abuse	Risk Childhood and lifetime abuse associated with higher levels of antenatal and postnatal depression	All studies found lifetime emotional abuse histories associated with higher antenatal and postnatal depression scores Most studies found lifetime sexual and physical abuse histories associated with higher antenatal and postpartum depression scores Childhood abuse also found to be related to antenatal and postnatal depression

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bas-Sarmiento et al. 2017	8 Moderate	Systematic review	STROBE Quality Assessment for Observational Studies (Von Elm et al. 2008) 10 studies assessed as good quality 11 studies assessed as moderate quality	Immigrants	21 studies Total participant N = 1,374,018 Sample sizes ranging from 105 – 1,103,513	Anxiety and depression	Immigration	Risk 13 studies showed immigrants have higher levels of anxiety and depression than the native rate	Immigrants had higher levels of depression and anxiety disorders compared to native populations Female immigrants have a greater prevalence of mental disorders than male immigrants Being single or divorced is related to mental illness, being married is a protective factor Educational level related to higher depression in some cases, particularly if under-employed in new country Unemployment, job dissatisfaction, low income and economic difficulties associated with higher levels of mental health problems

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bassuk et al. 2015	10 High	Systematic review and meta-analysis	Critical Appraisal of Health Research tool (Loney et al. 1998) 1 study assessed as strong 5 studies assessed as moderate 6 studies assessed as weak	Infants, toddlers, preschool children (6 studies, all but one focussed on 3-5 years old) School-aged children (6 studies, mostly primary or low-secondary school aged) One study preschool and school children	12 studies Total participant N = 4702 Sample sizes ranging from 53 – 2631	Anxiety and depression	Homelessness	Risk Homelessness associated with mental health problems, but not with depression 10% to 26% homeless preschoolers had mental health problems	No significant difference in depression rates between homeless and housed children, although many of the housed children comparison groups were children in low-income families, however higher rates of other behavioural and mental problems for children who were homeless

Battams et al. (2014)	9 High	Systematic Review	NHMRC (2000) 12 level IV studies 2 level III-2 studies 5 level II studies	Workers in male dominant industries	19 studies Total participant N = 105809 Sample sizes ranging from 50 – 25104	Anxiety Depression	Individual factors Team environment Work conditions Work-home interference	Risk Individual, team environment, work conditions and work/home interference are workplace risk factors for poor mental health	Individual factors: younger and mid-aged, female, poor health and sleep patterns, stressful life events or reduction in income in previous 12 months, and unmarried, associated with anxiety and depression Team environment factors: psychological violence, workplace bullying, low levels of social support or cooperation in workplace, poor human relations and interpersonal conflict associated with anxiety and depression Work conditions: job unsuitability, low skill discretion, lower skilled occupation, blue collar workers, lack of control over workplace, low decision latitude, job overload and high job demands (including psychological demands), occupational stress, negative work-related life events, environmental conditions associated with anxiety and depression (higher level occupations associated with less depression) Work-home interference factors: time pressure, conflict between work and family demands associated with anxiety and depression
Becares et al.	11 High	Systematic	Evaluation measure	Community adult	28 studies	Anxiety and	Own-ethnic	Protective	Protective association

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
2017		review and meta-analysis	developed for this study based on Quality Assessment Scales of Observational Studies (Thomas et al. 2004) All studies assessed as moderate or high methodological quality with scores ranging from 7 to 15	populations from a range of ethnic backgrounds (aged 16+)	assessed anxiety and depression (out of 41) Total participant N for depression outcome studies = 141,796; for anxiety 334,722 Sample sizes for depression outcome studies ranging from 567 – 108064, for anxiety 173 – 226,487	depression	residential density	Higher ethnic density often a protective factor for depression and anxiety	between increased own ethnic density and reduced risk of anxiety and depression found in over half the studies In 6 US studies there was a negative relationship between own ethnic density and anxiety and depression for African American and Latino populations, although in one of these studies the association with depression was only for the highest ethnic density level (85% or higher), at lower densities ethnic density was a protective factor

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Best et al. 2014	9 High	Systematic review	Downs and Black (1998) instrument to appraise methodological quality of studies Weak research designs, studies assessed with scores ranging from 8 to 20 out of 32	Adolescents using online technologies, with a mean age below 20	N = 43 No details provided on sample sizes	Anxiety and depression	Online social networks	Risk and Protective Online social networks provide positive wellbeing benefits Some evidence of social media use and increased depression symptoms	Social support available through online social network sites and forums was associated with increased emotional support and belongingness, and reduced social anxiety Mixed findings for the association between online social networking and depression with some studies finding no association, others finding an increased risk of depression. Amount of time spent online is a particular risk factor, as this increases the potential exposure to cyberbullying, which is associated with depression

Biaggi et al. 2016	4 Low	Systematic review	Not reported	Antenatal women	97 studies Total participants N = 1,514,085 Sample size range 39 - 877,589	Anxiety and depression (antenatal)	Psychological factors Substance use Attachment factors Social support Marital status Socio-demographic factors Economic factors Pregnancy-related factors Personality	Risk Antenatal anxiety a high risk factor for development of antenatal depression	Psychological and psychiatric factors: antenatal anxiety is the strongest risk factor for antenatal depression; previous history of mental illness (in particular anxiety, depression or psychiatric treatment during previous pregnancy or lifetime), are associated with development of antenatal anxiety and depression, and family history of psychiatric illness during the lifespan associated with depression Substance use factors: past or current use of alcohol or smoking associated with antenatal anxiety and depression; substance use during pregnancy associated with antenatal depression Quality of attachment factors: poor quality relationships particularly with own parents Social support: lack of social support and partner support, associated with increased risk of antenatal anxiety and depression. Social support and marital satisfaction are protective factors Marital status: Some studies found unmarried women or women not living with a partner associated with higher depression and anxiety Socio-demographic and economic factors:

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
									adolescents, older age, financial difficulties Pregnancy-related factors: unplanned/unwanted pregnancy
Blanner Kristiansen et al. 2019	11 High	Systematic review and meta-analysis	Newcastle-Ottawa Scale (Wells et al. 2008) Could not locate supplementary data table to report quality assessments	Widowed persons	42 studies Total participant N = 15,607 Sample size range 25 to 3031	Anxiety and depression	Widowhood	Risk Widowhood associated with high prevalence of anxiety and depression	Pooled prevalence estimate of depression across all studies was 40.6% Prevalence rates of depression for widowed men (25%) and women (22%) were similar Similar rates of depression were found for people aged >65 (28.2%) and <65 (27.9%) Pooled prevalence estimate of anxiety was 26.9%

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bogic et al. 2015	11 High	Systematic review	Quality appraisal tool with 5 criteria, developed for this study 13 studies assessed as high quality 16 studies assessed as low quality	Adult war-refugees (<5 years since displacement)	29 studies Total participants N = 16,010 Sample size range 50 - 3401	Anxiety and depression	War refugees	Risk War refugees have high rates of anxiety and depression Greater exposure to pre-migration traumatic experiences and post-migration stress were the most consistent factors associated with all three disorders, poor post-migration socio-economic status was associated with depression	Depression prevalence rates differed across countries, ranging from 2.3% (Southeast Asian refugees in Canada) to 80% (Cambodian refugees in the USA). Overall, 76% of the 21 studies examining depression found prevalence rates of over 20% Refugees from Middle East or Sub-saharan Africa tended to have the lowest prevalence (16-29%), higher prevalence for those from Yugoslavia (31-42%) and highest for those from Cambodia (50-80%) Host countries Australia and Canada had the lowest prevalence of war-refugee depression (2.5-16% and 2.3-22% respectively) Anxiety prevalence rates differed considerably, from 20% to 88% among Southeast Asian refugees in the USA, and across countries, depending on the methodological quality of the studies Lower rates of anxiety found for male refugees compared to females

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bottino et al. 2015	5 Low	Systematic review	Effective Public Health Practice Project Quality Assessment Tool (Armijo-Olivo et al. 2012) 7 studies assessed as strong 2 studies assessed as moderate 1 study assessed as weak	Adolescents, aged 10-17 or in 6th to 12th grade	10 studies	Anxiety and depression	Cyberbullying	Risk Cyberbullying associated with higher levels of social anxiety and moderate to severe depressive symptoms	Cyberbullying found to be associated with higher social anxiety levels in the 1 study that assessed this Cyberbullying found to be associated with higher levels of depressive symptoms in 4 of the 5 studies that assessed this
Brady et al. 2017	7 Moderate	Systematic review	Newcastle-Ottawa Quality Assessment Scale for cohort studies (Wells et al. 2014) 5 of the 129 studies found to be of low risk of introducing bias in the review and the majority of the systematic review reports the findings of these 5 studies.	Adolescents affected by a chronic illness, majority of the studies focused on asthma and diabetes, remaining studies did not report what conditions were examined	129 studies Majority of analysis focussed on 5 high-level of evidence studies. Sample size for these 5 studies = 496,778 Sample size range for these 5 studies = 1379 - 471,685	Mood disorders, major depressive episodes, anxiety, social phobia, generalised anxiety disorder, separation anxiety, depression	Chronic illness – primarily asthma and diabetes	Risk Asthma, diabetes and other chronic illnesses associated with higher prevalence of anxiety and depression	Asthma: strong association between asthma and emotional disorders, including depression and anxiety disorders. This association was no longer apparent for adolescents not currently experiencing symptoms of asthma Diabetes: higher prevalence of psychiatric diagnoses for females and males with diabetes, in particular mood disorders, including anxiety and depression – based on one high level study with age range 0 to 18. Non-categorised chronic illness: increased prevalence of emotional disorders associated with the condition

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bronsard et al. 2016	11 High	Systematic review	STROBE: Guidelines for reporting observational studies (Von Elm et al. 2007) Scores for each of the 13 methodological items range between 2 studies (for 1 item), to 8 studies (for 2 items.	Children and adolescents in foster care or other residential group care	8 studies Total participants N = 3104 Sample size range 48 - 1253	Anxiety and depression	Children in child welfare system	Risk Higher levels of depression and anxiety for children in the child welfare system 49% pooled prevalence for any mental disorder, nearly 4-fold greater than the 13.4% pooled prevalence among the general population	Depression: 5 studies examined major depressive disorder prevalence rates for children and adolescents in the welfare system, providing estimates between 1% and 23%, with a pooled prevalence estimate of 12%. Anxiety: 7 studies examined any anxiety disorder and found prevalence rates for children and adolescents in the welfare system to range between 4% and 32%, with a pooled prevalence estimate of 18%
Brown et al. 2018	11 High	Systematic review	Effective Public Health Practice Project Quality Assessment tool (Armijo-Olivo et al. 2012) 4 studies assessed as strong 6 studies assessed as moderate 6 studies assessed as weak	Women of reproductive age with a chronic medical condition	16 studies Total participants N = 1,626,260 Sample size range 305 – 707,701	Anxiety and depression	Chronic medical conditions	Risk Chronic medical conditions associated with higher levels of anxiety and depression during pregnancy and postpartum	Chronic medical conditions associated with higher odds (1.45) of developing peripartum depression and peripartum anxiety (1.63)

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Bruening et al. 2017	7 Moderate	Systematic review	Not reported	All ages, 6 studies female only, 1 study older people, 1 study children, 1 study HIV-infected homeless people	12 studies Total participant N = 34067 Sample size range 29 – 9481	Emotional wellbeing, mainly depression	Food insecurity	Risk Over half of the studies found a relationship with depression. Four studies examined bidirectional relationship between food insecurity and emotional wellbeing	Food insecurity: Sixty percent of longitudinal studies found an association between food insecurity and depression, the remaining studies did not find support for this after adjusting for additional variables

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Chan et al. 2019	9 High	Systematic review	Cochrane Risk of Bias tool (Higgins & Green, 2005) In most domains the studies were assessed as low risk of bias, unclear risk of bias on concealment of allocation and high risk on blinding of participants	Adults Samples included university students, adults, and older people	38 studies Total participant N = 1318 Sample size range 14 – 277	Depression and anxiety	Exercise	Protective Exercise associated with improvements in mood	Intensity of exercise: mixed findings, two studies found no impact of exercise on mood, 5 out of 19 found no difference in level of intensity on mood, 5 studies showed greater improvements in mood with high-intensity exercise, 4 showed greater improvements in mood with moderate-intensity exercise. High intensity exercise associated with reductions in anxiety Duration of exercise: majority of the 7 studies examining duration found that 10-15 minutes of exercise was sufficient to show an improvement in mood. Up to 30 minutes duration shows benefits in mood, however longer duration beyond this shows little additional improvement to mood Modality of exercise: anaerobic exercise associated with improvements to mood in all studies, findings mixed with aerobic exercise

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Charlet & Heinz, 2016	7 Moderate	Systematic review	Not reported	Adults who consume alcohol, ages ranging from 17 - 69 Of studies examining mental health outcomes, 2 studies female only, 1 study male only	63 studies Of these only 4 examined mental health and quality of life Total participant N for these 4 studies = 886 Sample size range for these 4 studies = 46 -454	Anxiety, depression, and wellbeing	Reduction in alcohol use	Protective Reduction in alcohol consumption associated with improvements in anxiety and depression symptoms	Significant improvements in levels of depression at 6 and 12 month follow-up, reductions in level of anxiety, and improvements in wellbeing with reduction in alcohol use
Close et al. 2016	10 High	Narrative review of systematic reviews	A measurement tool to assess the methodological quality of systematic reviews (AMSTAR) (Shea et al. 2009) 3 reviews assessed as moderate quality 5 reviews assessed as low quality	First generation migrants, including children and adults	8 studies Total participant N (across the 8 systematic reviews) = 74,251	Anxiety and depression	Migrants and refugees	Risk First generation migrants and asylum seekers have mostly high prevalence rates of depression. Young refugees have high levels of depression symptoms	First generation migrants found to have high prevalence rates of depression and anxiety Mixed findings on depression and anxiety rates for refugees and asylum seekers with most reviews finding elevated symptoms, however, one review found depression and anxiety levels similar to that of the general population Review of young refugees found high levels of self-reported levels of depression

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Dogra et al. 2018	10 High	Systematic review	Adapted version of Hoy tool (Hoy et al. 2012) for cross-sectional studies and Scottish Intercollegiate Guidelines Network (2011) for cohort and case-control studies 2 studies assessed with a low risk of bias. 3 studies assessed as a moderate risk of bias	Undergraduate university students	5 studies Total participant N = 27599 Sample size range 215 – 14,706	Depression	Physical activity	Protective Inconsistent findings, studies tended to find a relationship between physical activity and lower depression symptoms	Of the 2 low bias studies, one found a positive relationship between physical activity and lower depression symptoms and one found no relationship All 3 of the medium risk studies found that physical activity was associated with lower depression symptoms, however variations in how exercise was measured

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Eigenschenck et al. 2019	4 Low	Systematic review	Stated that methodological limitations and risk of bias were considered, no specific details provided	All ages, studies on children, adults and older people	74 studies (133 in total, 74 focus on mental health and wellbeing as outcome factors) Number of participants in individual studies not provided	Wellbeing, depression and anxiety	Sport and activity in the natural environment	Protective Being active in the outdoor environment and sport associated with positive mental health benefits	Mental health: Being active in the natural environment has positive benefits for general mental health and psychological stability. Outdoor activities and sports associated with increased self-esteem, self-efficacy, social effectiveness, self-confidence and a better self-concept Wellbeing: Being active in the natural environment, in particular in green and blue environments is positively associated with wellbeing Depression: Reduction in symptoms found to be associated with outdoor sports Anxiety: Reduction in symptoms found to be associated with outdoor sports

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Escobar-Viera et al. 2018	10 High	Systematic review	STROBE (Von Elm et al. 2007) for quantitative studies, Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al. 2007) for qualitative studies STROBE scores for the 9 quantitative studies ranged between 5 and 20 out of 22, and COREQ scores for the 2 qualitative studies were 15 and 17 out of 32.	Lesbian, gay and bisexual people who use social media	11 studies Total participant N = 15437 Sample size range 8 – 4700	Anxiety and depression	Social media use and cyberbullying	Risk and protective Integrated friendship networks and social media discussion of LGB issues are protective factors Cyberbullying, dating app and maintaining social media profile are risk factors	Cyberbullying: exposure to cyberbullying among LGB people was associated with reported feelings of depression – compared with heterosexual youth, bisexual boys and girls were more likely to report cyberbullying Gay hook-up mobile app: male users reported moderate levels of depression Friendship network: tightly integrated social network (more friends who knew each other) associated with lower depression scores Online profile: stressors associated with keeping profile up to date and monitoring it associated with depression Use of social media to discuss LGB issues negatively associated with anxiety

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Fluharty et al. 2017	9 High	Systematic review	Not reported	Adult samples, predominantly from the general population (70%), other samples ethnic based, clinical or other criteria	148 studies Total participant N = 537,282 Sample size range 59 – 90,627	Anxiety and depression	Smoking	Risk Smoking related to later development of depression and anxiety	Smoking status: 37 out of 51 studies found an association between smoking and later depression. Out of four studies that assessed the relationship between smoking and later anxiety, two found a relationship. 5 out of 7 studies that investigated a comorbid relationship between smoking and later development of anxiety and depression found a relationship Smoking heaviness: 7 out of 8 studies that investigated the amount of smoking on later depression found an association between these. One study examined and found evidence of an association between smoking heaviness and development of anxiety Gender: Mixed findings, with 1 study finding that males who smoke are more likely to develop depression, and 2 studies finding that females are more likely

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Foo et al. 2018	5 Low	Systematic review	Not reported	Adult migrants (16 to 65) (excluding refugees, asylum seekers, rural-to-urban internal migrants, and second or later generation migrants) Countries included Australia, Canada, Dominican Republic, Greece, Hong Kong, New Zealand, Spain and Taiwan	25 studies Total migrant participants N = 16, 121 Comparison samples N = 31,391 Sample sizes of individual studies not reported, however inclusion criteria was a minimum sample of 50	Depression	Migrants	Protective Educational attainment, employment status and length of residency associated with depression levels in first generation migrants	Depression prevalence of international migrants was 15.6%, however no significant difference was found in depression prevalence between migrants and the comparison native participants group Prevalence of depression ranged considerably across studies, with educational attainment, employment status, and length of residency contributing to the heterogeneity in the findings

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Forsman & Nordmyr, 2017	10 High	Systematic review	Assessment of quality of quantitative studies based on 4 criteria: validity, generalisability, reliability, and objectivity 15 studies met the criteria for validity 8 studies met the criteria for generalisability 12 studies met the criteria for reliability 18 studies met the criteria for objectivity	Older people (>60 years)	18 quantitative studies and 14 qualitative studies – analysis based on quantitative studies 7 studies examined depression and anxiety as an outcome variable. Of these 7 studies, total participant N = 16,849 Sample size range 122 – 7839	Depression	Internet use	Protective Internet use associated with lower levels of depression and anxiety symptoms and with positive wellbeing	General wellbeing and general mental health: wellbeing and self-efficacy found to be positively related to Internet use Depression: 2 out of the 3 studies found lower depressive symptoms associated with Internet use, 1 study found higher levels of depressive symptoms. Anxiety: 1 study found lower levels of anxiety among Internet users compared to non-users
Friend et al. 2018	4 Low	Systematic review	Not reported	Adult survivors of cancer as a child or young person	67 studies Total participant N = 391,078 Sample size range 21 - 57252	Anxiety and depression	Survivors of early life cancer	Risk Higher levels of anxiety and depression associated with cancer survivors	Cancer in childhood or as a young person associated with higher levels of depression and anxiety later in life, in particular survivors of solid tumours, compared to haematological malignancy Not all studies reported increased mental health problems with young survivors of cancer, and other associations were found such as with obesity and sleep problems

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Fritz et al. 2018	8 Moderate	Systematic review	STROBE (Von Elm et al. 2007) and Downs & Black's (1998) scale All studies met more than half of the assessed quality items	Adolescents who had experienced childhood adversity Mean age 13 - 24	22 studies Total participants = 21127 Sample size range from 59 – 6780	Resilience	Individual factors Attachment and social factors Personality factors Family/parental support Community factors	Protective Resilience a protective factor against anxiety and depressive symptoms after childhood adversity	Individual level factors: high distress tolerance, low expressive suppression, low aggression, and low alcohol coping expectancy were found to be resilience factors associated with low anxiety and depression symptoms Attachment and social factors: low insecure attachment, low disconnection and low rejection found to be resilience factors associated with low anxiety and depression symptoms Personality factors: low ego over- or under- control and high self-esteem found to be resilience factors associated with low anxiety and depression symptoms Family/parental support: high extended family support, immediate family support, family cohesion, a positive family climate, positive parenting and parental involvement are factors that support resilience Community factors: high social support is a factor that supports resilience

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Garcia-Blanco et al. 2017	2 Low	Systematic review	Not reported	Adult consumers of tea, coffee, or cocoa	17 studies Total participant N = 336,273 Sample size range 16 – 263,923	Anxiety and depression	Tea Cocoa Coffee	Protective Coffee associated with lower levels of depression and anxiety, findings mixed for tea and cocoa	Tea – seven out of 9 studies found tea consumption associated with lower depression levels, 2 studies had null findings (however the majority of the sample was in these 2 studies) Cocoa – 3 out of 6 studies found cocoa consumption associated with lower depression and anxiety levels, 1 study found an increase in depression levels, 2 had null findings Coffee – 2 out of 2 studies found coffee consumption associated with lower depression levels
Gascon et al. 2017	7 Moderate	Systematic review	Quality evaluation used an adapted version of criteria used in previous reviews conducted by these authors 1 study assessed as excellent,22 studies assessed as good, 6 studies assessed as fair, 6 studies assessed as poor	Children, adolescents, and adults	35 studies Mental health and wellbeing assessed in 12 studies. Of these 12 studies, total participant N = 97,101 Sample size range 331 – 21,947	Anxiety and depression	Outdoor blue spaces	Protective Positive association of living near coastal and inland waters associated with lower depression and better mental health	Location near coastal areas: mixed findings with some studies finding an association between residential location near coast and depression symptoms, other studies did not find an association. Measures of mental health also mixed findings, with some studies finding an association with better mental health if living near coastal areas and other studies finding no association

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Gibson, Ackling, et al. 2018	11 High	Systematic review	Quality in Prognosis Studies tool (Hayden et al. 2013) 17 of the 21 studies assessed as having moderate or high risk of bias	Adult patients with facial scarring	21 studies Total participant N = 2394 Sample size range 20 – 336	Anxiety and depression	Facial scarring	Risk High rate of anxiety 26.1% and depression 21.4% for people with facial scarring	Higher proportion of people with facial scarring have anxiety or depression than the prevalence rate in the general population Females and people whose scar came from a violent method were more likely to have anxiety or depression The prevalence of anxiety and depression for people with facial scarring appears to decrease over time
Glonti et al. 2015	8 Moderate	Systematic review	Quality Assessment Tool for Quantitative Studies (Thomas et al. 2004) 12 assessed with a low risk of bias 10 assessed with a moderate risk of bias	Adults who had been affected by a large-scale economic crisis	22 studies Participant numbers not provided	Anxiety and depression	Economic crisis, at a national level, lasting more than a few months	Risk Low income and uncertain employment associated with higher levels of depression	Income level: low income and precarious employment associated with depression and poor mental health Variable findings with different age groups and gender

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Gong et al. 2016	5 Low	Systematic review	Methodological pro-forma developed by Health Evidence Bulletin Wales project, adapted from Critical Appraisal Skills Programme (2012) Assessment of studies not provided	Adult community residents of urban areas	11 studies Total participant N = 24,788 Sample size range 273 – 5218	Anxiety and depression	Urban environment	Risk and Protective Urban environment and amount of accessible green space associated with depression and anxiety	Urban environment: Housing factors associated with higher depression symptoms include newly constructed dwelling (post-1969), access along a long corridor (deck access), and a shared recreational space Architectural features: Designs that promote visibility, such as a porch, are associated with reduced anxiety and depression Land use: Greater amounts of green space associated with lower anxiety and depression prevalence
Haines et al. 2015	7 Moderate	Systematic review	Newcastle-Ottawa Scale (Wells et al. 2008) All studies rated between 2 and 4 out of 9, indicating low quality	Adult caregivers of critically ill patients	14 studies Total participant N = 1491 Sample size range 24 – 370	Depression	Caregivers	Risk Caring for a critically ill patient associated with depressive symptoms	Depressive symptoms associated with caring for a critically ill survivor of intensive care Female and younger carers more likely to experience depressive symptoms Patient-specific factors associated with higher depressive symptoms for caregiver include older age, functional dependency and institutionalisation post hospital discharge

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Harvey et al. 2017	6 Moderate	Meta-review	AMSTAR (Shea et al. 2009) 7 studies assessed as moderate quality 12 studies assessed as low quality	Workers	37 review studies The 7 studies of moderate quality had a combined total of 213 studies. The number of studies in each review or sample sizes of individual studies not provided	Anxiety and depression	Workplace factors associated with mental ill-health	Risk Workplace factors, including interpersonal relationships, job demands, and work conditions associated with higher levels of anxiety and depression	High job strain, low job control, low decision latitude, high psychological demands, and low social support are each associated with higher levels of depression symptoms An imbalance between effort at work and reward received is associated with a greater risk of developing depression and anxiety disorders Procedural or relational justice problems associated with higher levels of depression symptoms Job insecurity associated with higher levels of depression symptoms Working more than 40 hours a week associated with increased levels of anxiety and depression Workplace bullying associated with higher levels of depression and anxiety

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Hashem et al. 2016	5 Low	Systematic review	Adaptation of Cochrane guidelines (Higgins & Green, 2008) and the Critical Appraisal Skills Programme (2012) The majority of studies provided adequate details of method, codebook, theoretical basis, and supported themes with quotes. Only a minority justified sample size and explained why patients were ineligible or chose not to participate	Adults (>18) who have experienced a critical illness	22 studies Total participant N = 594 Sample size range 1 – 298	Anxiety, depression and wellbeing	Critical illness	Risk Anxiety and depression symptoms experienced by some patients recovering from a critical illness episode	Anxiety symptoms high in patients recovering from a critical illness, including constant fear, worrying and panic attacks Depression symptoms reported in six studies, by patients recovering from a critical illness Poorer wellbeing experienced by patients recovering from a critical illness

Hergenrather et al. 2015	7 Moderate	Systematic review	Authors independently rated the studies, then ratings compared. Further details not provided.	Adults in the workforce or unemployed, including school leavers	48 studies Total participant N = 89,389 Sample size range 75 – 14,868	Psychological wellbeing, anxiety and depression	Employment, unemployment	Protective Employment is associated with better psychological wellbeing and lower depression and anxiety	Employment: Association between employment and lower rates of depression and anxiety and more positive psychological wellbeing Unemployment: Association between unemployment and higher levels of depression and increased anxiety Job loss: Associations between job loss and increased depression symptoms Reemployment: Over time reemployed people report lower depression, including for persons reemployed after retirement. People who are reemployed after a time of unemployment have decreased anxiety compared to unemployed people Retirement: Association between retirement and lower depression, compared to people who are employed Job Quality: Association between income-underemployed persons and higher levels of depression. People with temporary employment report increased depressive symptoms than people with stable employment
Hinkley et al. 2014	9 High	Systematic review	National Collaborating Centre	Children aged birth to 5 years	19 studies	Psychosocial wellbeing	Physical activity	Risk and protective	Physical activity: positively associated with psychosocial

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			for Methods and Tools (2008) 13 studies assessed as high quality 8 studies assessed as moderate quality 13 studies assessed as weak quality 8 studies assessed as moderate risk of bias		Total participant N = 37978 Sample size range 44 – 13470		Sedentary behaviour	Sedentary behaviour associated with poorer psychosocial wellbeing Physical activity positively associated with psychosocial wellbeing	wellbeing Sedentary behaviour: inversely associated with psychosocial wellbeing Depression and anxiety not outcome measures, but in 3 studies the outcome of psychosocial wellbeing was measured partly by these factors Too few studies to draw conclusions
Hoare et al. 2014	5 Low	Systematic review	No defined quality appraisal. Reference made to quality of evidence, such as diverse sample sizes	Obese adolescents	24 studies Total participant N = 99,683 Sample size range 160 – 35,184	Depression	Physical activity, sedentary behaviour, diet, and BMI	Risk and protective Physical activity associated with lower depression symptoms Sedentary behaviour and poor diet associated with higher depression symptoms	Physical activity: Regular exercise is associated with fewer symptoms of depression. In one study this relationship was found with females and not males Sedentary behaviour: More hours of screen time associated with more symptoms of depression Diet: Higher consumption of meat and meat alternatives and extras (e.g. chips, pizza) related to depressed mood BMI: Findings mixed, relative weight positively associated with depression for females, however, other studies did not find this relationship

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Hoare et al. 2016	5 Low	Systematic review	Quality Assessment Tool for Quantitative Studies (Effective Public Health Practice Project, 2009) 12 studies assessed as strong 17 studies assessed as moderate 3 studies demonstrated assessed as weak.	Adolescents	32 studies 24 cross-sectional studies, total participant N = 249,772 Sample size range 126 – 136,589	Anxiety and depression	Sedentary behaviour	Risk and protective Higher levels of screen time >2-3 hours per day associated with higher levels of depression and anxiety	Screen time: Higher daily average screen time associated with higher depression scores and greater severity of anxiety symptoms Computer/Internet use: Association between higher Internet use (3 or more hours per day) for adolescent females and higher depression symptoms, compared to adolescent females with less screen time. Low Internet use (up to 2 hours per day) associated with lower depression symptoms, compared to non-users (in 1 study). TV: More TV viewing per week associated with higher depressive symptoms in 1 study, but relationship not found in another study. Video gaming: One study found lower depression for adolescents who play games frequently compared to those who rarely play

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Hollocks et al. 2019	8 Moderate	Systematic review and meta-analysis	Quality Assessment Tool for Quantitative Studies (Effective Public Health Practice Project, 2009) Studies assessed as low overall quality.	Adults with an autism spectrum disorder	35 studies 27 studies examined anxiety (total participant N = 26,070) 29 studies examined depression (total participant N = 26,117 Sample size range 13 – 22,253	Anxiety and depression	Autism spectrum disorders	Risk Autism spectrum disorders are associated with higher rates of anxiety and depression	Pooled prevalence estimate for any current anxiety disorder for adults with an autism spectrum disorder (ASD) is 27% and lifetime estimated prevalence is 42% Pooled prevalence estimate for current general anxiety disorder for adults with an ASD is 18% and lifetime estimated prevalence is 26% Pooled prevalence estimate for current depression for adults with an ASD is 23% and lifetime estimated prevalence is 37%
Hünefeld et al. 2019	5 Low	Systematic review	Not reported	Adults who obtain work through temporary employment agencies	13 studies assessed mental health Total participant N = 73,233 Sample size range 18 – 19,405	Depression	Temporary agency workers	Risk Temporary agency employment related to depression	Association between temporary agency employment and depression

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Kelly et al. 2018	5 Low	Scoping review	Not reported	Population samples	Depression: 5 systematic reviews 14 studies of anxiety No participant numbers of studies provided	Anxiety and depression	Walking	Protective Walking has an association with lower depression and anxiety	3 systematic reviews found walking to have a protective effect on depression 4 out of 5 studies showed an association between walking and lower anxiety Walking has positive effects on psychological wellbeing, with walking in natural environments more beneficial than treadmill-based walking
Khazaeian et al. 2017	5 Low	Systematic review	STROBE (Von Elm et al. 2007) Studies that scored 16 or higher were included in the review	Female head of households 7 studies conducted in Tehran; 8 studies from other non-middle eastern countries, including: 1 study Australian sample 1 study Canadian sample 2 studies US samples	15 studies Total participant N = 12,060 Sample size range 60 – 2921	Depression and mental health	Social capital and social support	Protective Social support associated with lower levels of depression. Family support, in particular, has a significant positive association with mental health	Social support associated with lower levels of depression (single female heads of households more prone to depression than married women) in Canadian and Mexican samples Social capital (social trust, sense of belonging, social participation) associated with mental health

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Kien et al. 2018	11 High	Systematic review	AXIS tool (Downes et al. 2016) 2 studies assessed as low risk of bias 29 assessed as having unclear risk of bias 6 studies assessed as high risk of bias	Children and adolescent refugees and asylum seekers (accompanied and unaccompanied) seeking refuge in European countries	47 studies Total participant N = 24,786 Sample size range 19 – 15,264	Anxiety and depression	Refugees and asylum seekers	Risk Seeking asylum is associated with high levels of depression and anxiety	19 studies examined the prevalence of depression and found a median depression rate of 20.7%, however, prevalence when assessed using a structured clinical interview was between 3.1 and 9.4% Two studies that examined unaccompanied and accompanied minors found that unaccompanied children and adolescents had a higher prevalence of depression than accompanied children and adolescents 16 studies examined the prevalence of anxiety and found a median anxiety rate of 15% One study examined unaccompanied and accompanied minors and found that unaccompanied children and adolescents had a higher prevalence of anxiety than accompanied children and adolescents

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Kim & von dem Knesebeck, 2015	4 Low	Systematic review	Not reported	Unemployed people and people with job insecurity	13 studies Total participant N = 91,085 Sample size range 419 – 25,413	Anxiety and depression	Job insecurity and unemployment	Risk Job insecurity and unemployment are strongly associated with higher levels of depression and anxiety	Job insecurity: Associated with higher levels of depression and anxiety Unemployed: Associated with higher levels of depression and anxiety, particularly if currently unemployed or unemployed for a long period
Lagdon et al. 2014	8 Moderate	Systematic review	Critical Appraisal Skills Programme (2012) Appraisal used to assess whether studies should be included in the review	Adult victims of intimate partner violence	58 studies Could not retrieve sample details from Supplementary Table online	Anxiety and depression	Victims of intimate partner violence victimisation	Risk Intimate partner violence victimisation associated with higher levels of anxiety and depression	Intimate partner violence victims have higher rates of depression and anxiety than non-victims Psychological, physical and sexual violence all found to be associated with higher levels of depression and anxiety Poly-victimisation associated with increased risk of depression

Lawson et al. 2015	7 Moderate	Systematic review	Quality Assessment Tool for Quantitative Studies (Effective Public Health Practice Project, 2009) 1 study assessed as strong 13 studies assessed as moderate 17 studies assessed as weak	Postpartum women	31 studies Total participant N = 11675 Sample size range 20 – 4662	Anxiety and Depression	Disturbed, poor quality sleep in the antenatal or postnatal period	Risk Self-reported disturbed sleep in the antenatal and postnatal periods associated with depressive symptoms in the postpartum period	Sleep in third trimester: Self-reported sleep disruption in third trimester associated with depressive symptoms in the postpartum (in 7 of 10 studies) Sleep during pregnancy: Objective sleep measures did not find strong evidence for poor sleep during pregnancy and affective disorders in the postpartum period. One study did find a significant difference in depression scores at 2 and 6 weeks postpartum between women who were treated for insomnia in the 3rd trimester compared to a placebo group Sleep in postpartum period: 7 of 20 studies that assessed self-reported sleep during the postpartum and symptoms of postpartum depression, found poor sleep was associated with postpartum depression Sleep in postpartum period: Disrupted, shorter, variable or poor sleep quality associated with postpartum depression Insomnia symptoms in postpartum period: weak evidence of a relationship between moderate insomnia symptoms in postpartum period and generalised anxiety

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Leach et al. 2017	4 Low	Systematic review	Not reported	Perinatal women	98 studies Sample sizes not provided for all individual studies	Anxiety	Perinatal period	Risk Individual, economic and social factors associated with higher anxiety levels in perinatal period	During pregnancy, between 6.8 and 59.5% of women experienced high levels of general anxiety and between 4.7 and 33% of women during the postpartum period Younger maternal age, without a partner, lower maternal education, lower socio-economic situation, smoking, being overweight, lack of support from family or partner, and past psychiatric history identified as risk factors for the development of perinatal anxiety
Leigh-Hunt et al. 2017	9 High	Overview of systematic reviews and meta analysis	AMSTAR (Shea, et al. 2009) 7 reviews of high quality 20 reviews of moderate quality 13 reviews of low quality	Adolescents, adults and older people (>65)	40 systematic reviews Sample sizes of individual studies ranged between 10 and 100,000	Wellbeing, depression and anxiety	Loneliness and social isolation	Risk and protective High-quality social relationships associated with higher wellbeing and lower depression Association between social anxiety and social isolation	Positive relationship found between high quality social relationships and subjective wellbeing – quality of relationships more important than quantity Association found between large and diverse social networks and lower levels of depression Positive association between social isolation and social anxiety disorder (causality not determined)

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Lever et al. 2019	10 High	Systematic review	Critical Appraisal of Research Evidence (Ajetunmobi, 2002) 12 studies assessed as good 28 studies assessed as fair 5 studies assessed as poor	Healthcare workers	45 studies Total participant N = 62,005 Sample size range 61 – 9949	Anxiety and depression	Bullying in the workplace	Risk Bullying in healthcare sector workplaces is associated with higher levels of depression and anxiety	8 out of 14 studies examining depression found an association between bullying and depression symptoms (3 studies did not report significance of findings, 3 studies found no association) 2 out of 5 studies examining anxiety found an association between bullying and increased anxiety (2 studies did not report significance of findings,1 study found no association) Bullying prevalence ranged from 3.9 - 86.5%, with a pooled mean estimate of 26.3%
Llosa et al. 2018	10 High	Systematic review and meta-analysis	5-criteria quality assessment Out of a total score of 5, the mean for the articles included in the entire sample of 33 studies was 4.08, indicating a high quality of articles included	Workers Sample countries predominantly European	33 studies Total participant N for 11 depression studies = 16,684, and for 7 anxiety studies, N = 2677 Sample size range for each study not provided	Anxiety and depression	Job insecurity	Risk Job insecurity is associated with elevated levels of depression and of anxiety	Job insecurity is positively associated with depression symptoms and with anxiety symptoms, although the link with depression is stronger

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Marley & Mauki, 2018	7 Moderate	Systematic review	Scottish Intercollegiate Guidelines Network (2011) 3 studies assessed as below average methodological quality 8 studies assessed as above average methodological quality	Refugee children from a range of countries, settled in UK, Sweden, Denmark, USA, Australia, Canada, Netherlands, Croatia and Austria	11 studies Total participant N = 2891 Sample size range 67 - 1282	Wellbeing, adaptive psycho social functioning, mental health	Resilience factors for refugee children	Protective Individual, relationship, community and societal factors are associated with adaptive psychosocial functioning for refugee children	Individual factors: Younger aged children, high self-esteem, prosocial behaviour, intelligence, and a positive attitude toward own culture and host culture are associated with adaptive abilities when faced with adversity Social support: Good peer relationships and supportive family associated with more positive mental health outcomes Community factors: A sense of belonging and community support are protective factors for mental health Societal factors: socio-economic conditions and availability of health care associated with mental health outcomes
McCormick, 2017	4 Low	Systematic review	Not reported	Children and adolescents (>18)	12 studies Total participant N = 20,886 Sample size range 67 - 6333	Mental wellbeing	Access to greenspace	Protective Access to green space is positively associated with mental wellbeing	High quality and quantity green space associated with positive mental wellbeing for children and adolescents

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
McDonald, 2018	5 Low	Systematic review	5-criteria quality assessment No assessment rating providing	LGBTQ adolescents	10 studies Total participant N = 4170 Sample size range 98 – 1906	Anxiety and depression	Social support	Protective Social support associated with lower depression and anxiety levels	Higher levels of adolescent LGBTQ social support associated with lower levels of depression and anxiety Sexual minority adolescents experience lower levels of social support and a more hostile living environment than heterosexual adolescents, and social support was related to more positive psychosocial wellbeing
McParland & Camic, 2016	7 Moderate	Systematic review	STROBE (Von Elm et al. 2007) No consistent report of STROBE scores for studies	Lesbian, gay or bisexual adults aged over 60	41 studies Total participant N = 4633 Sample size range 2 – 1150	Depression	Social support	Protective Social support associated with lower depression	Social support: older gay men and lesbians with higher social support have lower depression scores compared to those with less social support (tended to be friendship social support rather than family support)

McPherson et al. 2014	9 High	Systematic review	Quality appraisal tool with 11 criteria designed for this study 37 studies assessed as high quality 17 studies assessed as medium quality 1 study assessed as poor quality	Pre-school children, school aged children and adolescents	55 studies Total participant N = 4633 Sample size range 31 – 98,340	Wellbeing, anxiety and depression (grouped into 'internalising behaviours'	Family social capital and community social capital	Protective Positive parent-child relationship, social networks and high-quality school and neighbourhood environments associated with lower depression and anxiety (internalising behaviours)	Family social capital. Positive parent-child relationships associated with less internalising behaviours and more positive mental wellbeing. Positive relations have more impact on lower internalising behaviours in low violence neighbourhoods, compared to high-violence neighbourhoods. Adolescents with positive relationships with their parent in rural areas had less internalising behaviours compared to adolescents in urban areas who have a positive relationship with their parent. Eating meals together and families with a high value of trust and fairness were associated with lower internalising behaviours Community social capital. Wider and good quality social networks associated with lower internalising behaviours. Peer support associated with lower internalising behaviours for rural adolescents, but relationship not present for urban adolescents. Schools and neighbourhoods with higher quality environments are associated with lower internalising behaviours
Medlow et al. 2014	4 Low	Systematic review	Not reported	Homeless youth aged 10 – 24	21 studies (6 studies	Anxiety and depression	Homelessness	Risk	Homeless young people had higher rates of depression

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
					examining depression, 1 study examining anxiety) Total participant N = 2374 Sample size range 150 –428			Homeless and LGBTQ young people have higher rates of depression Substance use and other mental health problems associated with higher rates of depression	than young people at school. Prevalence rates for depression ranged between 8 and 61% Substance use and other mental health problems associated with depression LGBTQ young people more likely to meet diagnostic criteria for depression than other young people

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Meng et al. 2018	7 Moderate	Systematic review	Quality assessment checklist developed for the study 43 studies (51%) assessed as above-average quality Average score 5.5 out of 10 (range 3 – 9)	People who had been maltreated as a child (including sexual, physical, psychological/ emotional abuse and neglect)	85 studies Total participant N = 194,876 Sample size range 51 – 47,869	Resilience Absence of psychopathology (including anxiety and depression) used to indicate resilience in almost half of the studies (N = 44)	Childhood maltreatment	Protective Individual, familial and community factors associated with resilience for people who were maltreated as a child	Individual factors: Optimal birth outcomes, education, relationships history, social and economic status, social skills, positive coping and adaptive functioning skills associated with adaptive functioning and resilience for people who have been maltreated as a child Familial factors: Early family environment, living with parents, positive parenting, parental care, family functioning, family and peer context, child religiosity, friendship, intimate partner relationships, sibling relationships and peer relationships Community/society factors: Other adult (other than family members) caring, teacher caring, social support, school safety, community support, inferential style, educational support, living in a neighbourhood with few problems, and social engagement

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Mitra & Hodes, 2019	6 Moderate	Systematic review	Newcastle-Ottawa Scale (Wells et al. 2008) 2 studies assessed as 9 out of 10 1 study 8 out of 10 3 studies 7 out of 10 2 studies 6 out of 10 4 studies 5 out of 10	Unaccompanied refugee children aged under 18 years	14 studies Of these, 6 studies examined residential care arrangements Of these 6 studies, total participant N = 1446 Sample size range 78 – 582	Depression	Unaccompanied refugee children	Risk More restrictive reception centres associated with higher rates of depression	Higher support in residential setting was associated with lower psychological distress Girls in highly restrictive reception centres (with regimes similar to prison) had higher scores for anxiety and depression than girls in the routine reception centre
Modini et al. 2016	6 Moderate	Systematic meta-review	AMSTAR (Shea et al. 2009) 3 studies assessed as moderate quality 6 studies assessed as low quality	Adult workers	11 reviews Total sample size of participant numbers for individual studies not provided	Anxiety and depression	Employment	Protective and risk Work is protective when there is good quality supervision Unemployment a risk factor for depression, anxiety and reduced wellbeing	Work found to be associated with reduced levels of anxiety and depression symptoms, if supportive supervision is present. Other benefits of work include a greater sense of autonomy, improved self-reported wellbeing, increased access to resources to cope with demands, enhanced social status and unique opportunities for personal development and mental health promotion Unemployment associated with increased rates of depression and anxiety, and reduced wellbeing

Moreno-Peral et al. 2014	9 High	Systematic review	Newcastle-Ottawa Scale (Wells et al. 2008) Out of a total of 9, 6 studies assessed as 9 9 studies assessed as 8 5 studies assessed as 7 1 study assessed as 4	General population of adults	21 studies Total participant N = 163,366 Sample size range 158 – 34,653	Anxiety	Demographic and life factors	Risk Individual and life factors associated with an increased risk of developing anxiety	Most common age of onset for generalised anxiety disorder (GAD) was 30-54 years, in one study and 45-64 years in another study Two out of 4 studies found females had a higher risk of developing GAD, the other 2 studies did not find this association One study found being widowed or divorced was associated with higher risk for GAD. Another study did not One study found that having fewer economic resources was associated with a higher risk for GAD Three out of 3 studies found that the onset of GAD was related to stressful life events in childhood, and one found an association with stressful life event in the previous month Certain personality traits found to be associated with GAD (e.g. neuroticism, behavioural inhibition, harm avoidance) Parental history of GAD or other mental health problems associated with GAD in offspring
Mucci et al. 2016	3 Low	Systematic review	Meta-analyses of Observational	Adults who have experienced	19 studies (14 examined	Anxiety and depression	Economic crisis	Risk	Higher rates of depression associated with employees

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
			Studies in Epidemiology guidelines (Stroup et al. 2000) No studies assessed as high quality 13 studies assessed as moderate quality 10 publications assessed as low quality	economic crisis, Older people >55	depression) Participant numbers for each study not reported			Economic crisis is associated with higher rates of depression and anxiety	affected by economic crisis. Greater prevalence for married workers or workers in a common-law relationship Higher rates of anxiety associated with employees affected by economic crisis Economic slowdown associated with higher rates of depression and anxiety for older adults Work stress and job instability associated with higher rates of depression
Nakamura et al. 2019	11 High	Systematic review	Cochrane Risk of Bias tool for intervention studies (Higgins & Green, 2005) Newcastle-Ottawa Scale for observational studies (Wells et al. 2008) 7 studies assessed as low risk of bias 11 studies assessed as moderate risk of bias 3 studies assessed as high risk of bias	Pregnant women	21 studies Total participant N = 101,295 Sample size range 22 – 70,866	Depression	Physical activity	Protective Physical activity associated with lower rates of postnatal depression	Significant reduction in postpartum depression scores for women physically active during pregnancy relative to those who were not active. Association was reinforced in intervention studies

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
O'Higgins et al. 2018	8 Moderate	Systematic review	Critical Appraisal Skills Program (2012) All studies were found to have methodological limitations	Unaccompanied refugee minors	9 studies (8 examined mental health) Total participant N for mental health studies = 1947 Sample size range 78 – 582	Depression	Type of accommodation refugee minors are provided with	Risk and protective Large detention-type facilities associated with higher levels of depression Foster care associated with lower levels of depression	Unaccompanied refugee minors living alone or in large detention facilities had higher rates of depression than those living in foster care, with family, or with other dedicated support Unaccompanied refugee minors placed in foster care with people of the same ethnic background have lower levels of depression than those placed with white Americans
Pascoe & Parker, 2018	2 Low	Systematic review	Quality assessment of papers not conducted	Secondary school and university students	11 studies Total participant N = 39,165 (N not provided for 2 studies) Sample size range 25 – 32,860	Depression	Physical activity and exercise	Protective Physical exercise associated with lower rates of depression	Physical exercise, including yoga, resistance exercise and aerobic exercise are associated with lower levels of depression

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Patel et al. 2018	9 Moderate	Systematic review and meta-analysis	Systematic Appraisal of Quality in Observational Research (citation for this instrument not provided in review) 12 studies assessed (those included in meta-analysis), 6 studies assessed as high quality, 6 studies assessed as moderate quality	Adolescent and adult population samples, 4 at a country level, 14 regional, and 8 at a local level	26 studies Total participant N = 1,243,976 Sample size range 241 – 235,067	Depression	Income inequality at a geographical scale	Risk Income inequality positively associated with depression	The majority of studies (N = 19) found a positive relationship between income inequality and depression symptoms. Six studies found no relationship between income inequality and depression and 1 study found a negative relationship. A meta-analysis of 12 studies found a pooled risk of depression of 1.19%
Perry et al. 2015	6 Moderate	Systematic review	Not reported	African American adolescent males	12 studies Total participant N = 4068 Sample size range 88 – 1704	Anxiety and depression	African American neighbourhoods	Risk and protective	Living in neighbourhoods with high exposure to violence, crime, unemployment and poverty associated with higher rates of depression and anxiety A protective factor for lower levels of anxiety was found to be neighbourhoods with high stability and higher density of African American residents

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Plöderl & Tremblay, 2015	2 Low	Systematic review	Methodological assessment developed for this study 26 studies assessed as high quality (representative national samples using clinical interviews).	Homosexual and bisexual persons – adolescent and adult samples	199 studies Sample sizes not provided for individual studies	Anxiety and depression	Sexual orientation	Risk Higher levels of anxiety and depression symptoms, and higher risk of anxiety and depression found for adolescent and adult male homosexual and bisexual persons	Majority of studies of adults (89%) found elevated levels/rates of depression in general or across sexual minority subgroups, for both genders, across age groups, and different regions Majority of studies of adolescents (97%) found elevated levels/rates of depression in general or across sexual minority subgroups Bisexual individuals had higher rates of depression than homosexual individuals in the majority of studies Larger effects for depression were found for men in a weak majority of studies Majority of studies of adults (83%) found elevated levels of anxiety symptoms or rates of anxiety disorders in general or across the sexual minority subgroups Each of the 4 studies that assessed adolescent anxiety levels found elevated levels of anxiety among sexual minority youths

Rautio et al. 2018	9 High	Systematic review	Downs & Black's (1998) 5-item checklist Out of a maximum of 5 points, the majority of studies were rated between 3 and 5, with 49 studies rated as 5.	Population studies, including 2 with adolescent samples and 10 with older adult samples	57 studies Total participant N = 6,026,451 Sample size range 278 – 4,400,000	Depression	Urban environment	Risk Elements of the urban environment associated with higher levels of depression Protective: Green areas associated with lower levels of depressive symptoms	Urbanisation: 7 out of 17 studies found a relationship between living in metropolitan area and depressive mood Population density: 3 studies found higher population density associated with depressive mood, 1 study found higher population density associated with lower depressive symptoms Aesthetics: 3 out of 8 studies found a relationship between aesthetic environment and depressive mood House/built environment: 9 out of 12 studies found a relationship between adverse house/built environment and depressive mood Green areas: Protective factor, 9 out of 12 studies found inverse relationship between green areas and depressive mood Accessibility: 2 out of 6 studies found walkability/accessibility associated with lower depression for older people Noise: 5 out of 5 studies found a relationship between high urban noise and depressive symptoms Services and facilities: 4 out of 10 studies found a

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
									relationship between the availability of health and cultural services, healthy food stores and fast food restaurants and lower levels of depressive mood
Roche et al. 2016	8 Moderate	Systematic review	Quality Assessment Tool for Quantitative Studies (National Collaborating Centre for Methods and Tools, 2008) 3 studies assessed as methodologically strong 9 studies assessed as moderate 8 studies assessed as weak	Paid workers in male dominated industries (defined as at least 70% of employees are male)	20 studies Total participant N = 279,180 Sample size range 468 – 60,556	Depression	Male dominated industries	Risk Male dominated employment associated with higher levels of depression (in some industries)	Majority of studies found levels of depression for workers in male dominated industries higher than population norms or comparator groups in the study, in particular the agriculture and mining industries and manual workers
Rugulies et al. 2017	11 High	Systematic review and meta-analysis	Newcastle-Ottawa Scale (Wells, et al. 2008) 2 studies assessed as high quality 2 studies assessed as moderate quality 4 studies assessed as low quality	Workers – public sector and general workforce	8 studies Total participant N = 84,963 Sample size range not provided	Depression	Effort-reward imbalance at work	Risk Effort-reward imbalance at work associated with depression	Seven out of 8 prospective studies found effort-reward imbalance is associated with a 1.5 fold increased risk of depressive disorders

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Saghafian et al. 2018	11 High	Systematic review and meta-analysis	Newcastle-Ottawa Scale (Wells et al. 2008) Out of a total of 7 1 study assessed as 7 7 studies assessed 6 6 studies assessed 5 4 studies assessed 4 9 studies assessed as 3 or lower	Adults	27 studies Total participant N = 289,018 Sample size range 71 – 125,428	Depression	Fruit and vegetable intake	Protective Increased intake of fruit or vegetables associated with reduced risk of depression	High intake of fruit (compared to low intake) association with a 17% reduction in the risk of depression. Inverse linear association between fruit intake and risk of depression found in some studies - with every 100g increase in fruit intake associated with a 3% reduction in the risk of depression High intake of vegetables (compared to low intake) association with a 14% reduction in the risk of depression. Every 100g increase in consumption of vegetables was associated with a reduced risk of depression of 3% (in cohort studies) and 5% (in cross-sectional studies)

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Schreiter et al. 2017	7 Moderate	Systematic review	Not reported	Homeless people in Germany (Adults)	11 studies Total participant N = 1220 Sample size ranging from 17 - 265	Anxiety and depression	Homeless	Risk High prevalence of anxiety and depressive disorders for people who are homeless	Anxiety was the second most common mental health problem for homeless people (substance use most common). Pooled prevalence rate for anxiety from 6 studies was 17.6% Affective disorders were the third most common mental health problem for homeless people. Pooled prevalence rate for major depressive disorder, from 5 studies, was 11.6%
Secinti et al. 2017	10 High	Systematic review and meta-analysis	STROBE (Van Elm et al. 2007) 1 study assessed as meeting over 80% of the criteria 22 studies assessed as meeting 70-80% 14 studies assessed as meeting 60-69% of criteria	Adults who had experienced a childhood chronic illness	37 studies Total participant N = 47, 561 Sample size ranging from 60 - 9883	Depression	Childhood chronic illness	Risk Childhood chronic illness associated with depression and anxiety in adulthood	History of childhood cancer associated with depression in adulthood Experience of a chronic childhood illness associated with depression in adulthood Experience of a chronic childhood illness associated with anxiety in adulthood

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Shoham et al. 2018	10 High	Systematic review	Newcastle-Ottawa Scale (Wells et al. 2008) Out of a total score of 8 1 study assessed as 8 1 study assessed as 7 2 studies assessed 6 4 studies assessed 5 2 studies assessed 4	People with hearing impairment	25 studies Total participant N = 16,756 Sample size range 30 – 5043	Anxiety	Hearing impairment	Risk Hearing impairment associated with anxiety symptoms	Large-scale community samples found an association between hearing loss and higher levels of anxiety, ranging from 11 - 31% of people with hearing impairment indicating elevated anxiety levels, with the prevalence rising to 41% for people with dual sensory loss Between 2.2% and 32% of hearing impaired clinical patients (under ENT care) also have high levels of anxiety Anxiety levels lower after surgical intervention to improve hearing
Simanek & Meier, 2015	6 Moderate	Systematic review	Not reported	Offspring whose mother had suffered from influenza, several studies during flu outbreaks	13 studies Total participant N = 1,741,163 Sample size ranging from 163 – 600,000	Anxiety and depression	Maternal prenatal influenza	Risk Maternal prenatal exposure to influenza virus has an association with depressive symptoms and bipolar disorder	Maternal prenatal influenza infection associated with higher depressive symptoms for offspring, stronger association with bipolar disorder

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Stiglic & Viner, 2019	9 High	Systematic review of reviews	AMSTAR (Shea et al. 2009) All 7 reviews examining mental health outcomes assessed as medium quality	Children and adolescents All ages of child and adolescence in sample sizes, from 0 to 19	13 reviews, 7 examined mental health Across these 7 reviews, number of studies included ranged from 23 to 235	Anxiety, depression and wellbeing	Screen time	Risk Higher levels of screen time associated with higher levels of anxiety and depression	One review found moderate evidence of a positive association between screen time duration and severity of anxiety symptoms One review found an association between social media screen time and depressive symptoms and that higher depressive symptoms were associated with 2 or more hours of screen time each day Two reviews found an association between increased screen time and poorer psychological wellbeing

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Sutaria et al. 2018	9 high	Systematic review and meta-analysis	Newcastle-Ottawa Scale (Wells et al. 2008) Cohort studies: out of a maximum of 7 3 studies assessed as 6 3 studies assessed 5 4 studies assessed 4 Cross-sectional studies: maximum of 5 2 studies assessed as 5 5 studies assessed 4 5 studies assessed as 3 or below	Children (<18 years)	22 studies Total participant N = 143,603 Sample size range 134 – 43,2113	Depression	Obesity	Risk Obesity in children is associated with increased incidence of depression	Overall prevalence of depression across the 22 studies was 10.4% Odds ratio for depression for obese children compared to normal-weight children is 1.32 The odds of female obese children developing depression (1.44) are higher than those of male obese children (1.14), compared to same gender normal-weight children
van der Noordt et al. 2014	9 High	Systematic review	Methodological quality assessed according to 14 criteria developed for prospective cohort studies 23 studies were assessed as high quality 10 studies were assessed as low quality	Adolescents and adults in the workforce or unemployed	33 studies Total participant N = 37,593 Sample size ranging from 45 – 7499	Depression	Employment	Protective Strong evidence employment is associated with lower depression	10 studies (6 assessed as high quality) found evidence for the protective effect of employment on depression Reemployment associated with improved mental wellbeing and decreased risk of depression

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Vins et al. 2015	5 Low	Systematic review	Not reported	Rural and remote people affected by drought	82 studies No details on sample sizes provided	Mental health, including depression and anxiety	Drought	Risk Drought is associated with higher levels of mental health problems	Depression an outcome variable included in mental health Risk factors for people affected by drought include rural or remote people, dependent on farming, indigenous, perceived stigma regarding mental health issues and lack of knowledge about support services, previous mental health problem or adverse life events and exposure to an extended period of drought Protective factors for people affected by drought include social support, social capital, a sense of knowledge, shared knowledge and community preparedness regarding availability of support services, mental health literacy and government assistance

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Von Werthern et al. 2018	9 High	Systematic review	Critical Appraisal Skills Programme Checklist (2012) Out of a score of 26 16 studies assessed as 19 or above 8 studies between 11 and 18 2 studies assessed below 10	Immigration detainees 16 studies reported on adults, 9 on children and families, and 1 study on adults and children	26 studies Total participant N = 2099 Sample size range 16 – 1354	Anxiety and depression	Detained immigrants	Risk Being detained associated with higher levels of anxiety and depression	Most studies using self-report measures of depression and anxiety reported symptoms of depression and anxiety for detained immigrants Six studies compared self-reported depression and anxiety symptoms with non-detained refugees or migrants from a similar background, and all 6 studies found higher symptom scores for the detained sample Clinical assessments of male detainees found a prevalence rate of mental health disorders of 26.2%, of these affective disorders (36%) and anxiety (34%) were most common Gaining temporary protection (rather than permanent) was associated with higher levels of depression Three studies assessed the level of anxiety and depression symptoms beyond the period of detention, and found the symptoms persisted, with studies following up at 10 months, and 3 and 4 years

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Wang et al. 2018	9 High	Systematic review	Mixed Methods Appraisal Tool (Pace et al. 2012) 11 studies met 1 criteria 8 studies met 2 criteria 0 studies met 3 or 4 criteria	Adults who have a mental illness	34 studies 23 studies with participants who have depression Total participant N (for 23 studies) = 5383 Sample size (for 23 studies) ranging from 66 - 604	Depression	Social support Loneliness	Risk Perceived poor social support and loneliness associated with higher levels of depression	13 studies assessed depression as an outcome variable, and 11 of these found an association between poor perceived social support and loneliness with depression symptoms

Washington et al. 2017	9 High	Systematic review	Quantitative Research Assessment Tool (Child Care and Early Education Research Connections, n.d.) 5 studies assessed as 7 out of 7 20 studies assessed as 6 2 studies assessed as 5 4 studies assessed as 4 or lower	African-American children (<18)	31 studies Sample sizes of individual studies not provided	Anxiety and depression	Family functioning	Risk and Protective Positive parenting practices and family functioning associated with lower levels of depression Family conflict and low SES associated with higher levels of depression	Parental monitoring: 4 out of 31 studies examined this and 2 found an association between parental monitoring and lower depression symptoms for their children Positive parenting: 13 out of 31 studies examined positive parenting (parental support, positive role model, maternal closeness). All studies found a relationship between positive parenting practices and lower depression and anxiety symptoms for their children Discipline: 2 studies out of 31 found that corporal punishment, without parental warmth, is associated with higher levels of depression Family functioning and environment: 7 out of 31 studies reported perceived support from family associated with lower levels of depression Family conflict and violence: 6 out of 31 studies examined conflict and found that increased levels of family conflict are associated with higher levels of depression and anxiety Family SES: 2 studies assessed this and found a positive relationship between low SES and depression symptoms
Watson et al.	6	Systematic	Not reported	Family carers of	26 studies	Anxiety and	Carers of people	Risk	Female carers and adult-child

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
2018	Moderate	review		people with dementia Adults, older adults	Total participant N = 3234 Sample size ranging from 16 – 351	depression	with dementia	Carer, patient and social support associated with depression	carers experience more depression symptoms Carer lower socioeconomic status, younger age, having children and lower education associated with higher depression symptoms Progression of dementia, time since diagnosis, symptom severity, and problem behaviours associated with greater carer depressive symptoms Carer burden and carer activity restriction associated with more depressive symptoms Good carer social support and close relationship with person they are caring for associated with lower depression symptoms and more positive wellbeing

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Wenze et al. 2015	5 Low	Systematic review	Not performed	Parents of multiple births	27 studies Total participant N = 27,594 Sample size range 26 – 12,712	Anxiety and depression	Multiple births	Risk Multiple births associated with higher levels of depression for mothers and fathers	Women with multiples found to have higher levels of postpartum depression and depression in the early parenting period than women with a single child Women with twins had more symptoms of anxiety in the postpartum and early parenthood periods than women with a single child Some studies found women expecting multiples have higher levels of antenatal anxiety and depression than women expecting a single child One study found that women who conceived the twins naturally had higher levels of antenatal depressive systems than those using IVF Fathers of multiples also experience similarly high levels of postpartum depression as mothers of multiples Fathers of multiples experience higher levels of anxiety at various times in early childhood

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Winokur et al. 2014	11 High	Systematic review	Evaluation method developed for this study, assessing selection bias, performance bias, detection bias, reporting bias, and attrition bias The majority of studies identified as either low risk or unclear risk, for each of these research dimensions	Children in kinship and non-kinship care	102 studies Total participant N = 666,615 Sample size ranging from 30 – 317,739	Mental health and wellbeing	Kinship care	Protective Kinship care is associated with more positive mental health and wellbeing	Children in kinship care experience better mental wellbeing compared to children placed in non-kinship care, with kinship care 2.0 times the odds of better emotional health Children in kinship care experience fewer mental health problems compared to children in non-kinship care. Children in non-kinship care have 2.0 times the odds of developing a mental health problem

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Wyatt et al. 2015	4 Low	Systematic review	Not reported	Asian American, native Hawaiian, and Pacific Islander youth living in the US	66 studies 57 studies with depression as outcome variable Total participant N = 67,711 Sample size ranging from 30 – 20,745	Depression	Asian and islander minority groups in the US	Risk and protective factors for these minority groups, including personal, lifestyle, and social factors	Personal factors Findings mixed on age, one study found a decline in depressive symptoms over time, other studies found depressive symptoms increased with time Females at higher risk of depression than males Low self-esteem and anxiety associated with higher depressive symptoms Lifestyle factors: Cigarette use and alcohol consumption associated with depression Social factors: Discrimination, ethnic marginalisation, greater acculturation and acculturative stress are associated with higher rates of depression Protective factors: Self-esteem, bicultural identity, school involvement, enculturation, peer support, collective self-esteem, family relations, personal spirituality and ethnic belonging are associated with lower levels of depression

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Xavier et al. 2018	9 High	Systematic review	Critical Appraisal Tool (Armijo-Olivo et al. 2012) 5 studies assessed as high quality 2 studies assessed as moderate quality 2 studies assessed as low quality	Teenage mothers	9 studies Total participant N = 16,021 Sample size ranging from 40 – 2645	Depression	Teenage mothers beyond the postpartum period	Risk Minority of studies found an association between teenage pregnancy and depression later in life	Mixed findings, 3 studies found a relationship between teenage pregnancy and depression later in life, 3 studies found this association after adjustment for other variables, and 5 studies did not find an association (9 studies, with 11 cohorts, hence no. of results reported = 11)

Yap et al. 2014	11 High	Systematic review and meta-analysis	Not reported	Young people (12-18 years)	181 studies 140 studies with depression as outcome variable No details on sample sizes for each study	Anxiety and depression	Parenting styles	Risk and protective Higher levels of aversiveness, inconsistent discipline, inter-parental conflict, and over-involvement associated with anxiety Higher levels of authoritarian parenting, aversiveness, inter-parental conflict, over-involvement and withdrawal associated with depression Higher levels of parental warmth associated with lower anxiety in adulthood Higher levels of autonomy granting, monitoring and warmth associated with lower levels of depression	Higher levels of authoritarian parenting are associated with higher levels of depression Higher levels of autonomy granting are associated with lower levels of depression Higher levels of aversiveness are associated with higher levels of anxiety and depression Higher levels of inconsistent discipline are associated with higher levels of depression Higher levels of inter-parental conflict are associated with higher levels of anxiety and depression Higher levels of monitoring are associated with lower levels of depression Higher levels of over-involvement associated with higher levels of anxiety and depression Higher levels of parental warmth during adolescence is associated with lower levels of anxiety in adulthood Higher levels of warmth associated with lower levels of depression Higher levels of withdrawal are associated with higher levels of anxiety

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Yim et al. 2015	5 Low	Systematic review	Not reported	Women in the first post-partum year	214 studies Total participant N = 151,651 Sample size ranging from 16 – 15,389	Depression	Pregnancy-related factors	Risk and protective Pregnancy-related hormones, perceived stress, life and parenting strains and conflictual relationships are associated with higher levels of depression High quality relationships are associated with lower levels of depression	Reproductive and stress and hormones associated with higher levels of depression Type and severity of stressful life events are associated with depression levels Perceived stress, strains (e.g. work or financial stress) and higher parenting stress are associated with depression Higher quality relationships and social support are associated with less depression Relationships with conflict, abuse, or unsupportive relationships are associated with higher levels of depression
Young et al. 2017	10 High	Systematic review	Newcastle-Ottawa Scale (Wells et al. 2008) Scores ranged from 4 to 10 12 studies assessed as low risk of bias 21 studies assessed as medium risk 14 studies assessed as high risk	Indigenous young people 4-20 years old, majority 11-18 years	47 studies Total participant N = 58218 Sample size ranging from 65 – 13,454	Mental health (including depression and anxiety	Indigenous young people in high-income countries	Risk and protective Personal, lifestyle and family factors associated with depression	Factors associated with poor mental health of indigenous young people include poor family relationships, adverse events, experiences of discrimination, substance use, comorbid internalising symptoms, and negative parental behaviour Protective factors include positive family and peer relationships, and high self-esteem and optimism

Source (Author, year)	Review quality rating	Study type	Level of evidence	Population / setting	N (number of studies, number of participants)	Outcomes	Variables of interest	Direction / magnitude effect	Comments
Ziersch & Due, 2018	7 Moderate	Systematic review	Not reported	Refugees and asylum seekers settling in new country Predominantly adult samples	30 studies Total approximate participant N = 2142 Sample size ranging from 4–423	Anxiety and depression	Refugees	Risk Poor housing conditions associated with poor mental health, including anxiety and depression	Poor housing conditions and insecure tenure associated with higher levels of anxiety and poorer mental health for refugees as they settle in their new country Stable and uncrowded housing associated with better mental wellbeing, including depression and anxiety levels

Table 2. Risk and protective factors, by priority groups

Priority Group	Risk Factors	Protective Factors	Source	N (number of studies)	Mental health outcome
People with low education	No systematic reviews identified				
People with low income	Food insecurity		Bruening et al. 2017	12	Depression
	National level economic crisis		Glonti et al. 2015	22	Anxiety and depression
	Under-employment Temporary employment		Hergenrather et al. 2015	48	Anxiety and depression
	Temporary agency employment		Hunefeld et al. 2019	13	Depression
	Economic crisis, particularly for married workers and older adults Work stress Job instability		Mucci et al. 2016	19	Anxiety and depression
	Low income		Patel et al. 2018	26	Depression
People who are unemployed	Unemployment Job loss	Reemployment	Hergenrather et al. 2015	48	Anxiety and depression
	Unemployed Long-term unemployment		Kim & von dem Knesebeck, 2015; Modini et al. 2016	13; 11	Anxiety and depression
		Reemployment	van der Noordt et al. 2014	33	Depression

Priority Group	Risk Factors	Protective Factors	Source	N (number of studies)	Mental health outcome
People who work in low-status occupations	Individual factors (e.g. age, health, sleep, stressful life events) Team environment (e.g. workplace bullying, low levels of social support or cooperation) Work conditions (e.g. lack of control over work place, occupational stress, job overload) Work-home interference (e.g. time pressure, conflict between role demands)		Battams et al. 2014	19	Anxiety and depression
	Low job control, low decision latitude, and low social support Imbalance between effort at work and reward received Job insecurity		Harvey et al. 2017	37	Anxiety and depression
	Job insecurity		Llosa et al. 2018	33	Anxiety and depression
	Employment in male-dominated industries, in particular agriculture, mining, and manual labour		Roche et al. 2016	20	Depression
Aboriginal or Torres Strait Islander people	Indigenous young people living in high-income countries: Poor family relationships Adverse events Discrimination Substance use Comorbid internalising symptoms Negative parental behaviour	Indigenous young people living in high-income countries: Positive family and peer relationships High self-esteem High optimism	Young et al. 2017	47	Anxiety and depression
CALD people		Own-ethnic residential density	Becares et al. 2017	28	Anxiety and depression

Priority Group	Risk Factors	Protective Factors	Source	N (number of studies)	Mental health outcome
	Asian American, Hawaiian, and Pacific Islander youth living in US: Female Low self-esteem Smoking and alcohol consumption Discrimination Ethnic marginalisation Greater acculturation and acculturation stress	Asian American, Hawaiian, and Pacific Islander youth living in US: Self-esteem Bicultural identity School involvement Enculturation Peer support Collective self-esteem Family relations Personal spirituality Ethnic belonging	Wyatt et al. 2015	66	Depression
People with migrant of refugee backgrounds	Female Being single Education (if underemployed in new country) Unemployment, job dissatisfaction, low income and economic difficulties	Being married	Bas-Sarmiento et al. 2017	21	Anxiety and depression
	Rates of depression and anxiety differ across countries of origin and host countries		Bogic et al. 2015	29	Anxiety and depression
	First generation migrant Seeking asylum		Close et al. 2016	8	Anxiety and depression
		Educational attainment Employment status Longer length of residency in new country	Foo et al. 2018	25	Depression
	Seeking asylum Unaccompanied minors		Kien et al. 2018	47	Anxiety and depression

Priority Group	Risk Factors	Protective Factors	Source	N (number of studies)	Mental health outcome
		For refugee children: Younger age High self-esteem Prosocial behaviour Intelligence Positive attitude to own and host culture Good social support Sense of community support Good SES conditions Access to health care	Marley & Mauki, 2018	11	Mental wellbeing
	For unaccompanied minors: More restrictive reception setting	For unaccompanied minors: Higher support in residential setting	Mitra & Hodes, 2019	14	
	Unaccompanied minors living alone Unaccompanied minors living in large detention facilities	Unaccompanied minors placed in foster care with a family or other dedicated support Unaccompanied minors in foster care with people of the same ethnic background	O'Higgins et al. 2018	9	Depression
	Detained immigrants Gaining temporary protection (rather than permanent protection)		Von Werthern et al. 2018	26	Anxiety and depression
	Poor housing conditions Insecure tenure	Stable and uncrowded housing	Ziersch & Due, 2018	30	Anxiety and depression
LGBTQI people	Cyberbullying		Abreu & Kenny, 2018	27	Depression
	Cyberbullying Use of a gay hook-up mobile app Maintaining and monitoring online profile Use of social media to discuss LGB issues	Tightly integrated friendship network	Escobar-Viera et al. 2018	11	Anxiety and depression

Priority Group	Risk Factors	Protective Factors	Source	N (number of studies)	Mental health outcome
		Social support (adolescent sample)	McDonald, 2018	10	Anxiety and depression
		Social support (older adult sample)	McParland & Camic, 2016	42	Depression
	Sexual orientation Male Sexual minority youths		Ploderl & Tremblay 2015	199	Anxiety and depression
People with a disability	Hearing impairment	Surgical intervention to improve hearing	Shoham et al. 2018	25	Anxiety
People living in rural or remote areas	Drought, in particular people who are dependent on farming, indigenous, perceived stigma about mental health issues, lack of knowledge about support services, previous mental health problem or adverse life events Exposure to an extended period of drought	Social support, social capital, a sense of knowledge, shared knowledge and community preparedness, mental health literacy and government support	Vins et al. 2015	82	Anxiety and depression

Table 3. Risk and protective factors, by age group

Age Group	Risk Factors	Protective Factors	Source	Population group
Children 0-11 years	Homelessness		Bassuk et al. 2015	
	Out of home care		Bronsard et al. 2016	
		Kinship care	Winokur et al. 2014	Children in out of home care
	Food insecurity		Bruening et al. 2017	
	Sedentary behaviour	Physical activity	Hinkley et al. 2014	
	Screentime		Stiglic & Viner, 2019	
	Unaccompanied refugee		Kien et al. 2018	Refugees
	Large detention facilities	Foster care	O'Higgins et al. 2018	Unaccompanied refugees
	More restrictive reception centres		Mitra & Hodes, 2019	Refugees
		Social support community belonging	Marley & Mauki, 2018	Refugees
		Family support Community social support	McPherson et al. 2014	
		Family functioning	Washington et al. 2017	
		Individual resilience factors Family support Supportive community environment	Meng et al. 2018	People maltreated as a child
		Access to greenspace	McCormick, 2017	
	Chronic illness		Secinti et al. 2017	Adults with chronic childhood illness
	Maternal prenatal influenza		Simanek & Meier, 2015	
	Obesity		Sutaria et al. 2018	

Age Group	Risk Factors	Protective Factors	Source	Population group
Teenagers	Cyberbullying		Bottino et al. 2015	
	Screen time	Physical activity	Hoare et al. 2014	Obese adolescents
	Screen time (>2-3 hours)		Hoare et al. 2016	
	Screen time		Stiglic & Viner, 2019	
	High social media time	Social support from online social networks	Best et al. 2014	
		Social support	McDonald, 2018	LGBTQ
	Poor parenting style	Positive parenting style	Yap et al. 2014	
		Family support Community social support	McPherson et al. 2014	
		Family functioning	Washington et al. 2017	
	Poor family relationships Adverse events Substance use	Positive peer relationships Positive family relationships	Young et al. 2017	Indigenous
	High demand academic environment	Positive relations teacher and peers Perceptions safety, belonging, connectedeness	Aldridge & McChesney, 2018	
		High distress tolerance, low expressive suppression, low aggression, and low alcohol coping expectancy Family support Community support	Fritz et al. 2018	Adolescents with adverse childhood experience
		Access to greenspace	McCormick, 2017	
	Out of home care		Bronsard et al. 2016	
	Chronic illness (asthma, diabetes)		Brady et al. 2017	
	Obesity		Sutaria et al. 2018	

Age Group	Risk Factors	Protective Factors	Source	Population group
	Cyberbullying		Abreu & Kenny, 2018	Refugees
	More restrictive reception centres		Mitra & Hodes, 2019	Refugees
	Large detention facilities	Foster care	O'Higgins et al. 2018	Unaccompanied refugees
Young adults	Cyberbullying	Integrated online social networks	Escobar-Viera et al. 2018	LGB
		Physical activity	Chan et al. 2019	
		Physical activity	Dogra et al. 2018	
		Physical activity	Pascoe & Parker, 2018	
	Social isolation Loneliness	High quality social relationships Strong social networks	Leigh-Hunt et al. 2017	
	Homelessness		Medlow et al. 2014	
	Sexual minority		Plöderl & Tremblay, 2015	
	Migration		Close et al. 2016	
Adults		Physical activity	Chan et al. 2019	
		Physical activity in natural environment	Eigenschenck et al. 2019	All ages
		Walking	Kelly et al. 2018	
		Outdoor blue spaces	Gascon et al. 2017	All ages
		Social support, social capital	Khazaeian et al. 2017	Female heads of households
	Social isolation Loneliness	High quality social relationships Strong social networks	Leigh-Hunt et al. 2017	
	Social isolation Loneliness		Wang et al. 2018	Adults with mental illness
	Work conditions and environment		Battams et al. (2014)	Male dominated industries

Age Group	Risk Factors	Protective Factors	Source	Population group
	Work conditions and environment		Harvey et al. 2017	
	Workplace bullying		Lever et al. 2019	Healthcare workers
	Work effort/reward imbalance		Rugulies et al. 2017	
	Temporary agency work		Hünefeld et al. 2019	Temporary agency workers
	Job insecurity unemployment		Kim & von dem Knesebeck, 2015	
	Job insecurity		Llosa et al. 2018	
		Employment	Hergenrather et al. 2015	
		Employment	Modini et al. 2016	
		Employment	van der Noordt et al. 2014	
	Income inequality		Patel et al. 2018	
	Large-scale economic crisis – low income and uncertain employment		Glonti et al. 2015 Mucci et al. 2016	
		Own ethnicity density	Becares et al. 2017	
	Migration		Bas-Sarmiento et al. 2017	
	Migration		Close et al. 2016	
	Migrant detention		Von Werthern et al. 2018	Migrants
	Poor housing conditions		Ziersch & Due, 2018	Refugees
	Pre-migration traumatic experiences and post-migration stress		Bogic et al. 2015	War refugees
	Food insecurity		Bruening et al. 2017	

Age Group	Risk Factors	Protective Factors	Source	Population group
		Coffee	Garcia-Blanco et al. 2017	
		Fruit and vegetable intake	Saghafian et al. 2018	
		Alcohol reduction	Charlet & Heinz, 2016	
	Smoking		Fluharty et al. 2017	
	Early life cancer		Friend et al. 2018	Child cancer survivors
	Critical illness		Hashem et al. 2016	
	Facial scarring		Gibson, Ackling, et al. 2018	Adults with facial scarring
	Hearing impairment		Shoham et al. 2018	
	Caregiving for critically ill person		Haines et al. 2015	Carers
	Caring for dementia		Watson et al. 2018	Carers
	Housing factors	Green space	Gong et al. 2016	
	Urban environment	Green space	Rautio et al. 2018	All ages
	Homelessness		Schreiter et al. 2017	
	Intimate partner violence		Lagdon et al. 2014	
	Stressful life events (including in childhood)		Moreno-Peral et al. 2014	
	Drought		Vins et al. 2015	
	Sexual minority		Plöderl & Tremblay, 2015	
Perinatal women	Childhood and lifelime abuse		Alvarez-Segura et al. 2014	Perinatal women

Age Group	Risk Factors	Protective Factors	Source	Population group
	Antenatal anxiety Substance use Lack of social support Childhood abuse		Biaggi et al. 2016	Antenatal women
	Chronic medical conditions		Brown et al. 2018	Postpartum women
	Disturbed sleep		Lawson et al. 2015	Postpartum women
		Physical activity	Nakamura et al. 2019	Postpartum women
	Stress Unsupportive relationships	Social support	Yim et al. 2015	Perinatal women
	Multiple births		Wenze et al. 2015	Parents of multiple births
Older adults	Death of partner		Blanner Kristiansen et al. 2019	Widows
		Physical activity	Chan et al. 2019	
		Internet use	Forsman & Nordmyr, 2017	
	Social isolation Loneliness	High quality social relationships Strong social networks	Leigh-Hunt et al. 2017	
		Social support	McParland & Camic, 2016	LGB
	Caring for person with dementia		Watson et al. 2018	Carers

Notes: The age groups are approximate and the predominant age of participants was used to group reviews. For example, the review by Blanner Kristiansen et al. 2019 included adults and older adults, but is included in the older adults category as the majority of studies were for those aged 65 years and over; the review by Escobar-Viera et al. 2018 included the age ranges of 11-30 where age was stated in the studies reviewed, so this review is in the 12-25 year category. Some studies were primarily of adults but did not exclude any age groups – these are included in the adult category, unless there was a specific focus on other ages.