

An Auternative critical literature review

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Introduction

The research project *A society fit for autistics: overcoming the barriers, challenging stereotypes and enabling autistics to take their place in the world*, short name *Auternative*, is investigating the following two research questions from the perspective of autistic people:

1. How do autistic people use strategies –including logic, reasoning and rules– to understand social situations and other people’s reactions and to empower themselves?
2. What are the barriers –including stereotypes, misconceptions and systemic issues– to autistic people using their strengths and appropriate strategies to participate in decision making, the economy and community?

This literature review was carried out to determine the state of existing research and gaps in knowledge and understanding, and to inform questionnaire development. There is already evidence that existing research is largely biomedical rather than focusing on improving autistics’ experiences and life chances (Pellicano et al., 2013). The researchers also wished to test their perceptions that little of the research is from the perspective of autistic people.

The terms autistic and autistic people will be used in this review to denote everyone on the autistic spectrum, as the terms found by research (Kenny et al., 2016) to be preferred by autistic people, as showing that autism is an integral part of our identity rather than an add-on. Although disliked by the researchers, the term ‘high functioning’ will be used to indicate that much of the research does not cover the whole autistic community, but only sections of it. It is always given in quotation marks, partly as a distancing technique and partly to indicate that it is not appropriate to divide any group by degree of functioning. This will depend on a number of factors.

This review looked for research articles on:

1. Use of logic and other strategies by autistics to understand emotions, social situations and interaction, easy and difficult situations and other people’s intentions and in decision making.
2. Participation, non-participation and exclusion of autistics from economy, community and decision making, including due to perceptions of autistics, stereotypes and misunderstandings and other barriers to participation of autistics.
3. Experiences of autistics and their attitudes to autism-specific and general services and service providers and to decision makers.

Some of the search strings used on Google Scholar, PubMed, etc. include 'autistic experience of service providers', 'satisfaction with services "autistic spectrum disorders"', 'experience of autistics', 'experiences of adults on the autism spectrum' and 'autistic experiences decision makers'.

Logic and other strategies to understand emotions, social situation and intentions and in decision making

There is a body of literature on the perceived 'deficits' of autistic people, but minimal work on their strengths and how they use these strengths on a daily basis to understand the social and frequently hostile world. In particular, autistic people are generally considered to experience difficulties in social development and communication (Baron-Cohen, 2009) and behaving flexibly (Yoshida, 2010), an inability to react to subtle non-verbal cues (Kuzmanovic et al., 2011) and understand others' intentions (theory of mind), and possible difficulties in learning social rules from examples (Galitsky, 2013). They are thought to develop fewer sophisticated strategies for responding to awkward questions, to be less courteous in tone (Cordier et al., 2016) and experience difficulties in efficient and speedy decision making, which may be particularly important in social interaction (Brosnan et al., 2014).

Social development and communication difficulties are considered to be lifelong and have a largely and profoundly negative impact (Baron-Cohen, 2009). There are indications that so-called 'high-functioning' autistic people experience difficulties in identifying nonverbal cues in the presence of conflicting information, though able to do this in isolation, and experience difficulties in integrating verbal and non-verbal social information rather than being totally unable to understand non-verbal social information. Some 'high functioning' autistic people may apply non-verbal cues to social understanding after a delay rather than not at all (Kuzmanovic et al., 2011). However, it should be noted that the research focus has been the deficit in the use of non-verbal information rather than any strengths in the use of verbal information. Autistic people are considered to lack flexible behaviour, leading to the use of fixed strategies and an inability to take account of other people's actions (Galitsky, 2013). Difficulties in efficient and quick decision making have been linked to a frequent preference for logical and rational decision making and reduced integration of emotions into decision making (Brosnan et al., 2014). However, this may be an example of viewing autistic people through a deficit lens, since there is evidence that their decision making style leads to reduced bias.

Autistic people have been found, when faced with socially awkward questions in a laboratory situation, to produce similar ratings of awkwardness as non-autistic people, indicating that they have similar perceptions of it. However, autistic people generated fewer sophisticated strategies themselves, provided poorer rationales and were less courteous (Bellesi et al., 2016).

Strengths of autistic people mentioned in the literature include systemising (Baron-Cohen, 2009), excellent attention to detail and pattern recognition ability, including in systemising domains (Baron-Cohen et al., 2009) and visual processing (Grandin, 2000), though by no means all autistic people are visual thinkers. Baron-Cohen's (2009) empathising–systemising theory characterises autistic people as having strengths in systemising or the ability to analyse and/or develop systems. While system theory approaches can be applied very widely e.g. (Hersh, 2006), systemising theory focuses on technical rather than social applications. Baron-Cohen et al. (2009) consider that systemising, but not previous theories

explain some of the strengths of autistic people, such as excellent attention to detail and pattern recognition, including in systemising domains. However research is lacking on whether and how autistic people apply these strengths in social domains and the role of systemising in understanding the social world (Brosnan et al., 2014; Kuzmanovic et al., 2011). There is also a tendency to reframe the strengths of autistic people as weaknesses. For instance, their attention to detail associated with a focus on the local rather than the global has been devalued as weak central coherence (Frith & Happé, 1994).

Camouflaging

Strategies used by autistic people in a social context include camouflaging and mimicry (Lai et al., 2017). Autistic people with high IQs are able to apply a level of sophistication, a key component of high level reasoning to make inferences in more complex dynamic social exchanges (Yoshida, 2010). Differences in cognitive approaches to social situations have been found to be based on differences in IQ (Brosnan et al., 2014; Kuzmanovic et al., 2011), giving rise to the possibility of differences in the computational processes of autistic people. This and the associated issue of training to improve the cognitive approaches to social situations are worth further research.

There is some evidence that autistic people, particularly women, use camouflaging and mimicry to mask social and communication barriers (Lai et al., 2017). Camouflaging is considered to involve hiding behaviours associated with autism and social difficulties and using explicit strategies to present expected social competences. Compensatory strategies may include presenting expected eye contact and facial expressions and following strict rules to govern behaviour in social situations (Hull et al., 2017). This leads to a discrepancy between 'external' behavioural presentation and internal state, as well as autistic individuals giving the impression that they understand a particular social situation when in reality they do not have a clue what is happening and why. This can have impacts on mental health, which may have a gender dimension, though evidence on this is conflicting.

Some authors have found that camouflaging leads to depressive symptoms and mental health issues in men, but not women (Lai et al., 2017) and suggested that this may be due to gender-based social experience and expectations leading to women having more practice and becoming better adapted to camouflaging. This is a departure from mainstream theory, as in the general population, women have higher rates of depression than men, often due to a rumination thinking style (Nolen-Hoeksema et al., 2008). This finding seems to indicate that camouflaging has a pronounced impact on male autistics.

Camouflaging can be a meaningful strategic choice for some autistic people, whether an effective one or not. However some autistic people feel forced to camouflage, or are unconsciously doing it due to societal pressure. It may be that more men than women feel forced to camouflage. The power dynamics, negative stereotypes, prejudice and discrimination that constrain autistic people's lives in the latter case is possibly the source of the negative impact on their mental health, in particular of depression (Hull et al., 2017).

Camouflaging is a coping strategy chosen by some autistic people to connect with others, at least initially; it is a 'real and meaningful experience in the lives of people with ASC, and directly impacts on their social functioning and mental wellbeing'. The negative and positive reasons and outcomes need further study (Hull et al., 2017). There is also a lack of research on the relationship of camouflaging to stigmatisation, including self-stigmatisation, and its likely implication of a negative self-identity and/or rejection of an autistic identity.

Suggested motivations for camouflaging include assimilation due to concerns for safety and wellbeing and increasing connections and relationships with others (Hull et al., 2017), though this again implies a lack of acceptance and self-acceptance of autistic people. While camouflaging is often 'successful', its short term impacts include exhaustion and anxiety and its long term consequences severe negative impacts on mental health, self-perception, and access to support (Hull et al., 2017). It may also be at least partially responsible for the difficulties and delays autistic women experiences in obtaining a diagnosis (Lai et al., 2017).

In contrast to the potentially implicit and self-directed camouflaging behaviours, explicit training in social skills and behaviours is often used with children and young autistic adults (Cappadocia & Weiss, 2011). However social skills training may be having a detrimental effect on autistic people through inhibiting authenticity and the ability to engage with others through a 'true self' (Kernis & Goldman, 2006). This leads to the autistic person feeling forced to attempt to behave according to social expectations. It may also have the effect of preventing autistics from developing an authentic sense of self and this would impact on their ability to have an authentic relationship with others. Explicit social skills training could be having the opposite intended effect in regards to enhancing social skills and quality of life.

This 'gap' between autistic people wanting to relate and take part in a neurotypical world (Humphrey & Lewis, 2008) and the difficulties that neurotypicals have in relating to autistics is referred to by Milton (2012) as the 'double-empathy problem'. This is where the onus is put entirely on the autistic individual to behave in a neurotypical way in order to have a successful social experience. Sasson et al. (2017) have also highlighted that neurotypicals will rate autistics negatively when compared to other neurotypicals and are less willing to interact with them, even after only a brief exposure. However Sasson does note that exposure is not synonymous with familiarity and that these experiments cannot capture all of the aspects of socializing over a longer period of time.

Technology

A potentially useful strategy is the use of technology, including apps to support social interaction and computer mediated communication, as a means of breaking down social barriers in communication and, for instance, to enable 'high functioning' autistic people to provide their own detailed perspectives (Benford & Standen, 2011). Computer mediated communication also draws on the perceived natural affinity of autistic people for technology and positive attitudes to computer-based training (Bernardini et al., 2014; Wainer and Ingersoll, 2011). Technology can provide a credible virtual, social partner for autistic children (and adults) and a predictable and structured environment that can meet needs for organisational support and preferences for routine and repetitive behaviours. It has the potential to support the development of social, communication, affective and interaction skills (Bernardini et al., 2014; Wainer and Ingersoll, 2011). The provision of interesting visual and audio stimuli can also be useful. However, few technological and other approaches do not have a negative side. Alongside the value of computer mediated communication in supporting the formation of meaningful relationships which do not require face-to-face contact, there are the potential disadvantages of increasing any existing problems of trust, disclosure, inflexible thinking, and perspective taking. This could make it more difficult rather than easier for some autistic people to maintain relationships (Burke et al., 2010).

There is therefore a need for research on the appropriate use of technology to maximise benefits and minimise disadvantages. Involvement of autistic people at all stages of technology research and development and implementation will be essential for the results to be appropriate and beneficial. An example of this is the involvement of autistic people in the development of the Brain in Hand software app (Fry, 2016) which aims to enable them to set

and attain their goals and improve interaction with support systems. Another suggested technological approach involves the use of a computer based simulator, natural language multiagent mental simulator (NL_MAMS), able to model mental and emotional states (Galitsky, 2013). This technological approach provides a conceptual framework for dealing with mental states that may be easier for autistic people to relate to. Computer based simulations have the further advantage of allowing repetition of exercises as often as desired. NL_MAMS-based training has been found to increase the social 'performance' of autistic children (guessing intention of others, questioning, pretending, conflict resolution, etc.) more than theory of mind training in both the laboratory environment and when interacting with other children in the real world (Galitsky, 2013). This again draws on the strengths of autistic people in using computerised learning and logic in understanding social situations outside of a laboratory environment.

The use of socially interactive robots or robot assisted therapy have been suggested as potentially beneficial for autistic children, as robots are less complex and more predictable than people (Huijnen et al., 2016). They can simultaneously provide humanlike social cues (e.g., waving, smiling) while maintaining object-like simplicity and being unthreatening. On the one hand, there are indications that robots can be used to support the development of competencies in interaction and communication, and that autistic children are using the robots as a 'mediator' to support interaction with the experimenter or other children (Badii et al., 2009; Dautenhahn, 2007). There is also potential for the use of robotics to support autistic people in resolving daily life challenges and independent living without trying to 'fix' them. On the other hand, there may be attempts at behavioural modification in order to try and 'normalize' autistic children rather than focusing on developing innate strengths and competencies, which help them to function in what is often a not particularly friendly world (Hersh, 2015). In addition, research has focused on robots for autistic children and there has been no consideration of their use to support autistic adults.

Wainer & Ingersoll (2011) have investigated technology use for developing social and communication skills for 'high functioning' autistic people with the aim of taking advantage of perceived autistic strengths in utilising electronics and the use of interesting visual and auditory stimuli as novel, stimulating features, which may be beneficial for autistic people given their relative strengths in visual processing. However, acquiring complex social skills, such as sharing personal emotions, may require interaction with other people rather than technology alone (Wainer & Ingersoll, 2011). Divergent findings have been obtained on success in generalising skills to other contexts, with Galitsky (2013) optimistic and Wainer and Ingersoll (2011) obtaining varying success rates.

The necessity for programs to consider the needs of users with a wide range of functioning has been recognised (Wainer and Ingersoll, 2011), but less attention has been given to the potential impacts of other factors, such as gender (within and beyond the binary), age, education, race, culture, sexuality, employment status, on technology design and use. In addition, all the research seems to have the tacit assumption that successful social functioning requires autistic people to acquire a wide range of social skills used with varying degrees of frequency by non-autistic people rather than examining what social skills would be most useful and appropriate for them. However, technology has the potential benefits of supporting strengths, interests and different cognitive approaches and allowing interactions which emphasise coping and personal growth rather than 'normalisation' and 'cures'. It could also be useful in giving the neurotypical population insight into autistic people's thought processes and enabling them to acquire the social skills required to interact with autistic people. However, it should also be recognised that, while many autistic people like technology, this is not universal and therefore technology is not a universal solution.

Logical decision making

Despite the relative tendency for autistic people to use logical decision making and their strengths in this area, there has been very limited work on the use of logic by autistic people to understand situations and support social interaction. There is also little research on understanding emotional and social situations from the perspective of autistic people. However, there is a body of research on the approaches used by autistic people in decision making. Grandin (2000, 2002) reports basing decisions purely on logic. However investigation of the experiences of other autistic people would be required to generalise this.

While rarely recognised as a strength, autistic people's reduced sensitivity to the framing or presentation of choices and limited emotional response to the choice paradigm used means that their decisions are more consistently logical (De Martino et al., 2008; Shah et al., 2016a). The reduced impact of emotional information on the moral judgements of autistic people also contributes to the reduction in emotional bias in their decisions (Patil et al., 2016) leading to more rational decisions. The literature has focused on the perceived associated weakness of reduced behavioural flexibility and the possible lack of intuitive reasoning in a social environment, as this uses subtle contextual clues. However, other researchers have found that autistic people do not use rational decision making more commonly than intuitive decision making (Luke et al., 2012), indicating a need for further research.

It has been suggested that the reduced impact of framing and associated effects are due to high levels of co-occurring alexithymia (Shah et al., 2016b), estimated at 40-60% (Patil et al., 2016). This involves difficulties in identifying and describing emotions, resulting in a reduced ability to determine the internal bodily state and use emotional cues in decision making. However, this has been found not to be the case, as the impact of framing is still reduced when autistic people are compared with a control group matched for alexithymia. This indicates that autistic people make more logically consistent decisions on account of autism rather than co-occurring alexithymia and that emotional and interoceptive (body state) signals have a reduced impact upon their decision-making processes (Brewer et al., 2015). However, the reduced impact of emotional and interoceptive signals could, for at least some individuals, be due to greater ability to focus on relevant factors and ignore irrelevant emotional and internal signals in decision making rather than the reduced strength of these signals.

Further investigation would be useful of the internal emotional states of autistic people during decision making, as well as comparison of these states with measures of the impact of framing, awareness of emotions during decision making and alexithymia. Emotional states could be measured through questionnaires and physical indications of state and alexithymia through the 20-item Toronto Alexithymia Scale [TAS-20]. It would also be useful to investigate in what circumstances a reduced framing effect enables autistic people to make more effective decisions. Other suggested areas for future research include interference by others in decision making and the possible fatigue experienced by autistic people in decision making.

Research shows that autistic children and adults have moral knowledge and can distinguish between intentional right and wrong actions. However, they find it difficult to take account of another person's mental state and the consequences of an action in moral decisions (Patil et al., 2016). In particular, autistic people may judge accidental harm more harshly due to possible difficulties in perceiving a benign intent, particularly if they have difficulties with theory of mind. However, taking into account the Alexithymia hypothesis (Brewer et al., 2015) and subsequent findings, it is suggested that decision-making by autistic people is

less subject to emotional biases, as they do not base their moral judgments on emotional information. While autistic people generally prefer non-emotional utilitarian reasoning, they are more likely to reject utilitarian options if they involve direct physical harm. Patil et al. (2016) suggest that this may be due to non-verbal intelligence being used to ensure that moral choices are in line with personally held views, but further research would be required to investigate this. It would also be useful to investigate whether autistic people are less influenced than non-autistic people by knowing or being close to other people impacted by a decision.

There is some evidence that autistic people experience difficulties in decision making if it requires discussion with others, changing routines or the decision needs to be made rapidly, as well as self-reported avoidance of decision-making (Luke et al., 2012). However, it would be useful to carry out a comparative investigation of difficulties experienced by non-autistic people in decision making. Autistic participants reported that their autism was more likely to be perceived as interfering with rather than enhancing, decision-making (Luke et al., 2012).

Dual-process theory suggests two approaches to decision-making, type 1, which is autonomous and typically rapid and non-conscious ('intuition'), and type 2, which is typically slower and conscious ('reflective'). Use of the cognitive reflections test with autistic participants has found that they are more likely to use reflective than intuitive reasoning, but do not produce a higher proportion of correct responses (Brosnan et al., 2017). This indicates that the tendency to use reflective reasoning does not necessarily result in greater reflective ability or greater ability to use logic correctly in reasoning.

Autistic people are also able to use intuitive reasoning, but do not use it as often and find it more difficult (Brosnan et al., 2016). Its use may be dependent on the task context. However, choice of an appropriate decision making strategy is frequently context dependent. The use of reflective over intuitive decision making has been suggested to be a strength in some areas, such as mathematics, and a weakness in others, such as emotion recognition. There is a need for research on differences in approaches to decision making in cognitive and social tasks and whether intuitive and reflective decision making can be elicited by the type of instructions given e.g., to think carefully (reflective) or to use gut-feeling (intuitive) and any differences between the responses of autistic and non-autistic individuals.

Another significant difference in decision making approaches is between satisficing or seeking decisions which are satisfactory, but not necessarily optimal and maximising or seeking optimal decisions (Hersh, 2006). It would therefore be useful to investigate the preferences of autistic people for satisficing or maximising and whether and, if so, how they differ from those of non-autistic people. Existing research has generally used small number of male participants of relatively high cognitive ability. Future research should include larger and much more diverse samples of autistic people.

Emotion recognition

Autistic people are considered to have impaired recognition of emotions (Hamilton & Uljarević, 2013). However, research on emotional recognition has tended to focus on facial emotion recognition and pay less attention to other means of recognising emotions, for instance from voices or through logical reasoning about a situation.

Studies typically have considered six basic emotions: fear, sadness, anger, disgust, happiness and surprise (Ekman & Friesen, 1976). Inclusion of a neutral face is important to establish a baseline condition. It has been suggested that autistic people perceive exaggerated facial expressions differently from neurotypical individuals (Rutherford &

McIntosh, 2007). In particular, they are more tolerant of exaggerated expressions and more likely to select the most exaggerated facial expression to represent a person feeling the emotion for the other five emotions, but not surprise. Rutherford and McIntosh (2007) also suggest that autistic people use a rule based strategy based on changes in specific facial features in emotion recognition, whereas non-autistic people use a template-based strategy. Rutherford & McIntosh (2007) report differences in speed of recognition of emotions and degree of automaticity or consciousness required, with non-autistic people acting on their emotional recognition without being aware they are doing it and autistic people being more conscious of any emotions they recognise. This may particularly be the case if they have learnt or been taught to recognise emotions.

A meta-analysis of emotional recognition by autistic people (Hamilton & Uljarević, 2013) has shown that autistic people have a reduced ability to recognise emotions from faces compared to non-autistic people, are able to recognise happiness to only a slightly reduced extent and recognise surprise to a similar extent to other emotions. The authors have suggested that this contradicts theories that autistic people do not understand theory of mind, as surprise is the only basic emotion that requires an understanding of a mental state to identify and thus should have a more pronounced recognition difficulty. There is thus also a need for further research on the relationship between theory of mind and facial emotion recognition for both autistic and non-autistic people, including the mechanisms by which autistic and non-autistic people understand theory of mind, the age at which they first understand it and how they apply this understanding in their interactions with other people.

Dual-process theory could be used to infer that autistic people experience difficulties in processing rapid social heuristics, such as low intensity emotional expressions, intuitively rather than a lack of empathy (Brosnan et al., 2015). There is also some evidence (Smith, 2009) that autistic people can have excessive empathy. For instance, they may experience other people's emotions too intensively and therefore need to block them out. There is therefore a need for research on both the strategies autistic people use for recognising emotions, instead of (or in addition to) the intuitive reasoning use by neurotypicals, (Brosnan et al., 2015) and their use of other types of information instead of (or in addition to) emotions.

Participation and isolation

Many of the studies of autistic people's social interaction are of 'high functioning' autistic children in an educational context. There is more limited work on adults, and autistic children or adults with cognitive impairments, or in other than educational contexts. Common experiences of children and adults include valuing social interaction, difficulties in initiating social interactions, isolation and anxiety (Cordier et al., 2016). Varying experiences of self-acceptance and wanting to fit in were found. For instance, autistic children were concerned about fitting in (Cordier et al., 2016), but also showed varying degrees of negative perceptions of their differences and acceptance or even celebration of being autistic (Humphrey and Lewis, 2008) whereas university students both wanted to be valued for themselves rather than make changes to fit in (Beardon et al., 2009) and had a range of positive and negative views of autism. In the positive cases, autism was a source of a sense of positive identity and explanation of difficulties (Hastwell et al., 2017). However, additional research would be required to confirm whether there is indeed a change in degree of self-acceptance from childhood to early adulthood and whether this change is specific to autistic university students or also affects other autistic adults. There may be additional common experiences, as well as changes over time, which have not been identified due to differences in methodology.

Both autistic children and adults frequently have high levels of anxiety during social interaction. Contributory factors to anxiety associated with social interaction at school may include the complex peer dynamics in schools and awareness of social difficulties (Cordier et al., 2016). Autistic university students have been found to experience depression and anxiety in levels from overwhelming to being able to cope due to issues such as bullying, humiliation, social exclusion, loneliness and unpredictable changes in social groups (Hastwell et al., 2017). A combination of over-eagerness for friendship and difficulties understanding the subtleties of social interaction have been found to lead to the bullying and ridicule of many autistic children (Humphrey and Lewis, 2008). Suggested individual strategies to enable (adults) to manage anxiety when it occurs include using creative outlets, physical activity, spiritual/religious practice and time spent alone (Müller et al., 2008). However, there is also a need to eliminate or at least reduce the factors that lead to anxiety. Therefore the impacts of dealing with bullying and harassment, encouraging peers to be more inclusive and working with autistic people to improve their self-esteem should be investigated.

Both autistic children and adults have been found to experience difficulties initiating social interactions and in communication. Autistic children also experience difficulties in initiating and maintaining friendship and are frequently dependent on parents to facilitate communication (Cordier et al., 2016; Müller et al., 2008). Autistic children's social naivety has led to negative experiences and over-eagerness for friendship combined with fear of peer rejection. Recommended supports for adults include alternative modes of communication, explicit communication and instruction in interpreting and using social cues (Müller et al., 2008). However, since concerns about communication are a persistent problem from childhood into adulthood, it would be useful to investigate in more detail the nature of the communication barriers experienced, including the role of perceived difficulties and anxiety, in order to better determine appropriate support. Shared activities associated with common interests are amongst the recommendations for supporting autistic adults. An autistic student's special interests were found to fascinate his peers and thereby increase his confidence (Humphrey & Lewis, 2008). However, there seems to be limited research on the use of (special) interests as a means of encouraging satisfying low stress social interaction by autistic people.

Since autistic children have been found to withdraw from playing with peers despite enjoying talking to friends and valuing their relationships with them (Cordier et al., 2016), the isolation and exclusion experienced by autistic adults (Müller et al., 2008) may start in childhood, implying that measures are required at this stage. Parental reports suggest that this withdrawal is due to a combination of awareness of social difficulties and negative social experiences, as well as a strong desire to fit in. In addition autistic children have been found to spend little time with friends due to the (perceived) need for supervision, working parents and the needs of siblings (Cordier et al., 2016). It would therefore be useful to investigate the impact of measures to build autistic children's self-confidence and self esteem and enable them to spend more time with friends. It could also be useful to investigate the role of parents and whether the communication support they provide is helpful or encourages dependence. However, there were also some positive experiences of existing friends protecting autistic school students (Humphrey and Lewis, 2008).

Identified barriers to social participation include sensory issues which may result in missed social opportunities, novel situations being terrifying to some autistic people, the (perceived) need for high levels of supervision of autistic children, perceptions of being socially awkward and negative past experiences, stress and anxiety and (perceived) communication difficulties (Cordier et al., 2016; Hastwell et al., 2017).

Several universities provide support and/or social groups for autistic students. However, not all autistic students want to participate in groups aimed solely at autistic people. There are also concerns about disclosure due to the possibility of stereotyping and difficulties in explaining what it means to be autistic to non-autistic people (Hastwell et al., 2017), as well as the desire of autistic children to appear 'normal' (Humphrey & Lewis, 2008). Where autistic children were able to adapt to mainstream ways of working, their experiences were generally more positive (Humphrey & Lewis, 2008). However, many university students experienced difficulties in accessing support in social situations and understanding the behaviour of non-autistic students (Beardon et al., 2009).

Experiences of services

Much of the literature on service provision focuses on the details of the services and outcomes. There is considerably less literature from the perspective of autistics about their experiences of services and service providers. While outcomes are very important, it is unlikely that successful outcomes will be obtained without considering the needs and experiences of autistic service users. Therefore, this section considers autistic experiences and attitudes to services, both autism-specific and general, and service providers and decision makers.

Healthcare

Five research papers and a thesis about autistic people's experiences of healthcare were identified. Although they cover different geographical areas, mainly North America and the UK, and had different methodologies and detailed focuses, they all highlight similar concerns: the lack of understanding of autism by healthcare professionals and the lack of adjustments to ensure better communication with professionals and better experiences of healthcare. Autistic views of their experiences of diagnosis in the UK were mixed. A survey of 128 'high functioning' autistics (Jones et al., 2014) found that just under half (47%) were very or quite satisfied and about two fifths of respondents 'very' or 'quite' dissatisfied. Nearly 60% were satisfied with the information they received, and just over 70% were satisfied with the way the information was provided. Satisfaction with support was the area in which participants expressed most discontent, with just 22.6% satisfied with the support received (Jones et al., 2014). The quality of information received and the time to diagnosis had the greatest impact on satisfaction. Participants highlighted the need for autism training for healthcare professionals and a more structured diagnostic process. There is clearly also a need for additional or better quality support as well as research on the barriers to extending and improving the available support.

A participatory research approach involving surveys of over 200 autistic and 200 non-autistic people found greater 'unmet health needs', greater use of emergency services and less use of preventative services by autistic respondents, as well as worse communication between autistic people and professionals and lower patient self-efficacy (Nicolaidis et al., 2013). Communication issues were highlighted in all the studies. 88% of the autistic people the Westminster Commission on Autism (2016) gathered evidence from do not think health professionals understand their needs as an autistic person. Other important issues included sensory overstimulation, empowerment and the attitudes and lack of knowledge of healthcare professionals. Communication issues included the use of non-verbal communication, slow processing speed and difficulties in understanding people (Nicolaidis et al., 2015; Wilson, 2017), communicating medical needs and advocating for oneself (Nicolaidis et al., 2016), as well as unhelpful non-literal interpretations and social and emotional processing (Wilson, 2017). The majority of the autistic young people involved in one study were not interviewed due to being considered to lack the 'verbal ability' required

for an interview or parents considering they could not be interviewed even with accommodations (Nicolaidis et al., 2016). This does not bode well for measures to take account of the communication needs of these young autistic people or them being listened to in healthcare or other contexts.

There was also concern about a lack of knowledge of autistic people by healthcare professionals and recognition of the importance of respectful attitudes and treatment, as well as appropriate skills, and the need to make healthcare facilities and processes more accessible to autistic people (Nicolaidis et al., 2015; Wilson, 2017). This lack of knowledge has impacted autistics in need of healthcare, as no accommodations or tailored information was provided to meet their needs, including sensory ones. In addition the frequently different way in which autistics experience pain is not understood. And their health concerns are dismissed as just a part of autism (The Westminster Commission on Autism, 2016).

Sensory issues were found to affect healthcare use in a small study of autistic young people and a medium scale study of autistic adults (Muskat et al., 2015; Nicolaidis et al., 2015). The autistic young people (6-18 years) were affected by sensory overstimulation and experienced heightened sensory sensitivity in a hospital environment, including to machines beeping and the feel of soap on their skin (Musket et al., 2015). The sensory issues mentioned by adults included body awareness, particularly the experience of pain (Nicolaidis et al., 2015), which presumably affects autistics' ability to communicate their state and needs to professionals. There is probably a need for research on autistic experiences of pain and how this affects diagnosis and treatment.

Proposed solutions, which have been found useful in practice, include alternatives to an overstimulating waiting room, use of preferred forms of communication e.g., writing or typing, use of precise, specific language; extra time for patients to process information; very detailed, step-by-step written instructions for obtaining prescriptions, tests and referrals; and clarifying the role of support personnel (Nicolaidis et al., 2013). Solutions suggested by participants for improving counselling services include therapists working 'collaboratively and respectfully', the provision of clear information and opportunities for discussion, for instance, of the reasons for the therapeutic approach chosen and what might be helpful (Wilson, 2017). Other suggestions included annual health checks, as autistics can experience difficulties in identifying changes in their health needs, and to be identified as autistic on GPs computer systems (The Westminster Commission on Autism, 2016).

While parents and healthcare professionals agreed on the 'importance of listening to parents' when planning hospital care for their autistic children (Muskat et al., 2015), no autistic young people commented on this or the need for input from autistic young people. An Autism Healthcare Accommodations Tool has been developed by the Academic Autistic Spectrum Partnership in Research and Education (AASPIRE). The tool enables autistic users to create a report based on a survey, including personalised suggestions for improving health care provision for them. The majority of autistic respondents to a survey of 259 autistic adults and 51 health care providers found the tool 'easy to use, important and useful' and helpful in preparing for visits and helping them communicate their medical needs and self-advocate more effectively (Nicolaidis et al., 2016). Over 90% would recommend it to a friend or their GP or healthcare provider. However, a minority were concerned that health care providers would react negatively or ignore the findings. Although the findings do not explicitly suggest this, they indicate the value of guidelines and recommendations on communication/providing information and reducing sensory overstimulation in hospitals and other healthcare settings. It would therefore be useful to supplement this tool with general recommendations for healthcare professionals and providers on supporting autistic service users and making health care of all types more accessible to them.

Criminal justice system

The three research papers identified show that autistics are dissatisfied with the criminal justice system. They are largely negative about interactions with the police and show that autistic people find life in prison difficult. A survey of 31 autistic adults (Crane et al., 2016) reports that 69% found the criminal justice system unsatisfactory and only 15% satisfactory. Participants highlighted police officers' lack of 'awareness and knowledge' of autism, adjustments, information and explanations as well as being detained and interviewed in an inappropriate physical environment. They were also concerned by delays and victimisation or discrimination of some individuals by police officers.

Eight autistic male prisoners in seven different prisons in New South Wales reported finding the unpredictable prison environment difficult (Newman et al., 2015). Several were looking for activities that would provide some routine. They found the rules strange and that they took away control and interfered with personal routines. They also experienced difficulties with social demands and lack of privacy. Coping strategies included self-isolation and avoidance. Interviews and observations with two adult male autistic prisoners and informal interviews with prison and specialist staff found that adapting prison rules, for instance to allow autistic prisoners to remain in their cells instead of associating with other prisoners, was successful in avoiding altercations and bullying (Paterson, 2008).

These findings indicate both the need for additional research and the need for information, training and modifications to make the criminal justice system better serve autistic people. While criticism of the excessive use of prison sentences in general is outwith the remit of this paper, the outcomes reported here indicate the particular unsuitability of prison for autistic people and the need for alternatives. The findings also indicate the need for information and training for police, prison officers, judges and other criminal justice personnel on the needs of autistic people, including communication and sensory issues.

Employment

Studies of employment show that autistics are often underemployed and frequently overqualified for any work they do obtain. The situation is worse compared to people with other disabilities (Roux et al., 2013). Their experience of work has generally been negative, but with exceptions, for example when a job matches skills and interests (Müller et al., 2003). The lack of autism understanding and acceptance from employers, colleagues and support services creates many challenges. Several studies show that vocational support, when it is specialised for autistics, can make a positive contribution to help autistics obtain and retain jobs (Hillier et al., 2007, Howlin et al., 2005). One study (Sarrett, 2017) suggested an approach, grounded in the social model of disability, in which the employer was trained in diversity by a disabled trainer and for the interview process to be changed to be made more inclusive. Autistic students who receive appropriate support to graduate and achieve their goals, may find that the support they need is no longer available in the workplace (Howlin and Moss, 2012). Consequently there is a need for research to support the development of programmes to meet the needs of young (and older) autistic adults (Cai & Richdale, 2010).

There are several surveys of experiences of and attitudes to employment of autistic people in a number of different countries. Both positive and negative experiences of employment were identified. An Australian survey involving 130 adults in paid employment found that for many of them work was of value in addition to being a source of income. They considered it both 'self-fulfilling' and of 'intrinsic value', as well as an opportunity to overcome some typical autistic difficulties and make a positive difference (Baldwin et al., 2014). Nine participants in a vocational support programme in the USA found their mainly entry level positions

'satisfying and enjoyable' and they improved or acquired skills, including improved communication and the abilities to problem solve and work as part of a team (Hillier et al., 2007). Another US survey of 18 adults who had worked for one year found that a few of them had obtained good jobs, generally when they matched their autistic skills, key interests and strengths, such as attention to detail (Müller et al., 2003).

Other participants experienced problems. Some of the Australian participants found their work boring and close to half of them were overeducated and overqualified for their jobs and a third were in casual employment (Baldwin et al., 2014). The US survey of autistics who had worked a year (Müller et al., 2003) found that most of them were negative about their work experiences and had had periods of un- or underemployment which acted as barriers to progression beyond entry-level positions. Participants in another US survey experienced difficulties in obtaining and keeping a job (Sarett, 2017). Many autistic people worked part time, nearly a third in one US survey (Sarett, 2017), with only just over a fifth working full time in another (Roux et al., 2013). Half the participants in a longitudinal US survey of young autistic people who had attended a special secondary school had worked since school and a third were employed when interviewed (Roux et al., 2013).

The Australian survey found that participants were working in a variety of different types of job (Baldwin et al., 2014). However, the longitudinal US survey found that the top five employment areas for autistic participants, which employed nearly 70% of them, were office, transport, production, food preparation and cleaning (Roux et al., 2013), and another US study of about 100 autistic adults found their top five job fields were retail or sales, internships, non-profit, customer care and contract work (Sarett, 2017). Only 6% of the Australian participants were in a managerial role, though some participants did not want a management position and its associated stress (Baldwin et al., 2014). The need for the differences in the experiences of autistic people in the Australian and US surveys should be investigated, including whether they relate to differences in the situation of autistic people in Australia and the USA or other factors.

Specific problems included a lack of adaptations of job content and working conditions, including flexible hours, special lighting, exemption from customer-facing tasks and tailored supervision strategies, such as written instructions, 'checking in' regularly and account being taken of 'bad days' (Baldwin et al., 2014). Participants were unhappy with the lack of autism knowledge of the vocational rehabilitation counsellors and found that they were unable to obtain the specific assistance they required from a general service, particularly in mastering the job application process, adapting to new job routines, communication, and navigating social interactions with supervisors and co-workers (Müller et al., 2003). Less than half of 31 US focus group participants had disclosed their diagnosis and even fewer always disclosed it (Sarett, 2017), further reducing the likelihood of adjustments. Some participants had stopped disclosing at work following negative experiences. There has also been recognition of the structural barriers and discrimination experienced by autistic people on the labour market (Rosqvist & Keisu, 2012).

Supported employment schemes have been evaluated in the UK (Howlin et al., 2005) and the USA (Hillier et al., 2007). The UK National Autistic Society Prospects employment scheme appears to have been relatively successful, with 63-70% of over 100 participants in work during the evaluation period, with the majority on permanent contracts with administrative, professional or technical jobs and an increase in salary (Howlin et al., 2005). Nine autistic participants on a two-year vocational support programme in the USA obtained a job or increased their working hours and hourly rate (Hillier et al., 2007). Most of the jobs were entry-level positions and participants found them 'satisfying and enjoyable' and they were very satisfied with the support programme. In both cases the scheme had a positive

impact on participants. The UK participants become more independent, secure and happy and the US ones increased their communication, problem solving and team working skills. However, in both cases they had limited social contacts with colleagues outside the workplace.

Suggested solutions included adapting the interview process to make it more accessible and making the work environment more accepting of autistics and difference, including through face-to-face diversity training led by a disabled person. This would help challenge the incorrect popular representations of autism that affect attitudes in the workplace (Sarett, 2017). There have also been suggestions that, in line with the social model of disability, autistic people need to obtain power over their work situation and resist the inherent inequality in the work environment (Rosqvist & Keisu, 2012).

There are some indications that employment outcomes for autistic women may be even worse than those for men. For instance a follow-up survey of 61 men and seven women found that most of the women had (very) poor outcomes, with only one having a job (with the family firm) and none reported to have friends or live independently, whereas 22% of the men had (very) good education, employment, relationship and independent living outcomes (Howlin et al., 2004). However, the small numbers make the results inconclusive. A study of three women and three men (Hurlbutt & Chalmers, 2004) found that frequent underemployment and a focus on social interactions rather than job performance affect both autistic men and women, but did not consider gender specifically.

Some of the studies of (successful) measures to support autistic people into and in employment have included women, though generally only as a small minority of 10 to 25%. However, none of them have paid particular attention to the specific experiences of women or reported measures targeted specifically at women. They include the successful use of a work training programme to enable four autistic adults to obtain and maintain competitive employment (Burt et al., 1991); and an eight year follow-up study of 89 autistic clients supported by the Prospects employment support agency, which found that the programme was very successful and no gender differences in those in and out of employment (Howlin et al., 2005).

Education

The accessibility of all the stages of education is essential for both personal development and to increase employment opportunities. There is serious concern about the future education and employment prospects of autistic people, with only an estimated 12-15% of 'higher functioning' individuals in paid employment and only 25% of young autistic adults having any education or training after school (Barnard et al., 2001; Touhig, 2013) and more than half of young autistic adults in the USA not transitioning into education or work in the initial years following secondary school (Howlin et al., 2004).

Parents provide organisational, financial and emotional support to their autistic and non-autistic children whilst they progress through school. In the case of autistic children this often continues into higher education. However, there are both practical barriers to this support continuing, with privacy and confidentiality regulations not allowing staff to provide e.g., student marks to parents, and issues of whether a high level of continuing support is appropriate or causes continuing dependence.

A number of barriers are experienced by autistic people in accessing further and higher education. Many autistic people experience very high levels of stress and anxiety. Since

stress prior to starting university has been found to affect the adjustment of neurotypical students six months later (Pancer et al., 2000), it seems likely that high stress levels will impede the adjustment of autistic students to an even greater extent.

Many autistic students require appropriate support to facilitate the transition from school or home (Taylor & Seltzer, 2010). The 'fragmented and understudied' nature of research on accommodations for autistic university students has been commented on (Gelbar et al., 2015). Further and higher education have a social, as well as an academic dimension. They also, and particularly higher education, require additional study skills and skills in time management. For students living away from home there are also issues of managing independent living. These factors may all require additional support and accommodations. For instance, 35 US students were found to be successful academically, but less well integrated socially and experienced difficulties with time management and study skills. However, they were receiving the same accommodations as at secondary school (Gelbar et al., 2015), and lacked the additional support and accommodations required to meet these additional needs.

Autistic students may require additional support and accommodations beyond what is generally available on campus, including skill development in areas such as self-determination and self-management (Getzel, 2008). Effective executive functioning by autistic people to manage their day-to-day activities and meet deadlines may require greater adherence to routine and less tolerance of variations (Adreon & Durocher 2007). This may cause difficulties in higher and further education, where there are both timetables with regular elements and considerable scope for flexibility and even chaos. Autistic students may understand what works best for them in terms of learning approaches and accommodations, but may be embarrassed or otherwise find it difficult to communicate this to academic staff and may not consider themselves disabled or be aware they are entitled to adjustments. Disclosure that a student is autistic can be essential for transition planning and ensuring that appropriate support is available throughout education (Adreon & Durocher, 2007). However, there are indications that negative experiences following disclosure have stopped disclosure by some autistic people in the workplace in the USA (Sarett, 2017). The same may be true of education.

Planning and knowing that structures are in place in further (or higher) education can reduce anxiety (Van Bergejik et al., 2008). Many autistic students find it difficult to explain their needs, advocate for themselves and/or know who to approach. Therefore, it may be necessary to actively solicit their input to ensure that accommodations are appropriate and useful to them (Cox et al., 2017). Suggested accommodations include extended test time, distraction free testing, flexible deadlines for assignments, breaks during class, the use of technology in classes, note takers, clear directions, the use of visuals, and optional group activities (Sayman, 2015; Zeedyk et al., 2016). However, it should also be noted that autistic students are not identical and therefore the same accommodations will not work for all of them. This makes it important to understand individual students' specific needs and target effort to meeting these needs, improving their welfare and making significant adjustments to the physical environment. Research indicates that, particularly at further education level, structural changes in the delivery of academic courses and at school level strong staff student-relationships can improve outcomes for autistic students (Brede et al., 2017; Downing, 2014). One-to-one peer contact can help autistic students obtain a better connection with the teacher and the subject (Downing, 2014). In particular, peer mentoring at college or university, possibly organised by the support unit for disabled students, can make a great difference (Adreon & Durocher, 2007).

Course and institution selection are important issues for all students, but may raise particular issues for autistic students. They may need to consider additional accessibility issues related to their sensory and communication needs, the availability of support in the chosen institution and the likely acceptance of autistic people and provision of adjustments in their subsequent careers. Proactive careers advice, including on the availability of adjustments, support and transition courses for disabled students can be helpful.

Older autistics

Lack of accurate knowledge of autism by professionals was found to underpin inadequate health and social services. Autistic adults have had more time to explore their autistic identity and some consider they are experts in the autism field and should be consulted. Also service provider staff should attend conferences featuring autistic speakers, and should be paid well enough to avoid turnover which creates change. (Hurlbutt et al., 2002, Griffith et al., 2012 & Elichaoff, 2015). Participants aged 58-63 in Elichaoff (2015) felt 'strongly about the need to educate mental health professionals and therapists [in order to be helpful], they want to be seen and heard as experts on autism, because of their insider perspective.'

Autistic adults have reflected on their unemployment and underemployment difficulties, which worsen with age. This includes both finding and retaining employment. Suggested strategies included job mentors and training on the job rather than in hypothetical scenarios, and social skills training in the workplace and a helpline for unexpected or hard to deal with workplace situations. Further strategies included more education about autism for employers and co-workers and mentors to help with job search (Griffith et al., 2012 & Hurlbutt et al., 2002).

'High-functioning' older autistic adults found support from their family, particularly their mother, and spirituality helpful. Independent living in the community is preferred to sharing a space. Also it is helpful to have an autistic space at autism conferences. (Hurlbutt et al., 2002). Other coping strategies included not relaxing around people, controlling their behaviour and moods, and masking. (Griffith et al., 2012)

Women and mothering

Autistic women found it difficult to access services as they were not perceived as needing them due to their masking skills. (Tint et al., 2017) Some women giving birth encountered the opposite, not being trusted with parenthood because they are autistic. Some autistic mothers had even had their baby taken away as they did not 'demonstrate parental capacity' sufficiently. Some of these mothers unfortunately trusted that this decision must have been taken in the best interest of their children. The fear of losing their children also meant that autistic women felt unable to ask for support (Burton, 2016). Another obstacle was a reluctance to seek services as feeling unworthy of them or because of past experiences (Tint et al., 2017).

In addition, services were often found to be exclusionary and inaccessible, and those that they could access were not tailored to autistic women. Communication with professionals was an issue for autistic women who were treated as medical objects. Their different sensory and communication needs and their humanity were ignored and they were provided with little or no information (Tint et al., 2017 & Burton, 2016). This was a particular issue for autistic women in hospital to give birth. Knowing your rights was found important to be able to challenge the professionals (Burton, 2016). And many women were positive about 'in-person and online self-advocacy and support groups.' (Tint et al., 2017).

Limitations of research

As in many other areas, there is a degree of publication bias which makes it more difficult to publish no effect than positive effect emotion recognition studies (Hamilton & Uljarević, 2013). There may also be bias against publishing studies which show better performance by autistic people. Most studies in this area tend to be underpowered and Hamilton and Uljarević (2013) estimate that a group of over 135 participants is needed to reliably detect comparative effects. They also suggest the need to investigate different emotional recognition capabilities based on diagnosis, while recognising changes in the diagnostic criteria of the DSM-5 (Grzadzinski et al., 2013) and self-diagnosis by a number of autistic people (Kenny et al., 2015). However, they ignore other factors which could impact on emotion recognition and ignore the fact that the specific autism diagnosis obtained may be determined by and change with a number of factors rather than be fixed. Another potential bias to avoid in research surveying both autistic and non-autistic cohorts, is data cleaning which may eliminate more responses from the autistic cohort (Mery, 2016).

Perspective taking and understanding of intentions is an understudied area in autism research. However, there is research showing that different types of understanding of someone else's perspective have different effects on well-being (Buffone et al., 2017). This includes imagining oneself in the place of someone who has had a negative experience rather than simply imagining their feelings. This is generally studied from a visuospatial or neurological framework. However, autistic people may have alternative approaches to understanding perspective, analogously to the social rule based approaches to understanding social situations found by Brosnan et al. (2016) and Patil et al (2016).

There is also some, but relatively limited research from an autistic or neurodiversity perspective (Lorenz & Heinitz, 2014). For instance, the importance of considering the perspective of autistic people and recognising its differences from that of professionals has been noted (Milton, 2014; Robledo et al., 2012). This includes recognising and valuing qualitative differences in the way autistics socialise (Milton, 2014) and the strengths and capabilities of autistic people rather than focusing purely on their difficulties, as does much of the literature (Lorenz & Heinitz, 2014). These strengths include the ability to concentrate in long-lasting routine work, identification of logical rules and patterns, visual information processing, and the ability to remember facts. Considering autistic behaviour as a response to sensory issues that would otherwise interfere with attempts to interact rather than a social deficit would lead to modifications of the approaches used by teachers and therapists, such as requiring eye contact before providing instruction (Robledo et al., 2012). They suggest the need to understand the accommodation strategies used by autistic people, rather than automatically assuming that different behaviour is due to social deficits.

Overall, the literature indicates a number of areas for further research. This includes the strengths and interests of autistic people and how they can be used to support social interaction, including attention to detail and the role of computers and other technology in understanding the social environment. There is a need to expand research from a clinical or educational setting to wider areas of interaction. There is also a need for research on successful strategies used by autistic people, as well as the potential and disadvantages of camouflaging, what social skills are actually useful to them and the feasibility of developing successful and specifically autistic forms of interaction. Finally there is a need for research involving large, diverse samples and investigating the impact of demographic and other factors.

Conclusions

This report has reviewed the existing literature in areas relevant to the research questions, including logic and other strategies to understand emotions, social situation and intentions and in decision making, participation and isolation, experiences of services such as healthcare, the criminal justice system, employment and education.

As is common in research on disabled people, many of the studies involve small numbers of autistic participants. There are also a few studies with several hundred participants. It can be difficult to compare the outcomes of small and large scale studies. Although the review has not focused on methodologies, methodological differences can further complicate comparisons of the results of different studies. Although autistic people appear as participants in many of the reported studies, there is little evidence of their involvement as researchers or as expert consultants on their own experiences or how the research should be carried out.

There is a tendency in much of the research to focus on deficits rather than strengths and to interpret potential strengths as deficits. For instance, the reduced impact of the framing effect can help ensure decisions are more consistently logical, rather than being a limitation

There is a body of work on autistic people's 'deficits' in social development and communication. However, much less attention has been paid to the strategies autistic people have developed and which work for them in social interaction. Autistic people have been found to use a more logical and rational, and less emotional approach to decision making than non-autistic people. However, this is interpreted as a deficit, rather than both its advantages and drawbacks being discussed. Much of the discussion of strategies used by autistic people has focused on camouflaging to mask social and communication barriers, though it has been noted that this can have negative impacts on mental health. Other approaches including the use of technology and the importance of the involvement of autistic people in technology development have been recognized.

Autistic people have been found to employ reflective rather than intuitive approaches to decision making, but may find decisions involving discussion with others difficult. Research shows that autistic people have less ability than non-autistic people to identify emotions from faces. However, there seems to be a lack of research on other approaches to emotion recognition and social interaction which is not based on knowledge of emotions. There also seems to be a tacit or explicit assumption in most of the literature that there is a standard set of social skills used by non-autistic people which autistic people should emulate rather than investigating what social skills are most appropriate for autistic people. This is in line with the limited research from an autistic or neurodiversity perspective of the ways autistic people socialise. The issue of distortion of the results through publication bias, with greater difficulties in publishing no effect studies and possible bias against publishing studies where autistic people perform 'better', has also been raised. Another possible bias is how the data is cleaned in surveys of autistic and non-autistic cohorts; eliminating partial answers may affect the autistic cohort disproportionately.

Isolation has been found to be a major issue for both autistic children and adults and both groups experience difficulties in initiating social interaction and communication. Depression and anxiety have been found to be major issues. Several universities provide support and/or social groups for autistic students. While useful, not all autistic students want to socialise mainly with other autistic students. Sensory issues have been found to lead to missed social opportunities, but there is little discussion of these issues. However, there has been a tendency for the research to focus on approaches to changing the behaviour of autistic

people rather than changes required by both society as a whole and individuals in order to be more welcoming and overcome barriers to the participation of autistics.

Healthcare, the criminal justice system, employment and education are discussed as examples of service provision. In all cases autistic people have been found to experience disadvantage. Autistic healthcare professionals were found to lack understanding of autistic people and there was a lack of adjustments to ensure better communication with professionals and experiences of the service. A number of solutions have been proposed, including a healthcare tool to support autistic people in communicating their medical and accessibility requirements, alternative quiet waiting areas and adaptations to communication such as precise language, written communication and more time to process information, as well as therapists working respectfully and collaboratively. There is a need for further work in this area, including on the link between experiences and healthcare outcomes.

The limited research found indicates that the criminal justice system is serving autistic people poorly. There was concern about police officers' lack of knowledge and awareness of autism and possible discrimination and victimisation, as well as indications that autistic people find prison particularly difficult and it may be unsuitable for them.

The research indicates that access to education and employment by autistic young people is a serious problem. The limited research on appropriate accommodations for autistic university students has been commented on. Autistic people have been found to experience a number of barriers in accessing further and higher education. They include the need (and lack) of appropriate support to facilitate the transition, additional support and accommodations to what is generally available on campus, high degrees of anxiety and stress and possible concerns about disclosure, as well as difficulties in communicating needs and, in some cases, a lack of awareness of entitlements to adjustments.

The literature indicates that in addition to unemployment, autistic people are frequently underemployed and overqualified for their jobs. They often experience barriers to obtaining and keeping jobs and are frequently in casual employment. Barriers include lack of understanding and acceptance and a lack of adaptations to job content and working conditions and navigating social interactions with colleagues and supervisors. Studies have found both positive and negative experiences of employment. On the one hand it has been fulfilling and to add value to their lives and on the other boring. There were also some concerns about disclosing an autism diagnosis, including due to bad experiences making it more difficult to obtain adjustments. The results of studies differ as whether autistic people work in all sectors of the economy or mainly in a limited number of fields and, if so, which ones. However, these differences need further investigation, including whether they are due to difference between the USA and Australia, where they were carried out. Despite concerns about the lack of knowledge of autism of vocational rehabilitation personnel, programmes tailored to autistic people and supported employment schemes have been found to help them obtain and retain permanent jobs and increase their salaries. There are some indications that employment outcomes may be even worse for autistic women than men, but other studies indicate no male-female differences. In addition, the number of female participants has generally been too small for definite conclusions. Suggested solutions include making the interview process more accessible and using face-to-face diversity training by a disabled person to make the work environment more accepting of autistic people.

Much of the literature has reported studies involving predominantly male participants. There has been little recognition or research into individual differences or the wide range of demographic factors which could lead to differences between autistic people.

Overall, the literature indicates a number of gaps and areas where further work is required. In each of these areas for research which involves large, diverse samples to enable investigation of demographic and other factors, including gender, age, race/ethnic origin, other impairments and LGBT+ status. There is also a need to move research from a clinical or educational setting to wider areas of interaction.

Specific topics which require (further) investigation include the following:

General issues:

1. Barriers experienced due to (sufficient) account not being taken of sensory issues.
2. Appropriate accommodations for sensory issues in different areas of life.
3. Using (special) interests to overcome barriers, improve social interaction and access to education and employment.
4. How best to change attitudes so the pressure is not (always) on autistic people to change and adapt themselves.
5. Defining and identifying examples of good practice.
6. Whether and, if so, how deficit models of autism influence research and interventions.

Training and information about autistic people:

1. Availability and gaps.
2. The best ways of delivering training to different types of professionals.
3. The best ways of making the general population aware of the needs of autistic people and how to interact with them.

Social interaction and participation:

1. Using the strengths and interests of autistic people to support social interaction.
2. Successful strategies used by autistic people.
3. The potential and disadvantages of camouflaging.
4. What social skills are useful to autistic people.
5. The feasibility of developing successful and specifically autistic forms of interaction, including with non-autistic people.
6. The benefits and damage from trying to make autistic people follow the behaviour patterns of the non-autistic majority.
7. Any differences in the type and extent of isolation experienced by autistic people compared with other minority groups.

Employment and services:

1. Comparison of experiences across services.
2. Good practice and whether it can be generalised or is specific to the particular workplace.
3. The measures required to enable autistics to gain permanent employment that uses their potential, skills and qualifications.
4. The measures required to support job retention and promotion.

Emotions:

1. The value or role, if any, of an ability to recognise emotions in real world decision making and functioning.
2. Strategies use by autistics to replace or complement emotion recognition.
3. Successful functioning without emotion recognition.

Technology use:

1. The potential uses of technology.

2. The potential uses of robots with adults as well as children.
3. Accessible interface design.
4. What do autistic people want from technology.
5. What types of technologies are used.
6. Limitations of technological interventions.

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