
Autism

Focus Paper

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Introduction

Autism is a lifelong developmental disability (that affects how people perceive the world and interact with others), which is characterised by impairments in social interaction, communication (both verbal and non-verbal language) and imagination (e.g. understanding other people's behaviours). The term 'autism' is used to describe all diagnoses on the autism spectrum i.e. the autism spectrum disorder (ASD).

Autism is a spectrum condition because it includes a range of difficulties which present differently in different people. This means that autistic people often require different levels of support. This is important to consider because people with autism are more likely to have poor health (Howlin and Moss, 2012) and experience problems with mental health and challenging behaviours than other people. Therefore, with the appropriate support, people with autism can be helped to live a more fulfilling life of their own choosing (Howlin and Moss, 2012, The National Autistic Society, 2017b).

There has been a 25-fold increase in the number of people being diagnosed with autism over the last 30 years. This means that around 1% of the general population are estimated to have autism. People with autism can have complex needs, for example, around (Parkin, 2016):

- 50% of people with autism have a learning disability;
- 70% have a diagnosis for another mental or behavioural disorder; and
- 40% have at least two other disorders.

There is a wide literature of the history, prevalence, aetiology, clinical presentation, and definition of autism, as well as contributing factors such as genes, comorbidity (having more than one disease) and gender (Masi et al., 2017).

Alongside national policy developments such as the Think Autism strategy (Department of Health, 2014), there has been a growing awareness of the requirement to better understand the needs of people with autism and a desire to provide access to better diagnostic services to determine whether someone has autism.

This document aims to provide an overview of people with autism in Cornwall and the Isles of Scilly and identify key issues that should be addressed to improve and develop future services. The following provides a summary of key policy developments that should be considered to inform future commissioning, a national context of autism, risk factors, determinants of health, current and future demand, service activity, review of intervention effectiveness and community voice.

Key messages / summary of key findings

The Think Autism Strategy (Department of Health, 2014) included a national pledge to improve outcomes for people with autism. The strategy emphasised three key areas:

- build communities that are aware of autism;
- promote service innovation; and
- integrate care.

In addition, it guided local commissioners to improve employment, welfare, criminal justice, transport and educational services. Future autism strategies should ensure they meet the expectations and ambitions provided by the range of policy and guidance detailed in this focus paper, including for example, *Implementing Fulfilling and Rewarding Lives: Statutory guidance for local authorities and NHS organisations to support implementation of the autism strategy* (Department of Health, 2010).

In line with national estimates, the number of children and adults with autism is predicted to increase in the future. This may be due to a combination of factors, including better ascertainment, broadening diagnostic criteria, misdiagnosis and/or increased incidence. Little is also known about the number of people who may have autism but remain unknown to current services.

Present estimates may not accurately reflect the potential number of people with autism accessing services later in life and/or the impact of an aging carers' network. Improved data on the number and health needs of children and adults with autism (both those with a known diagnosis and the estimated number of people with autism unknown to services) would help inform future services.

There is no information about the unmet health needs among children and adults with autism and who don't have a clinical diagnosis of either a learning disability and/or mental health problems. This means it can be difficult for some people with autism without a recognised learning disability or mental health problem to access care and support, including health checks to identify and manage unmet health needs.

There is no information available on the changing age profiles of children with autism. Modelling on adults shows a marked increase in the number of adults with autism reaching older age by 2030. However, the impact of aging on people with autism or the aging demographic profile on service provision (e.g. health and social care) remains unknown. Additionally, little is known about the reasons why more men than women have autism.

Risk factors contributing to the incidence of autism also remain yet to be fully explored. It is currently thought that a complex interaction between genetic and environmental exposures (coined epi-genetics) during perinatal, prenatal and postnatal periods contribute to the development of autism. Research focusing on wider determinants of health in this population requires further investigation, particularly for both physical and mental health outcomes.

The Cornwall Council Autism Spectrum Team is a new service supporting young people with autism of school age. The service aims to promote the inclusion of young people with autism and provide support to meet the needs of these younger people and their families.

Diagnostic rates and care pathways vary locally for children and adults. While there is no early years' provision of autism services, the needs of children aged between 4-18 years are partially met through educational provision, predominantly through mainstream and special schools. Cornwall Partnership Foundation Trust offers diagnosis for children. The provision of assessment and management advice for some adults with learning disabilities and autism is also available from Cornwall Partnership Foundation Trust. Diagnosis and support is offered by Outlook South West for adults.

However, there is currently no single agency to meet the diverse needs of children and adults with autism and most of these needs are unmet. There are no commissioned medical services specialising in autism and general psychiatric services to diagnose (except in children) or treat autism. The Autism Partnership Boards and Cornwall People First act as support mechanisms for people with autism and enable them to voice concerns.

A summary analysis of recent systematic reviews highlighted a number of potential public health and service interventions that could potentially be effective in improving health outcomes for people with autism. For example, joint attention (particularly when administered by a parent), social stories, peer-mediated instruction and intervention (PMII) for children, and supporting adult social skills interventions, appeared to work. Early behavioural change and family support interventions also appeared to be effective. However, some evidence of effectiveness was mixed and of low to moderate quality. Reviews also failed to consistently report key study characteristics (e.g. review and study quality) and the methods used may not be directly comparable to a UK setting. Importantly, this summary highlights the lack of systematic reviews on adult populations and lack of evidence around lifestyle interventions and health checks.

Despite some limitations of this research, there appears to be a need for more vigorous study designs that incorporate other social determinants of health, particularly among adults. These could focus on interventions targeting poverty, diet and nutrition, housing, transport, family stability, aging carers and resilience. The section on the effectiveness of interventions also highlights a number of issues or concerns raised by young people and adults with autism, family members, carers and service providers, which could be incorporated into future research. The impact of respite and short break services on mental health of people with autism and their carers needs to be evaluated.

The community voice section highlighted a number of key issues that need addressing. These includes, for example, more supportive school culture, increased access to the Autism Spectrum Team, specialist educational provision, adaptive teaching, increased access to peer support, greater employment opportunities and feeling safe in the community.

Policy summary

Successive governments have pledged to improve outcomes for people with autism. The 2009 Autism Act¹ committed the government to producing the 2010 Autism Strategy. The strategy entitled 'Fulfilling and Rewarding Lives' (Department of Health, 2010) sets out the government's vision that all adults with autism are able to live fulfilling and rewarding lives within a society that accepts and understands them. This means that people with autism can get a diagnosis and access support if needed, as well as depend on mainstream public services to treat them fairly as individuals, helping people to make the most of their talents.

The Think Autism strategy (Department of Health, 2014) builds on Fulfilling and Rewarding Lives by setting renewed focus on three key areas: building communities that are aware of autism; promoting innovation in service provision; and providing integrated care. The statutory guidance also contains duties and recommendations for employment, welfare, criminal justice, transport and educational services. Recent legislation also provides new duties for service providers, including the Care Act 2014 (all staff must have appropriate training) and the Children's and Families Act 2014 (new special education needs and disability support).

A recent House of Commons briefing paper provides an overview of UK policy and services including health and care services, education, employment, welfare and benefits, and the criminal justice system (Parkin, 2016). Appendix 1 provides a summary of requirements set out under the Care Act 2014, the Autism Act 2009, Mental Health Act 2007, the Department of Health Adult Autism Strategy 2015 and self-assessment, Implementing Fulfilling and Rewarding Lives, supporting people with autism through adulthood (National Audit Office), Think Local Act Personal (TLAP) and NICE guidelines.

National context

Autism is widely accepted as a complex, pervasive, heterogeneous condition with multiple aetiologies, sub-types and developmental trajectories, which makes initial diagnosis difficult (Crafa and Warfa, 2015, Masi et al., 2017). Autism is a broad term for a group of behaviourally defined neurodevelopmental disorders that historically includes autistic disorder, childhood autism, pervasive developmental disorder— not otherwise specified (PDD-NOS), and Asperger's syndrome. It is defined by the presence of abnormalities or impairments in social interaction and communication, with accompanying restricted or repetitive behaviours, activities or interests (Richards et al., 2015). The condition varies from profound severity in some through to subtle problems of understanding in others of average or above average intelligence (National Autistic Society, 2017). Other related problems include:

- resistance to change
- obsessive or ritualistic behaviour
- high levels of anxiety

¹ UK Legislation, *Autism Act* <http://www.legislation.gov.uk/ukpga/2009/15/contents> [Accessed: 10/01/2018]

- lack of motivation
- inability to transfer skills from one setting to another
- vulnerability and susceptibility to exploitation
- depression
- challenging behaviour

A range of conditions have sometimes been associated with autism, which may include, for example, attention deficit hyperactivity disorder (ADHD), learning disabilities, sensory impairments, Down's syndrome and epilepsy. People with autism may also experience high or low sensory sensitivity, resulting in unusual reactions to surroundings (National Autistic Society, 2017). The prevalence of autism in other genetic and metabolic syndromes (such as Down's, Rett's and Cohen Syndromes) also varies (Richards et al., 2015).

The prevalence of autism in the UK general population has increased, although it is not known if this is due to better ascertainment, broadening diagnostic criteria, or increased incidence.

The estimated number of children with autism varies considerably from 20.8 to 116 per 10,000 children (Hill et al., 2015, Baird et al., 2006). Increasing numbers of children with autism are now entering adolescence and adulthood. Little is known about the impact of increasing age on people with autism. For example, it is not clear whether social functioning, cognitive ability and language skills remain stable or decline with age. However, adaptive functioning and severity of autism-related behaviours are thought to improve with increasing age. Childhood Intelligence Quotient (IQ) and early language ability appeared to be the strongest predictors for receiving an autism diagnosis in later years (Magiati et al., 2014).

According to national estimates, there were 430,696 adults with autism in 2017, which included 337,174 aged between 18-64 years and 93,522 aged over 65 years. The prevalence of autism also varies by gender and possibly by ethnicity. During the same year, there were an estimated 385,942 men and 44,752 women with autism. The number of adults with autism is expected to increase to 488,901 with increases in both age categories and by gender.²

Consistent with the findings from the National Autistic Society (NAS) (The National Autistic Society, 2017a), the male-to-female ratio is closer to 3:1 (The National Autistic Society, 2017a), although the ratio of men to women who use NAS schools is approximately 5:1 (The National Autistic Society, 2017a). This suggests a diagnostic gender bias, meaning that girls who meet criteria for autism are at disproportionate risk of not receiving a clinical diagnosis (Loomes et al., 2017), or alternatively autism is harder to diagnose in girls. The NAS has seen a steady increase in the number of women and girls referred for diagnosis, which suggests an historic bias towards men and boys in the diagnostic criteria for autism (The National Autistic Society, 2017a). This is,

² IPC, Projecting adult and Older People Population Information www.poppi.org.uk & <http://www.pansi.org.uk/> [Accessed: 11/01/2018]

however controversial and the alternative explanation is that the neuropathology is influenced by male sex hormones during neurodevelopment.

The resultant impact of these wider determinants of health maybe influenced with gender at an early age. For example, girls are thought to have more active imaginations and tend to pretend play more than boys (Knickmeyer et al., 2008), which may influence their experiences and challenges through childhood and into adulthood. The interests of girls in the spectrum are very often similar to those of other girls and therefore are not seen as unusual. It is not the special interests that differentiate them from their peers but it is the quality and intensity of these interests. While these behaviours are also seen in boys, it is rare to see the same level of intensity. The presence of repetitive behaviour and special interests is part of the diagnostic criteria for autism. This is a crucial area in which the male stereotype of autism has clouded the issue in diagnosing women and girls (The National Autistic Society, 2017a). The issue of whether autism is underdiagnosed in girls or whether the incidence and severity are lower is not resolved.

Levels of autism appear to be influenced by ethnicity (with the exception of Hispanic children) and migration of people from outside Europe e.g. from Africa and South America. The prevalence of autism appears to be higher in these migrant communities, which is thought to be due to epigenetic changes after stressful experiences and/or underlying biological risk factors. The evidence supporting the role of immigration status is limited and mixed, particularly in the UK. Also, it is unclear whether higher prevalence estimates of autism among immigrants reflects true differences, especially considering many potential confounding factors, e.g. genetic, biological, environmental and cultural factors (Kawa et al., 2017, Crafa and Warfa, 2015).

The severity of autism is generally described as either 'high functioning' (e.g. generally an IQ of >70) or 'low functioning' (IQ <70), with those with a learning disability falling into the latter category (Crafa and Warfa, 2015). The estimated proportion of people with autism and a learning disability ranges from 15% to 84% (Emerson and Baines, 2010, Charman et al., 2011), although the severity of learning disability among those with autism can vary significantly. Also, 16.6% of adults with autism have been found to be above the threshold for learning disability but below average IQ, whereas 25.4% of adults with autism had an average IQ (Charman et al., 2011).

Risk factors

Despite robust evidence of heritability (e.g. having a parent with autism), the aetiology of autism remains yet to be fully explored (Richards et al., 2015). Several environmental and biological risk factors have been associated with autism, which may be influenced by increased levels of deprivation (Delobel-Ayoub et al., 2015). Typical risk factors include a high parental age, low birth weight, poor pregnancy conditions, low apgar score, low birth weight, caesarean section, premature birth, congenital malformation, multiple births (Crafa and Warfa, 2015) and wider environmental exposures (or wider determinants of health) such as behaviours including smoking, air pollution and levels of vaccination (Morales-Suarez-Varela et al., 2017, Modabbernia et al., 2017). While prenatal, perinatal, and postnatal factors play an important role, it is

still unclear whether these factors are causal or play a secondary role in the development of autism (Wang et al., 2017).

Understanding autism development is further compounded by a lack of biological markers to identify genetic causes (Voineagu and Yoo, 2013) and the unknown interaction between genes and these external environmental exposures, which may alter the risk of developing autism. It is hypothesized that increased risk of autism may be related to epigenetic (this interaction between someone's genes and environmental exposures) changes in some communities such as the stress of maternal migration discussed above (Crafa and Warfa, 2015). This may include potential pathways across multiple body systems that together can impact brain and behaviour. It has also been suggested that changes in the human microbiome (e.g. bacteria on the skin and in the gut) may contribute to symptoms of neurodevelopmental disease (Vuong and Hsiao, 2017).

External environmental factors and wider determinants of health

While the evidence appears to be limited, some systematic reviews and/or meta-analyses have investigated potential socio-economic or wider determinants of health. These include gender differences, physical activity (PA), transitioning between primary and secondary schools, bullying and victimisation, smoking, alcohol and drug intake and sexual behaviours.

People with autism appear to participate in lower levels of physical activity. To be healthy, it is recommended that children or adolescents have at least 60 minutes of moderate- to vigorous-intensity physical activity (MVPA) per day. However, it has been found that people with autism (and a learning disability) participate in around 48 minutes/day MVPA. Social impairment and restricted interests combined with high rates of motor problems increases risk of sedentary behaviour and associated harmful health outcomes such as those associated with obesity. Further research is needed to identify levels of physical activity, potential correlates of these behaviours and interventions to healthier lifestyles (Jones et al., 2017).

The majority of children with autism attend mainstream schools, where they encounter a number of challenges, including bullying, emotional and behavioural problems, school exclusion and showing lower-than-expected academic attainment given their IQ (Mandy et al., 2016). Children with autism are at greater risk of victimization than their typically developing peers or peers with other types of disabilities (e.g. attention deficit hyperactivity disorder [ADHD], and learning disabilities). For example, children with autism may be involved in bullying as perpetrators, victims or perpetrator-victims, with school bullying victimization being the most common type of bullying experienced. For example, nearly one in two school-aged youths with autism are at risk of being a victim of physical, verbal, or school bullying (Maiano et al., 2016).

There are a range of options for improving health outcomes among young people with autism attending school and those transitioning from childhood into adulthood. These include attending college, entering the labour force, and achieving a degree of independent living (van Schalkwyk and Volkmar, 2017). However, a recent systematic

review highlighted a number of studies investigating the potential role of employment. Studies were limited by poor participant characterisation, small sample size and/or a lack of randomisation and use of appropriate controls. This highlights the need for higher quality studies that undertake a multidisciplinary and multifaceted approach to exploring employment outcomes, for example, on the individual, the family system, co-workers and the employer (Hedley et al., 2017). Furthermore, few studies have examined the benefits, the costs and the cost-benefit ratio of employing an adult with autism from the perspective of employers (Jacob et al., 2015).

Despite some inconsistent evidence, smoking and/or exposure to environmental tobacco smoke (ETS) during pregnancy has been associated with increased risk of autism (Tang et al., 2015). Furthermore, smoking is a well-known risk factor for many health outcomes. The literature search identified no systematic review focusing on the health impacts of smoking or ETS. In terms of substance use among adolescents with psychiatric disorders (N=566) compared with a general population sample, those with autism (n=39) had the lowest frequency of smoking (0%), drinking alcohol (7.7%) and drug use (0%) (Mangerud et al., 2014), which may explain the limited research in this area.

Sexual behaviours and gender differences are important to consider because of the potential impact on the individual and family. Inappropriate sexual behaviours are thought to be caused via a lack of understanding of normal puberty, the absence of appropriate sex education, the severity of their autism and other associated problems. Despite this being a common problem, there is limited evidence on inappropriate sexual behaviours and what interventions are effective (Beddows and Brooks, 2016). It is also important to consider the gender identity and sexual diversity of people with autism in education and clinical work because more people with autism have reported sexual attraction to both same- and opposite-sex partners. Additionally, a notable number of people with autism (more women than men) have reported gender non-conforming feelings (Dewinter et al., 2017). Developmental differences between boys and girls indicate the need for early, attuned, and comprehensive sexuality-related education and communication (Dewinter et al., 2016).

There appears to be little known about other potential factors influencing health among this population. This includes other social determinants not reviewed here. These may include levels of poverty, mental health, levels of breast feeding, diet and nutrition, housing, transport, family stability, social opportunities, aging carers and resilience. According to the learning disability research, to reduce these inequalities requires three key actions, which include reducing child poverty, reducing exposure to specific hazards and building resilience (Emerson, 2015).

Local context

There is no single database that records all of the children and adults with an autism diagnosis in Cornwall. As highlighted above, current estimates do not account for the high proportion of people with autism who remain unknown to services. Furthermore, autism may not be a person's primary diagnosis for receiving care and support, and thus may influence the number of people known to have autism. This may be further

compounded because there continues to be several different diagnosis pathways and a backlog of diagnostics for children and young people (Cornwall Council, 2015). There also appears to be no modelling of the potential administrative (those known to services) and true prevalence (those known plus unknown to services) rates of autism nationally and locally. Moreover, unless autism is very severe it usually isn't identified until a child is at school or in some cases, later in life.

In 2014, Cornwall had a similar number of children with autism known to schools (10.3 per 1,000 pupils) when compared to England and other areas in the South West of England (Figure 1). Returns for the school census in spring 2016 indicated that there were 741 pupils in Cornwall schools with a primary need of autism at either Special Educational Needs (SEN) Support or with a Statement of Special Educational Needs or an Education Health and Care Plan (reception to Year 11). Of these; 280 were at SEN Support; and 461 had a Statement of Special Educational Needs or an Education Health and Care Plan (Cornwall Council, 2015).

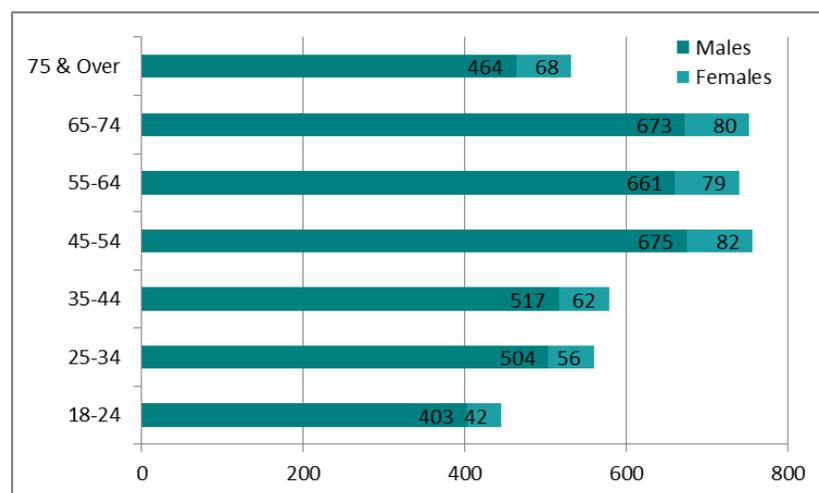
The most authoritative and widely used research and baseline evidence is provided by the Institute of Public Care (i.e. PANSI & POPPI data). In 2017, there were 4,367 adults estimated to have autism in Cornwall, which includes 3,082 aged 18-64 years and 1,285 older adults (>65 years). There is a considerable difference in the number of men and women presenting with autism over the entire age range, with on average 89% of males against 11% females (Figure 2). The PANSI and POPPI methodology enables local projections to be made on the number of adults locally and assess potential future demand.

Figure 1 Number of children with autism known to schools in 2014 (number of children per 1,000)³

Area	Value	Lower CI	Upper CI
England	10.8	10.7	10.8
South West region	9.9	9.7	10.1
Bath and North East Som...	11.3	10.2	12.6
Bournemouth	10.1	8.9	11.4
Bristol	10.6	9.8	11.4
Cornwall	10.3	9.6	11.1
Devon	9.0	8.4	9.6
Dorset	13.8	12.9	14.8
Gloucestershire	5.2	4.8	5.7
Isles of Scilly	14.6	5.7	36.9
North Somerset	6.5	5.7	7.5
Plymouth	17.8	16.5	19.2
Poole	7.3	6.2	8.5
Somerset	6.5	5.9	7.1
South Gloucestershire	9.7	8.8	10.7
Swindon	12.9	11.7	14.2
Torbay	7.2	6.1	8.5
Wiltshire	13.1	12.3	14.0

Source: Department for Education, Special Educational Needs in England; Statistics: special educational needs; Local authority tables spreadsheet, sum of Autistic Spectrum Disorder

Figure 2 Cornwall Population (Male & Female) with Autistic Spectrum Disorders 2017⁴



Future demand

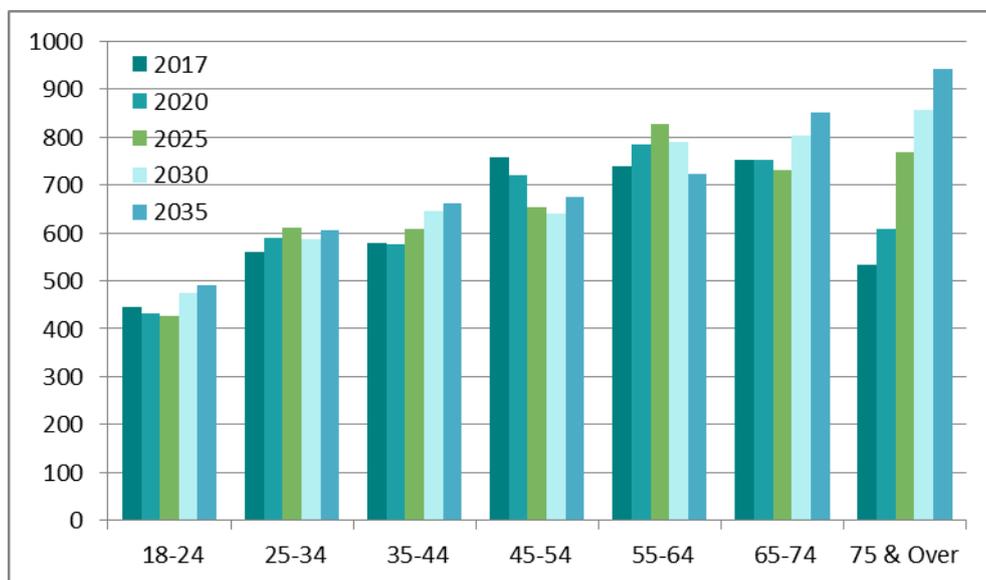
Projections for the number of children with autism are not available. However, between 2012 and 2016 there was an increase of 34% in the number of children in schools with a diagnosis of autism (either at SEN School Action or with a Statement/Education Health and Care Plan) (Cornwall Council, 2015). For adults (and in line with national estimates), the number of people with autism is predicted to rise. For Cornwall, the number of adults with autism is predicted to increase from 3,082 to 3,155 adults (18-64 years) and from 1,285 to 1,793 in those aged over >65 years between 2017 and 2035

³ Public Health England, 2017, Learning disability profiles, <https://fingertips.phe.org.uk/profile/learning-disabilities> [Accessed: 11/01/2018]

⁴ IPC, Projecting adult and Older People Population Information www.poppi.org.uk & <http://www.pansi.org.uk/> [Accessed: 11/01/2018]

(for both women and men). The age profile of adults also varies over time (Figure 3), with a noticeable increase in the number of people aged over 75 years with autism.

Figure 3 Cornwall Population Predicted to have Autistic Spectrum Disorders⁵



Services and Activity

The substantial direct and indirect effects of autism extend across many sectors including, health, education, social care, housing, employment, welfare benefits, and labour markets, with a high economic burden extending to adulthood, which is often carried by families (Masi et al., 2017).

Cornwall's Autism Spectrum Team's vision is to support children and young people with autism to achieve positive outcomes. The service is an expansion of the existing Autism Services consisting of advisory teachers, specialist and highly specialist speech and language therapists, a specialist nurse practitioner, educational psychologists and Autism Spectrum Team workers. While the Team has a county wide brief it is organised into three area teams, West, Mid and East Cornwall. The service aims to play a significant role in promoting the inclusion of young people with Autism and in supporting multi agency working to meet the needs of these young people and their families. Professionals within the Autism Spectrum Team will promote a joint problem solving approach and promote interventions that are evidence based. These include training, interventions and traded Services (Cornwall Council, 2017a).

There is some support for children who have social communication difficulties but there are no specialist early years settings for children with autism. However, there is a range of educational provision available for children and young people with autism aged 4-16 in Cornwall, which is mostly met by mainstream schools. Although, there are no after school clubs, weekend activities or holiday care provision for children with autism thus reducing the family income and wellbeing.

⁵ IPC, Projecting adult and Older People Population Information www.poppi.org.uk & <http://www.pansi.org.uk/> [Accessed: 11/01/2018]

Cornwall's Autism strategy provides an overview of educational provision for people with autism (Cornwall Council, 2015). The strategy has a number of broad aims and objectives covering health, education, early health and social care, leisure and community services, prioritises for the Children's Cornwall Autism Partnership Group, and governance. However, it is not clear how the strategy aligns with standards such as those detailed in *Implementing Fulfilling and Rewarding Lives: Statutory guidance for local authorities and NHS organisations to support implementation of the autism strategy* (Department of Health, 2010).

Cornwall Partnership Foundation Trust offers a diagnosis service for children aged between 5 and a half up to their 16th birthday who have complex social and communication difficulties (Cornwall Partnership NHS Foundation Trust, 2018). The Autism Spectrum Disorders Assessment Team (ASDAT) is made up of the following disciplines:

- Child & Adolescent Psychiatry
- Clinical Psychology
- Occupational Therapy
- Speech & Language Therapy

Adults with autism and a learning disability or severe and enduring mental illness can receive support from Cornwall Partnership Foundation Trust. The Trust provides specialist learning disability services across Cornwall, involving an interaction between social care, adult autism, GPs, Kernow Clinical Commissioning Group and Royal Cornwall Hospital Trust. The service includes allied health professionals, clinical psychology, primary care liaison nurses, adult learning disability community health teams, epilepsy service, Intensive support team, and mental health liaison. The Intensive support team (challenging behaviour, prevention) provides behaviour support, occupational therapy (OT), speech and language therapy (SALT), physiotherapy, psychological assessment and treatment, psychiatry diagnosis and support, and an epilepsy service (Shankar et al., 2017).

Outlook South West provides talking therapy and counselling services for people aged 16 and above in Cornwall and the Isles of Scilly. The service also has a self-referral mechanism for NHS-funded therapies for mild-to-moderate anxiety and depression. Therapies include (Outlook South West, 2017):

- Guided Cognitive Behavioural Therapy (CBT)
- Individual Therapy
- Cognitive Behavioural Therapy (CBT)
- Counselling
- Interpersonal Therapy (IPT)
- Eye Movement Desensitization and Reprocessing (EMDR)

The services for anxiety and depression are equally available to those with autism. Outlook South West also offers this service for adults with autism without a learning disability or mental health need (Cornwall Council, 2018b).

The diagnosis of autism from a set of widely publicised criteria is a cause for concern. The lack of a specialist psychiatric diagnostic service in Cornwall is considered to be contributing to over diagnosis. Also, there is limited support for adults with autism that fall in-between the provision of learning disability and mental health services. Therefore, people with autism without a recognised learning disability or mental health problem find it difficult to access care and support. This includes the provision of annual health checks to identify and manage unmet health needs. This means that the needs of individuals with autism are not easily met by current service provision and there is not a single agency to support a range of needs. Furthermore, there is a profound lack of social and occupational activities, which may further exacerbate health inequalities.

People with autism can use Cornwall's Autism Partnership Boards to raise specific issues, voice concerns and get more support. Both the children and adult boards are facilitated by Healthwatch via quarterly meetings with representatives from Cornwall Council and organisations working with autism. For example this includes NHS provider services and commissioners, voluntary sectors including the National Autistic Society and parents/carers.

Cornwall's Autism Partnership for children has been established to oversee the implementation of the new children's and young people's autism strategy for 2016-2019 (Cornwall Council, 2015). The adult partnership board aims to build a "better and brighter future for people with autism in Cornwall". The partnership hopes that the development of a film targeting autism in Cornwall will help achieve this aim by raising awareness of the issues faced by people living with autism. The Autism Transitions film aims to explore the issues young people with autism face whilst moving into adulthood and the adult world. It tells several individuals' stories, looking at issues and barriers, but also highlights what some people have achieved (Cornwall Council, 2018a).

Cornwall People First (CPF) provides a Self-Advocacy service for adults with autism in Cornwall. CPF run forums and have representatives who attend and feed into the autism partnership meetings, where they provide feedback on what people have been talking about at the forums (Cornwall People First, 2018).

Effectiveness of interventions targeting the health of people with autism

The lack of evidence informing interventions to health outcomes is a concern for people with autism and their carers (Masi et al., 2017). This section provides an overview of potential interventions that aim to improve health of people with autism. Due to time and resourcing constraints, the following highlights evidence identified from a quick literature search, rather than a comprehensive systematic review. This review also fails to adequately assess the quality of systematic reviews or undertake a full data extraction of included study characteristics.

A literature search in Pubmed and National Autistic Society databases was conducted during July 2017. Key search terms were used to identify interventions focusing on children or adults with autism. Searches were restricted to identifying only systematic reviews and/or meta-analyses synthesising evidence from robust studies such as randomised controlled (excluding those focusing on pharmacological treatment). Despite

the limitations of the searches, wide ranging interventions on social skills, family / early intervention, cognition, lifestyle, education and employment, for example, were identified. The following provides an overview of the number of included studies, review characteristics and summary of key findings (Appendix 2).

The majority of the systematic reviews focused on children, highlighting the potential lack of interventions targeting adult populations. When reported, the numbers of studies included by systematic reviews were predominantly from a non-UK setting, raising concerns about the generalisability of these findings. Furthermore, reviews failed to consistently report on key characteristics such as quality, country of origin and types of studies included. When reported, much of the evidence was of low to moderate quality and included studies other than randomised control trials or comparable studies.

Group-based skills and social skills interventions (children and adults) resulted in mixed findings. Although there was some evidence supporting the use of joint attention (particularly when administered by a parent), social stories, peer-mediated instruction and intervention (PMII) in children. For adults, there was some evidence supporting social skills interventions to improve outcomes such as social knowledge and understanding, functioning and loneliness.

Family support and early interventions appeared to be effective, although there were inconsistent gains associated with parent training. Other interventions that provided some positive outcomes included those focusing on 'Theory of Mind' interventions, and the use of 'Cognitive Behavioural Therapy' to improve anxiety. Early interventions, early intensive behaviour interventions (EIBI) or on spoken-language and sampling involvement may be effective (although there was some contrasting evidence). One review assessed video modelling and found interventions may be moderately effective in preschool and secondary school children. However, there are a number of concerns with the use of technology, which includes variable uptake and engagement rates for example (Hollis et al., 2017).

In terms of lifestyle interventions, there was limited evidence supporting dietary therapies and nutritional supplement interventions. Two of three reviews supported positive outcomes resulting from exercise interventions. A single review reported some improvements in motor, verbal and cognitive skills following the Treatment and Education of Autistic Communication Handicapped Children (TEACCH) intervention. The three systematic reviews focusing on employment interventions also resulted in mixed findings. Evidence seemed to support the adoption of internships and simulation training and assistive technology. However, future multidisciplinary and multifaceted approaches are required to explore employment outcomes on the individual, the family system, co-workers and the employer, along with the impact of individual differences on outcome (Hedley et al., 2017).

No systematic reviews focusing on determinants of health (e.g. housing, transport and other potential risk factors such as anti-social behaviour, neglect/abuse, and community activities, impacts on family and carers, family functioning or substance misuse) were identified. However, substance use was low in people with autism and there are relatively few patients with co-occurring autism and substance use disorder. There is

also a need for research on interventions that take account of the special needs of this patient group (Arnevik and Helverschou, 2016).

Furthermore, no interventions involving the use of health checks to identify and manage unmet health needs in people with autism were identified. Taking evidence from the learning disability literature, health checks consistently led to the identification of unmet health needs and targeted actions to address them (Robertson et al., 2014), as well as reduce preventable hospital admissions (but not alter overall emergency admissions) (Carey et al., 2017). Further research is required to assess the potential benefits from health checks.

The outcomes of this literature search appear to be similar to those reported by an updated review. This highlighted the growing evidence base, which seemed to support behavioural (e.g. early intervention parent training programmes, social skills, play/interaction-based approaches and joint attention) interventions in children with autism. However, further research is needed to broaden our understanding into which interventions are most effective for specific children with autism and to isolate elements or components of interventions most associated with effects (Weitlauf et al., 2014).

Community Voice

A 2015 autism strategy consultation (Cornwall Council, 2017b) on young people with autism, parents/carers and professionals assessed what works well and what needs improving in Cornwall. While this focused on children's services, much of the evidence may also relate to adults with autism. Specific issues raised by young people and parents/carers included the provision of; a better diagnostic process; better training in schools; more specialist provision and educational support; opportunities for highly anxious children and young people with autism who didn't have a learning disability; improved access and sign posting to health care (including Child Adolescent Mental Health Services (CAMHS)); lesson/classroom adaptations; physical and emotional bullying; friendly leisure services; and access to community activities. An area that was reported to work well included the Aspires, which is a project in Cornwall that supports young people (8-18 years) without a specific learning disability to access mainstream social activities. Aspires is run by the Dreadnought Centre, which is a charitable service. Its aims are to develop and improve social skills, confidence and self-esteem, and independence skills, with the overall aim being to enable young people to access mainstream social activities. Young people join an Aspires group for up to a year. The group sessions include structured social skills activities, but also unstructured time to do activities of their choice. When young people finish the group, support is provided to enable them to access mainstream activities (The Dreadnought Centre, 2017).

Only 15% of professionals completing the consultation survey agreed with the statement: 'Cornwall has an appropriate range of education provision and the capacity within provision to meet the needs of children and young people with autism'. Many of the consultation outcomes were consistent with the young people, family and carers. The key issues highlighted were:

- more supportive school culture, adaptive teaching style and 'autism friendly classroom' settings;
- increased availability of the specialist Autism Spectrum Team
- additional specialist educational provision with a better cultural understanding of autism; and
- adapted teaching (including post-16 education providers and employers).

The adult autism strategy (2017-2020) is currently being developed with short, medium and long-term actions. A range of feedback has been received on the previous strategy, which will be incorporated into the strategy update. New areas to be addressed included the provision of: training; autism specific assessments; access to independent and financial advocates; improved data collection; preventative services; independent living and diagnostic services. Following this consultation people wanted to know more about how to connect with people, safety in the community, finding employment and getting support from an employer. The areas raised during the consultations will be addressed through delivering five priority areas, including community, housing, health and social care, jobs, and skills and training. These correspond to Think Autism priority categories;

- an equal part of my local community;
- the right support at the right time during my lifetime; and
- developing my skills and independence and working to the best of my ability.

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Appendix 1 Policy Context

The Care Act 2014⁶ makes provision to reform the law relating to care and support for adults and the law relating to support for carers; to make provision about safeguarding adults from abuse or neglect; to make provision about care standards; to establish and make provision about Health Education England; to establish and make provision about the Health Research Authority; to make provision about integrating care and support with health services; and for connected purposes.

The Autism Act 2009⁷ makes provision about meeting the needs of adults with autistic spectrum conditions; and for connected purposes.

Mental Health Act 2007⁸ amends the Mental Health Act 1983, the Domestic Violence, Crime and Victims Act 2004 and the Mental Capacity Act 2005 in relation to mentally disordered persons; to amend section 40 of the Mental Capacity Act 2005; and for connected purposes.

DoH Adult Autism Strategy 2015⁹ is statutory guidance showing how local authorities and NHS organisations should carry out their responsibilities under the Autism Act 2009 to develop services that support and meet the needs of people with autism, and their families and carers. It also explains what support they can expect to receive from local authorities and NHS organisations.

DoH Council self-assessment on progress in implementing the Autism Act¹⁰ - all local authorities in England in 2011 were provided with the means to assess their progress towards Autism Strategy goals. In December of that year, local authorities were invited to send copies of their assessment of their own position in relation to the issues raised to the Learning Disabilities Public Health Observatory for collation and wider publication.

Implementing Fulfilling and Rewarding Lives: Statutory guidance for local authorities and NHS organisations to support implementation of the autism strategy (DoH - 2010)¹¹ was issued in line with the requirements of the Autism Act 2009. Guidance for local authorities, NHS bodies and NHS Foundation Trusts around training of staff, the diagnosis of autism and the leadership and planning of services.

Supporting people with autism through adulthood (National Audit Office)¹²

"Greater awareness of the numbers of people with autism, as well as better understanding of autism amongst those providing health, social care, benefits,

⁶ UK Legislation, *The Care Act 2014* <http://www.legislation.gov.uk/ukpga/2014/23/contents/enacted> [Accessed: 11/01/2018]

⁷ UK Legislation, *Autism Act 2009* <http://www.legislation.gov.uk/ukpga/2009/15/contents> [Accessed: 11/01/2018]

⁸ UK Legislation, *Mental Health Act 2007* <http://www.legislation.gov.uk/ukpga/2007/12/contents> [Accessed: 11/01/2018]

⁹ Government Publication, *Adult Autism Strategy 2015* <https://www.gov.uk/government/publications/adult-autism-strategy-statutory-guidance> [Accessed: 11/01/2018]

¹⁰ Public Health England, *Local Authority Autism Self-Assessment 2010-11* [Link no longer available] [Accessed: 11/01/2018]

¹¹ Government Publication, *Implementing Fulfilling and Rewarding Lives 2010* <https://www.gov.uk/government/publications/implementing-fulfilling-and-rewarding-lives> [Accessed: 11/01/2018]

¹² National Audit Office, *Supporting people with Autism through adulthood* <http://www.nao.org.uk/report/supporting-people-with-autism-through-adulthood/> [Accessed: 11/01/2018]

education and employment services, would lead to improved quality of life for those on the autistic spectrum. Specialist support and joint working across all areas – clinical, social and employment – could improve the transition from childhood to adult services, make services more effective and improve value for money." *The Comptroller and Auditor General, 5 June 2009*

Think Local Act Personal (TLAP) (2011)¹³ A new concordat for the social care sector and the Government's vision for adult social care, committed to transforming health and care through personalisation and community-based support.

NICE guidance¹⁴:

- Autism spectrum disorder in adults: diagnosis and management (CG142)
- Autism spectrum disorder in under 19s: recognition, referral and diagnosis (CG128)
- Autism spectrum disorder in under 19s: support and management (CG170)
- Challenging behaviour and learning disabilities: prevention and interventions for people with learning disabilities whose behaviour challenges (NG11)
- Mental health problems in people with learning disabilities: prevention, assessment and management (NG54)
- Cerebral palsy in under 25s: assessment and management (NG62)
- Harmful sexual behaviour among children and young people (NG55)
- Violence and aggression: short-term management in mental health, health and community settings (NG10)
- Gastro-oesophageal reflux disease in children and young people: diagnosis and management (NG1)
- Antisocial behaviour and conduct disorders in children and young people: recognition and management (CG158)
- Social anxiety disorder: recognition, assessment and treatment (CG159)
- Children's attachment: attachment in children and young people who are adopted from care, in care or at high risk of going into care (NG26)
- Unintentional injuries: prevention strategies for under 15s (PH29)
- Social and emotional wellbeing: early years (PH40)
- Immunisations: reducing differences in uptake in under 19s (PH21)
- Child maltreatment: when to suspect maltreatment in under 18s (CG89)
- Service user experience in adult mental health: improving the experience of care for people using adult NHS mental health services (CG136)
- Looked-after children and young people (PH28)
- CG99: Constipation in children and young people: diagnosis and management

¹³ Think Local Act Personal <https://www.thinklocalactpersonal.org.uk/> [Accessed: 11/01/2018]

¹⁴ NICE, Guidance <https://www.nice.org.uk/guidance/published?type=apg,csq,mpg,ph,sg,sc> [Accessed: 11/01/2018]

Appendix 2 Overview of systematic reviews assessing the effectiveness of interventions to improve the health and wellbeing of people with autism

Summary of interventions reported by systematic reviews and meta-analyses								
Category	Author, year, location of corresponding author	No. of included studies, No. from the UK	Quality of included studies	Population	No. of RCT included	Type of interventions included	Outcome/s of interest	Summary of main finding/s
Social skills	Murza et al. (2016), USA	16, NR	Low risk of bias (60%) falling within the assessment category. 7% were high risk and 30% unknown	Children with ASD aged 18 months & 8 years	All as an inclusion criteria, though not stated	Joint attention (social communication) interventions for children with ASD	Joint attention outcomes were diverse and ranged from early development joint attention behaviours such as eye gaze to an object during joint referencing acts to more complex joint attention behaviours e.g. child initiated coordinated joint attention paired with shared positive effect	All interventions resulted in a positive effect size, with the largest effects evidenced for discrete trail training plus social interactive approaches. This was followed by joint attention treatments that were administered by a parent. Interventions were similar in terms of efficacy.
	Spain and Blainey (2015), UK	5, 1	No study fully employed RCT conditions and all had small sample sizes.	High functioning young adult9s (mean age 26 years)	0	Social skills interventions for adults with high-functioning autism spectrum disorders	Social skills or associated symptoms	Despite a degree of variation of interventions being delivered and methodological limitations, group social skills interventions may be effective for enhancing social knowledge and understanding, improving social functioning, reducing loneliness and potentially alleviating co-morbid psychiatric symptoms

Summary of interventions reported by systematic reviews and meta-analyses

Category	Author, year, location of corresponding author	No. of included studies, No. from the UK	Quality of included studies	Population	No. of RCT included	Type of interventions included	Outcome/s of interest	Summary of main finding/s
	Reichow et al. (2013) , USA	5, 0	High risk of performance and detection bias.	Children (7-12 years)	5	Social skills group interventions	social competence, social communication, and quality of life for people with ASD	Some evidence that social skills groups improve overall social competence and friendship quality. There was no effect on emotional recognition or social communication as related to the understanding of idioms or on child or parental depression, though the evidence was limited. There was some evidence supporting a decrease in loneliness.
	Karkhaneh et al. (2010), Canada	6, 0	Low	Children (0-14 years)	4	Social stories, which describe a situation, skill, or concept in terms of relevant social cue, perspectives, and common responses in a specifically defined style and format	Social skills though varied (included playing skills, story comprehension, social skills comprehension, emotional recognition and social skills)	Five of the six trials showed statistically significant benefits for a variety of outcomes related to social interaction.
	(Zagona and Mastergeorge, 2016), USA	17	Variable	Children	1	Peer-mediated instruction and intervention (PMII) for addressing the social communication needs of children with ASD	Social communication	PMII continues to be an effective practice. Future research should focus on larger sample sizes, particularly for those who are preschool-age, and include measures of generalization and maintenance as well as treatment integrity measures of peers' actions.

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	(Parsons et al., 2017), Australia	22 studies reporting on 20 interventions, 1 UK	Variable	Children aged 0-18 years	all	Pragmatic language interventions	Skills encompassed by domains of Introduction and Responsiveness, Non-verbal Communication, Social-emotional Attunement, Executive Function and Negotiation	Tailored pragmatic language interventions have the potential to reduce the impact of reduced social communication, when combined with their parent involvement, inclusion of typically developing peers or delivery of group interventions to maximise benefits.
	(Gates et al., 2017), USA	19, NR	No evidence of publication bias and quality not assessed	Children and young adults	19	Group-based social skills interventions	Social skills and performance	Interventions involving social skills appear modestly effective for youths with ASD, but may not generalize to school settings or self-reported social behaviour.
	(Chang and Locke, 2016), USA	5, NR	Mixed quality ratings between "strong" and "adequate."	Children and adolescents	4	Peer mediated intervention (PMI)	Social skills (e.g., social initiations, social responses, social communication)	PMI is a promising practice used to increase social skills in children with ASD, particularly in a school setting.
Family / Early intervention	Beaudoin et al. (2014), Canada	15, NR	NR	Children at risk or had a diagnosis of ASD (50% had to be <36 months old)	6	Parent training interventions, positioned on pure behavioural interventions to socio-pragmatic interventions	Parent training outcomes (effects on children, parents, and parent-child interactions)	Inconsistent gains in communication, socioemotional functioning, symptom severity, and play. Most included studies had low levels of certainty of evidence (as a result of methodological limitations) and the magnitudes of changes were hard to judge (few effect size data available).

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	Strauss et al. (2013), Italy (a synthesis of meta-analyses)	13, NR	Not assessed	Young children	Not clearly reported	Parent inclusion in early intensive behaviour intervention (EIBI)	Intellectual functioning, language skills and adaptive behaviours.	EIBI leads generally to positive medium-to-large effects for three available outcome measures: intellectual functioning, language skills and adaptive behaviours. Although favourable effects were apparent across comparative studies, analysis by type of delivery format revealed that EIBI programs that include parents in treatment provision are more effective.
	Patterson et al. (2012), USA	11, NR	Moderate	Children	NR	Interventions designed to increase parents' ability to support communication and social development	Parent skills and child language and communication outcomes	Several interventions demonstrated positive effects for both parent and child outcomes. However, limited generalization and follow-up data suggested only one intervention demonstrated parents' accurate and ongoing intervention implementation beyond training.

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	Shivers and Plavnick (2015), USA	17, NR	Not assessed	Children	Not clearly reported	Sibling involvement interventions	Social, relationship and academic skills etc.	Sibling-mediated interventions are similar to results of peer mediated interventions; sibling involvement seems to lead to positive outcomes for children with ASD across a variety of skills and methods. Overall, the siblings learned the intervention procedures, and their brothers and sisters with ASD showed increases in skill acquisition and/or decreases in problematic behaviour.
	(Hampton and Kaiser, 2016), USA	26, 5	Low to high risk of bias	Children	15	Early interventions on spoken-language	Spoken language	Spoken-language outcomes for children with ASD, and the largest effects are found when both parent and clinician implement the intervention. Future research should report standard language measures as well as child (cognitive ability and socio-economic status) and intervention characteristics to improve evidence related to the effects of interventions on spoken communication

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	Bradshaw et al. (2015), USA	9, NR	Not assessed	Infants with average age <24 months at risk of ASD	4	Early intervention programmes. Systematic, experimentally controlled investigation of a non-pharmacological intervention.	Observed changes in infant measures following the intervention as well as any parent measures that were collected, such as fidelity of implementation or satisfaction.	Infant gains in social-communicative and developmental skills were observed following intervention in most of the reviewed studies, though further research is needed.
Cognitive	Fletcher-Watson et al. (2014), UK	32, 5	Low quality and variable risk of bias	Any age but majority focused on pre-school or primary-school aged children	32	'Theory of Mind' interventions, which is a treatment or therapy, explicitly or implicitly based on the Theory of Mind (ToM) cognitive model of ASD e.g. using 'thought bubbles' to teach children with ASD to understand others' thoughts and beliefs.	Communication (level of non-echoed language; stereotyped or idiosyncratic use of words; pointing; gestures; conversation); and social function (eye-contact; facial expressions; spontaneous initiation of joint attention; shared enjoyment; quality of rapport).	There was some evidence that theory of mind skills can be taught to people with ASD, but there was low quality evidence on whether these skills can be maintained, generalised to other settings, or that teaching theory of mind has an impact on developmentally-linked abilities.

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	(Spain and Blainey, 2015), UK	4, NR	Not assessed	Children and adults	0	Cognitive Behavioural Therapy	Social anxiety	Improvements in SA, depressive symptoms, social skills, and activity levels were noted. Generalisability of results is hampered, however, by the small number of studies and participants and lack of randomised controlled trial conditions employed.
	Kreslins et al. (2015), USA	10, NR	Variable risk of bias	Children and adolescents	10	Cognitive behavioural therapy (CBT)	Anxiety	Clinician and parent-reported outcome measures showed that psychosocial interventions were superior to waitlist and treatment-as-usual control conditions at post-treatment. However, the results of self-reported outcome measures failed to reach significance.
Lifestyle	Sathe et al. (2017), USA (full text not available)	NR	4/9 had low risk of bias	Children	9	Effectiveness and safety of dietary interventions or nutritional supplements in ASD	Symptom severity, communication and challenging behaviour,	Little evidence to support the use of nutritional supplements or dietary therapies for children with ASD

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	Gogou and Kolios (2017), Greece	17, NR	NR	paediatric or adolescent groups	17	Nutrition and dietary supplements	Measure of clinical outcomes such as irritability were included	Use of dietary supplements in children with autism seems to be a safe practice with encouraging data about their clinical efficacy. Only N-acetylcysteine was shown to exert a beneficial effect on symptoms of irritability. Results supporting other supplements were mixed.
	Zarafshan et al. (2017), Iran	15, NR	High quality studies were only included	Preschool children <7 years	3	Any non-pharmacological intervention, excluding pharmacological, dietary, and herbal interventions	Reducing stereotyped and repetitive behaviours	Can be used to treat repetitive behaviours, but evidence for their effectiveness does not exist. Of the 3 RCTs, two improved outcomes, but no association was identified for aerobic exercise.
	Dillon et al. (2016), USA	23, NR	Low	Children and young adults (1 to 21 years)	0	Exercise interventions	Social and behavioural issues, repetitive and stereotypical behaviours, health-related fitness, motor skill development, skill-related fitness, executive functioning, time-on-task and bone density	Mixed findings. One study of moderate quality evidence supported that exercise interventions could be considered as evidence-based best practice in school-aged children.

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	(Tan et al., 2016), Australia	16 ADHD and 6 ASD	NR	Children and young adults (aged 3 to 25 years) with diagnosis with ADHD or autism	NR	Exercise intervention	Cognitive performance, excluding self-reported measures	Exercise is likely to be beneficial to both ASD and ADHD populations with around a small to medium effect on outcomes.
	Bremer et al. (2016), Canada	13, NR	Acceptable to high quality	Children aged ≤16 years	NR	Exercise interventions	Behavioural outcomes	Interventions consisting of jogging, horseback riding, martial arts, swimming or yoga/dance can result in improvements to numerous behavioural outcomes including stereotypical behaviours, social-emotional functioning, cognition and attention.
	Hong et al. (2016), USA	23, NR	Not assessed	Preschool through to adolescent and adults	0	Video modelling interventions	Functional living skills; (a) toileting, cooking, hygiene, bathing, tooth-brushing, dressing, or independent eating, (b) household chores, (c) employment related skills, and (d) accessing the community, such as transportation use, banking or shopping.	Video modelling interventions are moderately effective overall. More single-case experiments are needed in this area, particularly with preschool and secondary-school aged participants, participants with ASD-only and those with high-functioning ASD, and for video modelling interventions addressing community access skills.

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Education	Virues-Ortega et al. (2013), Canada	13, 0 (2 in Ireland)	Average methodological quality.	Children and young adults	2	Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH); emphasizes a close working relationship between parents and practitioners, adapts individual characteristics, use of structured teaching experiences.	A variety of standardized outcomes including perceptual and motor skills, activities of daily living, behavioural adaptive skills, cognition and language.	The results suggested that TEACCH effects on perceptual, motor, verbal and cognitive skills were of small magnitude in the meta-analysed studies. Effects over adaptive behavioural repertoires including communication, activities of daily living and motor functioning were within the negligible to small range. There were moderate to large gains in social behaviour and maladaptive behaviour.
Employment	Westbrook et al. (2015), USA	NR	Weak	Transitioned aged individuals (14-22 years)	Not clearly reported	Competitive, supported, or integrated employment interventions.	Attainment of an employment placement and specific data about the duration and/or retention of that placement.	Limited evidence. Future research efforts are needed to develop studies that utilize rigorous experimental designs to determine the relative effectiveness of the various interventions being utilized in transition programming for students with ASD.

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	Smith et al. (2017), USA	5 on autism	Not clearly reported	Adults	Not clearly reported	Internships and job simulation training and assistive technology.	Work participation.	Moderate evidence was found on effective strategies to increase work participation, including internships and job simulation and assistive technology.
	Weaver (2015), USA	23	Variable	All age groups	Not clearly reported	Occupational therapy.	Interventions addressing work, activities of daily living (ADLs), instrumental activities of daily living (IADLs), education and sleep.	Supported the use of mobile and tablet technologies for vocational skills. There was limited or variable evidence supporting ADL/IADL interventions, daily yoga and brief exercise, group physical activities and use of technologies for IADLs.