The relationship between autism and suicide: Risk factors and potential mitigation strategies

Derica J. Su
University of California, Los Angeles, dericasu@gmail.com

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Abstract

Suicide is a major problem worldwide, but individuals with autism may be at particular risk due to multiple factors—perceived burdensomeness, thwarted belonging, and capability for suicide, according to the IPTS model for suicidality as modified by Pelton and Cassidy (2017). This review focuses on these three factors and proposes a new feature of the model: the intersection between perceived burdensomeness and thwarted belonging. Existing suicide support mechanisms for young adults with autism without intellectual disability that target the main components of the model will be critiqued, and areas for further improvement will be suggested. Potential areas for future inquiry may include interdisciplinary collaboration between the autism community and researchers to identify the causes of suicide among autistic people, implement autism-specific risk assessment and suicide prevention tools, and educate clinicians and the public about autism and suicide.

Keywords: autism spectrum disorder, risk factors, suicide, suicide prevention

The Relationship Between Autism and Suicide: Risk Factors and Potential Mitigation Strategies

Autism spectrum disorder (ASD) covers a range of childhood-onset neurodevelopmental conditions defined by persistent deficits in social communication, restricted patterns of behaviour, and heightened sensory sensitivities (American Psychiatric Association, 2013). There are several barriers to ASD diagnosis–mainly knowledge about autism, access to diagnostic services, and high cost. Therefore, for the purposes of this paper, the broader autism phenotype will be defined as having elevated autistic traits relative to the neurotypical population and/or a diagnosis of ASD or Asperger's syndrome (AS; Cassidy et al., 2022).

There has been growing evidence that autism and autistic traits are correlated with increased suicidality (Balfe & Tantam, 2010; Cassidy et al., 2014; Paquette-Smith et al., 2014; Hirvikoski et al., 2016; Cassidy et al., 2022). This appears to be a recent phenomenon, with most papers published in the last decade. Suicidality, for the purposes of this paper, describes suicidal ideation, suicide attempts or plans, and broader risk for suicide (APA, 2023). The approximate suicide rate in neurotypical populations varies from 1.1% to 19.8%, according to a study done by Casey and others in 2008 across five European countries and involving 12,000 adult participants.

Although ASD prevalence is estimated at about 1.1% of the general adult population in the UK, the attempted suicide rate for ASD populations is between 1.8% and 36% (Cassidy et al., 2022). Richards and others (2019) demonstrated that elevated autistic traits were present in adults who had attempted suicide. In another UK study, Cassidy and colleagues (2014) noted a 66% lifetime suicidal ideation rate among adults with AS, which is a fourfold increase from the general population and a notable increase from patients with psychosis (59%). Additionally,

there is a sevenfold increase in deaths by suicide in the ASD population compared to the general

population (Hirvikoski et al., 2016). This is much higher than the estimated suicidality rate for

neurotypical populations, as evidenced by Casey and colleagues (2008).

This trend of increased suicidality among ASD populations appears to be cross-cultural,

not just limited to English-speaking countries. In a study conducted by Kolves and others in 2021

analysing a Denmark national registry, researchers found that people with an ASD diagnosis had

an over threefold increase in suicide attempts (or suicides), even after adjusting for other factors

such as sex, age, and time period. Kolves and others (2021) also found that factors such as older

age and higher educational level were not protective against suicide attempts in the ASD

population as in the general population, while other factors such as comorbidity were major risk

factors for people with ASD and people who attempt or die by suicide. Another nationwide study

done in Taiwan by Chen and colleagues (2017) found that patients with ASD had strikingly more

suicide attempts than patients without ASD (3.9% compared to 0.7%). Hence, the authors

concluded that ASD was an independent risk factor for attempted suicide.

Compared to other conditions where suicidality is prevalent, among patients with major

depressive disorder (MDD), 46.67% reported suicidality to some degree, and a higher percentage

of unemployed participants reported suicidality than employed participants (Dold et al., 2018).

Protective factors such as employment are not as protective against suicidality among the ASD

population as Kolves and others (2021) described. As for the suicide rate among individuals

diagnosed with attention deficit hyperactivity disorder (ADHD), researchers found that 15.8% to

66.3% had described suicidal ideation (Impey & Heun, 2020). Notably, the comorbidity rate

between ASD and ADHD is relatively high with estimates ranging from 14% to 78% (Gargaro et

al., 2010).

This review focuses on how suicide is a growing concern among the autistic population and potential risk factors surrounding ASD, in which healthcare providers should be more aware of. While several meta-analyses have systematically reviewed the literature linking autism and suicide, there is a lack of evidence surrounding potential suicide mitigation methods for individuals with ASD, particularly autistic young adults without major intellectual disabilities. Existing suicide support strategies will be analysed, and ASD-specific suicide prevention mechanisms for this specific demographic will be suggested. Towards the end, the remaining challenges to research will be explained, and future areas of inquiry will be recommended.
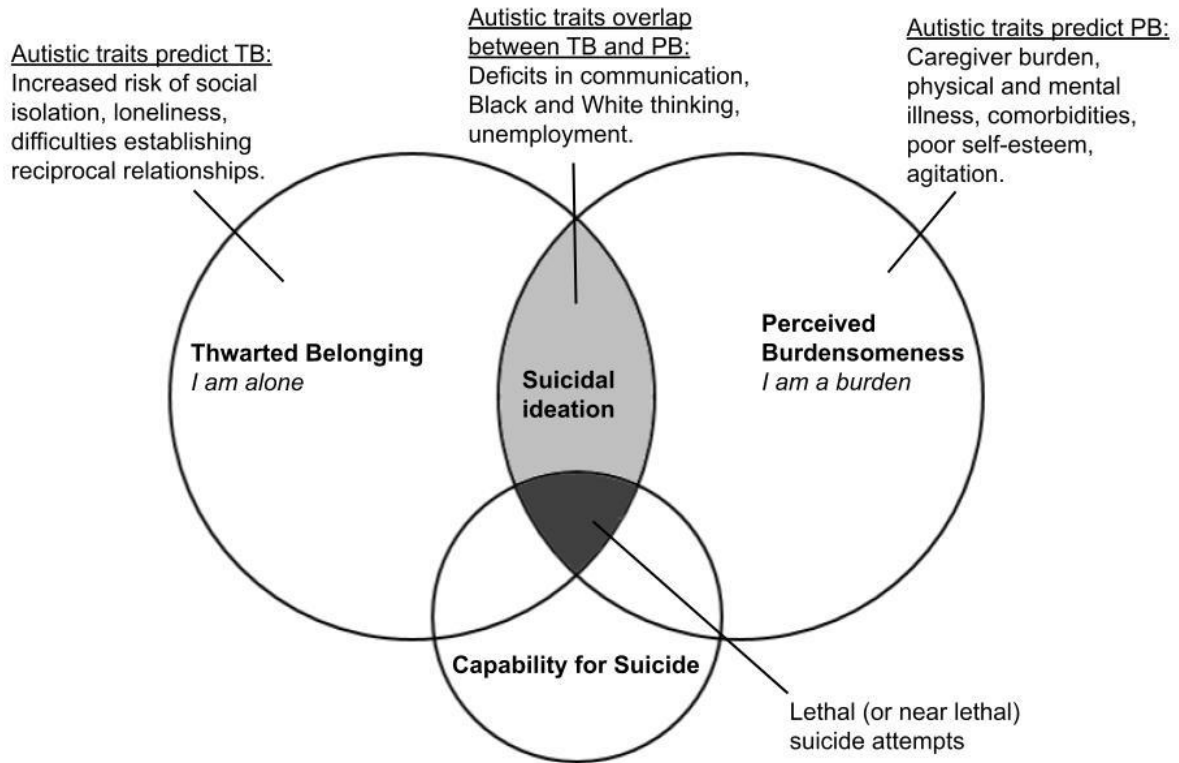
<div align="center">**Risk Factors**</div>

The IPTS Model and Related Factors

Several factors put autistic individuals at risk of suicidality, which can be summed up in the interpersonal theory of suicidality (IPTS), as developed by Van Orden and colleagues (2010), and adapted for autistic traits by Pelton and Cassidy (2017). The IPTS adapted for autism as presented by Pelton and Cassidy (2017) is composed of three main parts: thwarted belonging (TB), perceived burdensomeness (PB), and capability for suicide, with the former two being proximal social risk factors for suicide. For this paper, the model includes an additional section that addresses the overlap between TB and PB (shown in Figure 1).

Figure 1

The IPTS Model Modified for Autistic Traits (adapted from Pelton & Cassidy, 2017; Van Orden et al., 2010)

Autistic traits predict TB:
Increased risk of social
isolation, loneliness,
difficulties establishing
reciprocal relationships.

Autistic traits overlap
between TB and PB:
Deficits in communication,
Black and White thinking,
unemployment.

Autistic traits predict PB:
Caregiver burden,
physical and mental
illness, comorbidities,
poor self-esteem,
agitation.

Thwarted Belonging
I am alone

**Suicidal
ideation**

**Perceived
Burdensomeness**
I am a burden

Capability for Suicide

Lethal (or near lethal)
suicide attempts

Note. This image is a modification from a previous figure published by Pelton and Cassidy (2017).

'Thwarted belonging' is defined by Van Orden and others (2010) as the absence of reciprocal social relationships and 'perceived burdensomeness' as the perception that one has become a burden on loved ones. Pelton and Cassidy (2017) noted that autistic traits such as the risk of social isolation, loneliness, and difficulty establishing relationships contribute to TB. Similarly, autistic traits also predicted PB through caregiver burden, unemployment, physical and mental illnesses, poor self-esteem, and agitation (Pelton & Cassidy, 2017). According to the predictive model for ASD individuals, for a suicide attempt to be made, all three parts of the IPTS must be present - TB, PB, and capability for suicide; two factors constitute active suicidal ideation, and one factor constitutes passive suicidal ideation (Pelton & Cassidy, 2017; Van

Orden et al., 2010). The autism adapted IPTS theory may help explain why suicidality is so common amongst individuals with ASD. Pelton and Cassidy (2017) found both significant indirect effects of autistic traits through thwarted belonging and perceived burdensomeness on suicidality. Since several autistic traits are present and contribute to the social risk factors for suicide, it is not surprising that many individuals with ASD struggle with suicidality.

Perceived Burdensomeness

Perceived burdensomeness, according to the IPTS model, includes comorbidities, physical and mental illnesses, caregiver burden, poor self-esteem, and agitation (Figure 1). This section will focus on two of these aspects: comorbidities and poor self-esteem.

Comorbidity between ASD and other mental disorders, notably depression and anxiety, contributes strongly to suicidality. In a study by Hwang and colleagues (2019), researchers found that comorbid mental health conditions were correlated with the largest risk of death increase among the autistic population. Studies have also shown that high rates of depression put individuals with ASD at a higher risk of suicidality (Cassidy et al., 2014; Takara & Kondo, 2014). Researchers have found that depression and suicide are highly correlated, such that 90% of individuals who died by suicide had depression, an alarming statistic (Barraclough et al., 1975). Lugnegård and colleagues (2011) conducted a study among adults with AS, 70% of the participants had at least one episode of MDD and 50% had recurrent episodes of depression. Cassidy and colleagues (2014) described that among study participants, those with AS and depression were more likely to self-report suicidality, and those with previous suicide attempts or plans had elevated autistic traits.

Poor self-esteem may also result from MDD and contribute to PB. As demonstrated by Orth and others (2009), poor self-esteem is a risk factor for MDD symptoms across all ages. MDD and poor self-esteem are often linked, as fragile self-esteem may exacerbate depressive symptoms (e.g., Kernis et al., 1998). One of the key characteristics of persistent depressive disorder, also known as dysthymic disorder, includes low self-esteem (American Psychiatric Association, 2013). It is not uncommon to find low self-esteem in patients with MDD as well (e.g., Choi et al., 2019). Low self-esteem contributes to perceived burdensomeness since it often encompasses thought patterns that focus on worthlessness or guilt, such as 'I am a burden' and other self-deprecating thoughts (Figure 1). It is also worth mentioning that diagnoses of depression and anxiety may be hindered due to the difficulties in communication and expression of feelings that individuals with ASD often experience (Lainhart & Folstein, 1994). These limitations may also present socialisation and social inclusion problems described in the next section.

Thwarted Belonging

A risk factor for suicidal behaviour among autistic individuals that fits into the TB category is social isolation and lack of supportive social relationships. Mikami and others (2006) performed a case study on a 23-year-old individual with AS and concluded that the individual had poor self-esteem because of previously failed social relationships and social isolation. Engstrom and colleagues (2003) studied a group of individuals with high-functioning autism or AS in Sweden and found that most, if not all, needed a high to moderate level of public and/or private support. This was because many were unemployed, none were married–thus suggesting low social support–though most were living independently. Engström and colleagues (2003) categorised 75% of the sample as fairly adjusted, with 12% well-adjusted and 12% poorly

adjusted. This study highlights the necessity for autistic people to receive public and private support through various means which may be protective against suicidal behaviour and promote social belonging.

Social isolation predicts suicidality even among individuals without ASD (Barraclough et al., 1975). Kato and colleagues (2013) studied ASD amongst individuals presenting to the emergency room and found that individuals with ASD had more adjustment disorders, a higher probability of living alone, and lower chances of utilising psychiatric services. In addition, those with ASD were more likely to present themselves to the emergency room without a substantial trigger event in the past 24 hours, which implies that earlier intervention may be possible for those with ASD who struggle with suicidality (Lai et al., 2013). Being that individuals with ASD often struggle with social isolation–inherently a risk factor for suicide–TB plays a significant role in contributing to suicidality among the ASD population.

As part of the TB sector, those with ASD are also at risk for certain psychosocial life stressors such as trauma, abuse, and childhood bullying (Richa et al., 2014). It is possible that a lack of awareness about social cues among individuals with ASD may put them more at risk for abuse due to deficits in emotional processing and communication (Edelson, 2010). For example, Gillberg (2002) noted an incident where a schoolmate shouted "go kill yourself" to an individual with AS, who took it literally, as this is common among those with AS. Shtayermman (2007) wrote that among the young adults and adolescents diagnosed with AS in the study, the results suggested that these individuals experienced significant amounts of peer victimisation, which is a proximal risk factor for suicidal ideation. Bullying was a common contributing factor to suicide attempts (Shtayermann, 2007). However, it is worth noting that in Shtayermman's study (2007), the sample size was small, and the study participants may have lacked distal risk factors which

would lead to them having higher levels of suicidality than they presented with. In addition to

bullying and peer victimisation, studies have estimated that 18.5% of autistic children in

community settings were physically abused, and 16.6% were sexually abused (Mandell et al.,

2005). Mandell and others (2005) also concluded that both physically and sexually abused

children were at risk for suicide attempts or self-injurious behaviours. Additionally, those with

ASD tend to have magnified responses to what most people would generally consider 'everyday'

events, and they have difficulty adjusting to major life changes due to changes in routine (Richa

et al., 2014). Therefore, such psychosocial life stressors contribute to suicidality by way of TB.

Intersection between TB and PB, and ASD-inherent Traits

The current IPTS model proposed by Pelton and Cassidy (2017) lacks such distinction;

therefore, this section focuses on the intersection between TB and PB (Figure 1). While the

original model contains TB and PB, some autistic traits that put individuals at risk of suicide can

fall into both categories. It is not sufficient to simply have TB and PB, as certain factors can

influence both. For example, many individuals with ASD experience deficits in communication

such as expressing feelings and thoughts. This may result in both TB and PB, as social deficits

can lead to both social isolation (an aspect of TB) and poor self-esteem (an aspect of PB).

Rigidity in thought is another commonality between ASD and non-ASD individuals

contemplating suicide (Storch et al., 2013; Patsiokas et al., 1979; Neuringer, 1974). Rigid

thinking, also known as Black and White thinking, among autistic people has been identified as a

major barrier to effective psychological therapy (Cooper et al., 2018). Black and White thinking

has also been thought to contribute to autistic individuals being entrenched in depressive and

suicidal thought patterns (Storch et al., 2013). Therefore, it is not surprising that many autistic

individuals struggle with escaping the suicidal thought patterns that plague them. Cognitive

rigidity can exacerbate existing thought patterns (e.g., "I am alone" or "I am a burden to others"), which are characteristic of TB and PB, respectively (Cassidy et al., 2020).

Employment, or lack thereof, is another risk factor for suicidality (among both ASD and non-ASD populations) that falls into both TB and PB categories (Cassidy et al., 2014). Studies have shown that employment brings a sense of purpose to an individual, yet only approximately 12% of adults with high-functioning autism were in some form of full-time employment (Hedley et al., 2018; Scott et al., 2018; National Autistic Society, 2001). According to Eaves and Ho (2008), a significant number of individuals with ASD were employed in low-skill or menial jobs where they received the minimum wage. Balfe and Tantam (2010) suggested that trouble finding meaningful employment may negatively affect the mental health of those with AS. Employment provides opportunities to socialise with peers, targeting the TB aspect of the IPTS model, and income potential, focusing on the PB aspect. Evidently, there are some aspects that the current IPTS model lacks, such as the overlap between TB and PB for several autistic traits and risk factors.

Capability for Suicide

Capability for suicide is the remaining aspect of the IPTS model and can be defined as the access to potentially lethal means for committing suicide (Figure 1). Along with PB and TB, capability for suicide contributes to successful or near-successful suicide attempts (Pelton & Cassidy, 2017). Raja and others (2011) studied 26 adult psychiatric patients with some form of ASD and recognised that suicidality was significantly elevated, and notably, two of the 26 participants had committed suicide during the study. While previous suicide attempts should be taken seriously, the lack of previous attempts should not lessen alarm regarding potential future

attempts. In a Finnish study by Isometsä and Lönnqvist (1998), 56% of suicide victims died on their first attempt. However, there is contrasting evidence surrounding whether or not autistic individuals use more lethal means of suicide (Kato et al., 2013; Cassidy et al., 2022). Either way, access to lethal means and a tendency to act upon suicidal thoughts could only exacerbate the potential of suicide among the ASD population, especially given the high comorbidity rates with anxiety and mood disorders as mentioned previously.

Sex and Demographic Differences

Demographic differences impacting suicidal behaviour among both ASD and non-ASD populations are worth considering. There are distinctions in suicidality between the sexes among the general population. In the United States, men are four to six times more likely to die by suicide, making up about 80% of suicides, while women are three to four times more likely to attempt suicide (Callanan and Davis, 2011; Payne et al., 2008). This trend is consistent across ethnic groups. Oquendo and others (2001) analysed five major ethnic groups in the United States and found that among all the ethnicities, males were far more likely to attempt suicide than females. Park (2015) wrote that male suicide rates were consistently higher than female suicide rates in all four countries included in the study, with higher male-to-female ratios possibly due to the availability of firearms in Westernised countries. However, the research on sex differences and suicidality are inconclusive among autistic people. Though Cassidy and colleagues (2014) found no significant differences in suicidality as measured by the Suicide Behaviours Questionnaire-Revised (SBQ-R) among autistic males and autistic females, the researchers did find that autistic females tend to camouflage more often overall. It is possible that autistic women are more likely to hide their suicidality, which may put them at a higher risk of suicide than their non-ASD counterparts (Hirvikoski et al., 2016).

Additionally, women with ASD are less likely to be diagnosed than their male counterparts (largely due to gender bias, leading to false negatives in diagnostic testing), which adds another layer of difficulty in seeking support and treatment (Beck et al., 2020). Beck and others (2020) found that women who camouflage their autistic traits–most of whom did not have a formal diagnosis of ASD–are more likely to report mental health challenges, including suicidality. Camouflaging behaviours can put women with ASD at a stark disadvantage compared to the general population, where it is theorised that women are less likely to die by suicide due to social (in particular, emotional) support mechanisms (Murphy, 1998). Comparably, camouflaging autistic women may lack such support due to thwarted belonging, thus indirectly affecting their suicidal behaviour (Cassidy et al., 2020). In contrast, Mayes and colleagues (2013) identified several risk factors among autistic children that were associated with higher suicidality: being age ten or older, low socioeconomic status, Black or Hispanic, and male. According to Lai and others (2017), the sex differences in ASD and suicide do not converge.

Existing and Potential Suicide Support Mechanisms

Young adults are at an increased risk for suicide, with the second leading cause of death for those aged 15-29 being suicide (World Health Organisation, 2017). While young adults in general and young autistic people are at high risk for suicide, this section focuses on suicide support mechanisms for young adults with ASD without significant intellectual disability, which studies have shown are most at risk for suicidality (Hannon and Taylor, 2013). Existing suicidality support methods will be critiqued, and possible improvements will be suggested.

Solutions for TB

To address the issue of thwarted belonging, according to the IPTS, peer-support and social-skills groups may be effective. Hedley and colleagues (2017) suggested that tangible (material) support, such as having someone take care of them while sick, can protect against suicidality by alleviating depressive symptoms among those with ASD, although they found that appraisal and belonging support were less effective at reducing depressive symptoms for autistic individuals than is the case for neurotypical populations. Other studies have proven that peer support groups, especially those that include other autistic peers, promote 'an ethos of inclusivity,' bolster flexibility, and provide opportunities for those with ASD to share various benefits and challenges they have experienced (Crompton et al., 2022). Peer groups as studied by Crompton and colleagues (2022) target the challenges associated with TB because they promote embracing being autistic, finding like-minded peers, inclusivity and accessibility, and increased understanding and acceptance of being autistic (among other aspects), which address the social isolation components of TB.

Evidence has also shown that social skills groups such as the UCLA PEERS (Program for the Education and Enrichment of Relational Skills) program for young adults can improve social communication, cognition, awareness, and motivation (Laugeson et al., 2012). The PEERS program has been shown to increase friendship skills, which are maintained one to five years after the program (Mandelberg et al., 2013). Another program, the Aspirations Program, aims to improve social and vocational skills for those with ASD (Hillier et al., 2007). It has been shown to increase participants' Empathy Quotients (a self-report measure of empathy), reflecting improvements in empathy with others, ability to see other people's perspectives, and awareness of social situations (Hillier et al., 2007). The results from programs such as PEERS and

Aspirations may reduce suicidality as social barriers are an aspect of TB (Pelton & Cassidy, 2017).

Solutions for PB

Targeting perceived burdensomeness may require a mixture of professional and social support. Professional help, such as cognitive behavioural therapy (CBT), has been shown to reduce primarily anxiety symptoms in those with high-functioning ASD, yet little is known about reducing the severity of autistic traits themselves (Wood et al., 2011). Therefore, we can only presume that CBT may alleviate depressive and suicidality symptoms in adults with ASD, judging from the literature showing that CBT is effective for those with MDD (e.g., Chand et al., 2018). However, it is important to consider that inherent ASD features such as deficits in communication may provide challenges for cognitive behavioural therapists, so it may be better to suggest that therapists gear their treatment towards core ASD symptoms (Sze and Wood, 2008; Cooper et al., 2018). CBT may help individuals with ASD address their comorbid diagnoses, yet the evidence is unclear as to whether CBT will address their suicidality directly. Additionally, medical professionals such as doctors, nurses, and occupational therapists may best address physical ailments that require caregiver support for those with ASD.

Other forms of therapy may also be effective in targeting PB. A study in Japan noted that group therapy effectively improved self-esteem and reduced anxiety and depression symptoms among high-functioning autistic university students (Furihashi, 2017). Another study focused on mindfulness-based therapy (MBT), which reduced rumination and depressive symptoms and increased positive affect among autistic adults (Spek et al., 2013). It is possible that the results

from MBT, decreasing rumination and increasing positive affect, may contribute toward higher

self-esteem and a more positive self-image, thus moderating PB.

Social support is another factor that may mitigate PB. Bjarnason (1994) found that mental

support (i.e., emotional and directive support) from family members reduced depression and

suicidal behaviour and that social support in general had an indirect effect on suicidal behaviour

through reducing depression. Support from families and friends may be effective in reducing PB

as it can help target negative false beliefs; having a supportive family would likely reduce the

perceived burdensomeness afflicting some individuals with depression. Being that PB is only

perceived, various forms of therapy and additional social support may help increase self-esteem,

enhance self-image, and reduce cognitive distortions for autistic individuals.

Solutions for the TB and PB Overlap

Addressing TB and PB overlaps as part of the IPTS may require a multifaceted approach.

Some factors of the overlap between TB and PB are deficits in communication and Black and

White thinking (Figure 1). These can both be addressed using a modified CBT approach, with

adjustments to the therapy method depending on the patient, and certain modifications to the

therapy session itself to facilitate treatment (Lipinski et al., 2019; Attwood, 2004). There is also

evidence suggesting that radically open dialectical behavioural therapy (RO DBT) may be

effective in addressing maladaptive overcontrol (linked to issues such as social isolation), which

is common among those with ASD (Cornwall et al., 2021). RO DBT aims to improve social

connectedness, emotional expression, and flexibility through effective social signaling (Cornwall

et al., 2021).

Another correlation between TB and PB is unemployment. In the UK, it is estimated that individuals with ASD have an employment rate of just 18%, compared to the general population's 70.9% rate (Whitehouse et al., 2009; Office for National Statistics, 2019). Studies have shown that employment gives individuals a sense of purpose and is vital for their well-being, as it promotes independence, self-esteem, and community engagement (Chen et al., 2015). Chiang and colleagues (2013) found that quality of life, cognitive, and mental health outcomes were improved for those who were employed. Furthermore, employment would offer an opportunity to develop social and communication skills for individuals with ASD and bring a sense of belonging to a group–directly addressing TB (Chen et al., 2015). It may also reduce any actual financial burdensomeness of the individual in question on their family members–an aspect of PB. While there are several barriers to employment for individuals with ASD, supported employment, transition services, assistive technology, and multidisciplinary collaboration among employers, service providers, employees, and family members would be helpful (Chen et al., 2015). In addition, vocational education groups such as TEACHH help autistic individuals find and keep jobs by making the most out of individual strengths and interests, identifying suitable employment opportunities, and providing longitudinal care and support (Keel et al., 1997).

Solutions for Capability of Suicide

Capability for suicide is the remaining aspect of the triad of the IPTS. Arguably, this is the area with the most overlap between autistic and non-autistic individuals, where access to means of suicide is a predictor for suicide attempts if the other two factors, TB and PB, are present (Pelton & Cassidy, 2017). This section will cover several suicide prevention mechanisms that have been proven to work for non-autistic individuals and attempt to extrapolate that to autistic individuals.

The primary approach to suicide prevention is safety planning, which is an evidence-based intervention that has been shown to reduce the acute risk of suicide (Stanley & Brown, 2012). The safety plan comprises several parts: restricting access to lethal means, recognising warning signs, utilising internal coping strategies, reaching out to loved ones, and contacting mental health professionals (Stanley & Brown, 2012). Safety planning effectively reduces depression, hopelessness, and hospitalisations, and improves treatment attendance (Ferguson et al., 2021). It has also been shown to reduce suicide attempts and ideation among non-autistic individuals (McCabe et al., 2018).

However, there are little to no studies focusing on whether safety planning is as effective for autistic individuals. Jager-Hyman and others (2020) demonstrated that among the 121 clinicians surveyed, less than half (39%) had heard of safety planning interventions and even fewer used them. Only 21% had used it with autistic clients (Jager-Hyman et al., 2020). Additionally, less than 60% of the participating clinicians had used standardised screening measures for non-autistic and autistic clients, which is concerning, as there are several opportunities for intervention and prevention of suicide available to healthcare providers (Jager-Hyman et al., 2020). More standardised training is necessary to educate healthcare providers and clinicians about the suicide risk for autistic individuals. It is important to ensure that clinicians are aware of risk factors that many autistic adults possess, and that precautionary measures be taken to screen for suicidality symptoms. Specifically, these measures should include safety planning interventions.

Other Interventions

One aspect not found in the IPTS model is autistic individuals' sensory issues. Individuals with ASD often struggle with sensory-perceptual processing difficulties (American Psychiatric Association, 2013). While there is no definitive answer as to what may help remediate sensory difficulties, there is some evidence showing that pet therapy has helped children with ASD who struggle with communication, sensory responses, and concentration (Ward et al., 2013). Ward and others (2013) concluded that therapeutic horseback riding helped children and adolescents develop social responses and appropriately manage sensory input and responses.

While there have been several studies focusing on animal-assisted therapy (AAT) among children with ASD, little has been done surrounding adults with ASD and the effects of AAT on suicidality. However, one study by Barcelos and others (2021) found that dog ownership among high-functioning autistic adults was associated with wellbeing. Specifically, close dog-owner interactions most frequently improved emotions and moods, while routine activities improved life functioning (Barcelos et al., 2021). On the other hand, there were some negatives associated with dog ownership such as behavioural problems, health concerns, death of the dog, and obligations (Barcelos et al., 2021). The researchers concluded that the net effect of dog ownership was positive and that owning a dog may have prevented suicide in many cases due to the maintenance of a structured routine, expressions of affection, and conversation facilitation for the autistic owner of the dog (Barcelos et al., 2021). Although the current evidence is not definitive, more research needs to be conducted regarding suicide prevention via AAT.

Discussion

In summary, numerous risk factors contribute to suicidal behaviour among autistic people. While there are some existing suicide prevention interventions, few specialise in individuals with ASD who struggle with suicidality. This field is only in its infancy, but it is important to provide a foundation for future research. The main challenges that remain are addressing why individuals with ASD are more prone to suicide, establishing ASD-specific suicide prevention mechanisms, increasing awareness about ASD and suicide, and using appropriate risk assessment tools to evaluate suicide risk for autistic individuals.

Limitations

More research needs to be conducted regarding autism and suicidality. The existing literature on the subject of suicide among individuals with ASD lacks comprehensive exploration, particularly regarding the underlying reasons for increased susceptibility to suicide and potential interventions to address this issue. There needs to be more focused research, including thorough surveys, discussions, and focus groups (e.g., Cassidy et al., 2021), on all aspects of ASD—as experienced and defined by autistic individuals. Research about ASD, including its nexus with suicidality, cannot be conducted without the active participation of those with ASD to obtain a better understanding.

Further research is warranted regarding suicidality among high-functioning autistic women, as this group has often been overlooked but may be at high risk due to camouflaging, as described in the risk factors section. Currently, the research is mostly focused on autistic men, with a great majority of participants being male. Moreover, it cannot be assumed that the scientific evidence that is gathered on autistic men is equally applicable to autistic women due to several biological differences (e.g., Werling & Geschwind, 2013). Additionally, there is a

potential bias towards males in autism research due to the diagnostic criteria emphasising the

male autism phenotype; a broader phenotype needs to be included in future ASD studies to

include those who do not fit into the stereotypical male phenotype (Werling & Geschwind,

2013). Thus, there is a need for research on gender and sex differences in suicidality among ASD

populations, including those who remain undiagnosed. Additionally, more longitudinal studies

need to be conducted to study the long-term outcomes of suicide interventions for autistic

people. So far, there is not any long-term (> 5 years) data on how existing suicide interventions

impact suicidality and mental well-being for those with ASD.

Future Directions

The IPTS model may also be solidified and improved upon (Figure 1). This model is

relatively new, like much of the research in this field, therefore future studies can add new

domains to or modify the model. The various aspects of the model could be adapted for various

demographic and diagnostic/clinical subgroups, particularly young autistic adults without major

intellectual disability. Also, it would be beneficial to receive input from individuals with ASD

regarding the IPTS model's applicability and practical use. Additionally, the model may be

useful outside the academic literature and be implemented by clinicians to treat suicidality

among autistic clients, much like the widely used biopsychosocial model for depression.

Despite all the suicide prevention services that exist for neurotypical people, there are

few, if any, that are catered specifically for individuals with ASD. It is also mportant to have

autism-specific suicide prevention services, as those with ASD often have specific needs (e.g.,

sensory, communication) that cannot be met by standard services. Although there are many

general ASD support groups, there are no groups that specifically address suicidality for

neurodiverse individuals. Suggestions for future areas of study may include collaborations

between researchers and autism support groups to address the issue of suicidality and ASD.

Moreso, active involvement of individuals with ASD is essential for this research domain. For

instance, conducting focus groups and panels specifically tailored to different subgroups of the

ASD population is crucial due to the sensitive nature of suicidality and its impact on the lived

experiences of autistic individuals. It is important to not only to conduct qualitative research and

gather quantitative data, but to apply such research findings in a practical way to improve autistic

individuals' lives.

There needs to be increased awareness about both suicidality and autism among the

general population and clinicians. This could potentially be that findings are still new; however,

it is important to educate friends, family members, and loved ones of autistic individuals about

the warning signs of suicidal ideation and suicidal behaviours–which may be different for

autistic versus non-autistic people–to prevent future suicides. Education can be done by public

health awareness campaigns, talks, open-forum-style events, or conferences that are specific to

the issue of ASD and suicidality. Training for healthcare professionals, especially those that may

encounter individuals with ASD, should be mandatory to look for warning signs or triggers that

may precede or indicate suicidality. Additionally, standardised risk assessment tools and

alternative assessment methods designed specifically for individuals with ASD may also be

helpful. Current risk assessment tools are costly and labour-intensive and often involve

questionnaires and interviews that are ill-suited to the needs of autistic people.

With the rise in artificial intelligence (AI), forms of AI, specifically natural language

processing (NLP) which uses speech and language patterns rather than self-report assessments,

may be useful for individuals with ASD who have difficulty communicating their feelings

directly. Alexithymia (i.e., difficulty recognising, describing, and identifying emotions) is often an issue for autistic people; AI can be especially helpful in assessing suicide risk for those who experience emotion blunting, as it is less apt to be keyed to affective content than human care providers. NLP can inform clinicians monitoring suicide risk by analysing the different forms of digital communication (e.g., text messages, emails, etc.) that are popular among young adults. NLP may determine levels of PB and TB experienced by individuals with ASD through the frequency of word usage, for example, or the tone of communications to friends and family members. Clinicians and healthcare professionals may be able to stay updated on patients' suicidality without having to meet regularly and speak to them directly, thus saving time and labour. Clinicians can then use data analysis algorithms to automatically determine who is at risk for suicide. In addition to suicide risk assessment, another application for NLP and AI may be for ASD diagnosis, especially for individuals with communication challenges, supplementing or even replacing clinical interviews. There is much potential for technology like AI and data analysis to prevent suicides among autistic people.

There is still much more to discover about the interaction between ASD and suicide, and it is vital that future research is conducted in a timely manner to prevent future deaths. It is a high priority for those in the autism community that research focuses on suicide prevention through intervention, elimination of barriers to treatment, increased understanding of risk and protective factors, and proper risk assessment in collaboration with autistic people (Cassidy et al., 2021). Suicide prevention among the ASD population should be an equally important priority for future researchers.

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