


## Brief Report: Social Support, Depression and Suicidal Ideation in Adults with Autism Spectrum Disorder

Darren Hedley<sup>1</sup>  · Mirko Uljarević<sup>1</sup> · Mathilda Wilmot<sup>1</sup> · Amanda Richdale<sup>1,2</sup> · Cheryl Dissanayake<sup>1</sup>

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**Abstract** Adults with autism spectrum disorder (ASD) are at increased risk of suicide compared to the general population. Research has yet to identify the mechanisms underlying this increased risk. This study examined perceived social support as a potential protective factor for depressive symptoms and suicidal ideation in 76 adults with ASD. Twenty-five percent of participants were in the clinical range for depression, and 20% reported recent suicidal ideation. Social support in the form of appraisal and belonging was not associated with depression or ideation; however the perceived availability of tangible (material) support indirectly acted on ideation through depression. The findings suggest that tangible support, but not appraisal or belonging, may act as an indirect protective factor against suicidality in ASD.

**Keywords** Autism spectrum disorder · Depression · Mechanisms · Social support · Suicide · Suicidal ideation

### Introduction

Recent research has identified suicidal ideation and behavior as a pressing concern in individuals with Autism Spectrum Disorder (ASD) (Balfe and Tantam 2010; Cassidy et al. 2014; Hirvikoski et al. 2016; Raja 2014; Segers and Rawana 2014), and Horowitz et al. (2017) identified a lack of data

estimating the prevalence of suicidal ideation and behavior in this population. Suicidality is strongly associated with depression in both general (Barraclough et al. 1974; Pagliaro 1996; Roberts et al. 1998) and ASD (Cassidy et al. 2014; Mayes et al. 2013; Segers and Rawana 2014) populations. Moreover, depression is one of the most prevalent co-morbid mental health conditions in people with ASD affecting up to 50% of individuals during their lifetime (Hofvander et al. 2009). Consistent with the high prevalence of depression in people with ASD, Cassidy et al. (2014) found that the rate of lifetime suicidal ideation (66%) in adults with recent diagnoses of Asperger's syndrome in the United Kingdom was 9.6 times higher than the general population. Additionally, 35% of this sample had planned or attempted suicide. Hirvikoski et al. (2016), using population-based Swedish mortality data, reported that suicide was the leading cause of premature death in people with ASD without a co-occurring intellectual disability and, furthermore, this group were 9.4 times at risk of suicide compared to the general population. Finally, in a recent multisite study, talk of death or suicide (via parent report) was reported to be common in 22% of youth with ASD assessed during an inpatient psychiatric admission (Horowitz et al. 2017). These studies highlight the relationship between suicidal ideation and behavior and, moreover, emphasize the urgent need for studying the mechanisms underlying suicidality in this population.

Despite growing evidence suggesting there is an increased risk of suicide in people with ASD, a comprehensive understanding of the mechanisms underlying this risk, and whether mechanisms are similar to, or differ from, those in the general population, is currently lacking. Indeed, in a recent systematic review of studies investigating suicidality in ASD, Segers and Rawana (2014) reported that “protective factors were nearly completely overlooked” (p. 517). This comes as a surprise as bolstering protective factors has

✉ Darren Hedley  
D.Hedley@latrobe.edu.au

<sup>1</sup> Olga Tennison Autism Research Centre, School of Psychology and Public Health, La Trobe University, Melbourne, VIC 3086, Australia

<sup>2</sup> Cooperative Research Centre for Living with Autism (Autism CRC), Long Pocket, Brisbane, QLD, Australia

received considerable attention in the non-ASD literature concerning depression and suicide risk (Bjarnason 1994; Chioqueta and Stiles 2007; Hefner and Eisenberg 2009; Kleiman and Liu 2013; Meadows et al. 2005). Segers and Rawana (2014) provide a comprehensive overview of protective factors that may be important for people with ASD. These include presence of social support systems, cognitive skills related to coping and problem-solving, religious commitment, fear of suicide or death, and being a caregiver of young children. Of these, social support may be particularly salient as many people with ASD experience difficulties establishing and maintaining friendships (Buitelaar et al. 1991; Mazurek 2014; Seltzer et al. 2004). For this reason, the present study examined social support as a potential protective factor for depression and suicidal ideation in adults with ASD.

### Social Support as a Protective Factor Against Suicide Risk

Social support is multidimensional and can include the availability of interpersonal resources, the degree to which the individual is integrated into society, and the availability of material support (Bjarnason 1994; Cohen and Wills 1985). In the general population, social support has been linked to positive mental health outcomes. For example, Kleiman and Liu (2013) found that the ability to confide in a friend about worries was associated with a significantly decreased likelihood of lifetime suicide attempt, controlling for psychopathological and demographic variables. In other studies, social support predicted low levels of suicidal ideation in university students (Chioqueta and Stiles 2007), and emerged as a protective factor in at risk African American women exposed to domestic violence (Meadows et al. 2005). Social support was also found to decrease the risk of suicidal death in Japanese men and women (Poudel-Tandukar et al. 2011).

### Social Support and the Stress Buffering Model

Cohen and Wills (1985) outline a stress-buffering mechanism whereby the perception that others will provide resources to offset potential harm or bolster one's ability to cope, may reduce the likelihood of an adverse reaction to a stressful event. The availability of support may also lead to reappraisal of a stressful event and inhibit a maladaptive response. Cohen and Wills (1985) go on to identify social resources that may operate as stress buffers including esteem support (information that leads a person to feel esteemed and accepted), appraisal support (help to cope with stressful events), companionship or belongingness, and instrumental support (financial aid, material resources, services).

In an attempt to unify differing theories of suicidal behavior into a single framework, Bjarnason (1994) posited a theoretical model whereby depression influences suicidal behavior directly, and aspects of social support, such as perceived quality of social support, is related to suicide risk both directly and indirectly, as insufficient social support will also cause psychological distress, including depression, thereby indirectly influencing suicidal behavior. Support for this theory comes from several lines of evidence. First, studies indicate that low level of perceived social support is associated with a higher level of depression (Hefner and Eisenberg 2009; Kendler et al. 2005; Vilhjalmsson 1993). Second, using split-half random sample modelling in a population-based study of 7018 Icelandic youth to test the model, Bjarnason (1994) found that mental support by family (e.g., warmth and caring, advice) directly predicted lower depression and fewer suicidal behaviors, whereas the availability of material support by family (e.g., borrowing items, money) indirectly predicted fewer suicidal behaviors through depression. The study also found that although mental support provided by others (i.e., not family) had a very weak (effect size = 0.05) but positive effect on suicidal behavior, this effect (at least in females) was negated by a weak negative effect (effect size = -0.06) on depression. Thus, in addition to a direct effect on suicidal behavior, social support may reduce depression, thereby also indirectly affecting suicidal behavior. Importantly, Bjarnason's (1994) results suggest that different social support *constructs* may act on suicidal risk differently.

### Social Support in Autism Spectrum Disorder

Atypical or poor social functioning is a core ASD trait (American Psychiatric Association 2013) that is likely to negatively impact the ability to form a supportive social network, however, there have been limited studies that have investigated the role of social support on well-being in this population. Bauminger and Kasari (2000) found that children with ASD were lonelier and had poorer quality friendships in terms of companionship, security, and help than typically developing peers. Laskaard, Nielsen, Eriksen, and Goossens (2010) reported a high rate of perceived loneliness in adolescent boys with ASD relative to peers, and perceived social support was negatively associated with loneliness. Finally, Humphrey and Symes (2010) found that students with ASD might turn to a friend for help if they were experiencing bullying, and that a portion of students reported anxiety if their friends were not at school. Importantly, in individuals with ASD, isolation and loneliness have been found to be associated with increased rates of depression and decreased life satisfaction (Mazurek 2014; Whitehouse

et al. 2009), suggesting the importance of social relationships as potential protective factors against poor mental health outcomes in this population.

The studies reviewed above have exclusively focused on children or adolescents and currently there is no evidence on the importance of social supports in adults with ASD. This is a limitation as developmental needs may intersect with the need for social support. Furthermore, the role of social support in the expression of depressive symptoms and suicidality in ASD has implications for clinical practice. For example, identifying the role of social support as a potential protective factor for depression and suicide risk in ASD can inform the development of interventions that target social support networks (Segers and Rawana 2014). Therefore, the aim in the present study was to characterize the nature of the inter-relationships between perceived social support, depression, and suicidal ideation in adults with ASD. Specifically, we were interested in *if* and *how* social support might function to lower suicidal risk. Based on the literature in non-ASD populations (Bjarnason 1994; Cohen and Wills 1985), we predicted that social support would be related to suicidal ideation both directly and indirectly. More specifically, higher levels of perceived interpersonal support, including the availability of someone to discuss personal issues and to interact with socially, would be related to lower levels of depressive symptoms and suicidal ideation (direct model). We also expected that perceived availability of material support from others would act on ideation indirectly, through depression (indirect model).

## Methods

### Participants

Seventy-six adults (69 male) with ASD aged 17–56 years ( $M_{\text{age}} = 25.15$ ,  $SD = 7.74$  years) completed online questionnaires as a part of a longitudinal study on health and well-being after applying for a supported employment program in the information technology sector in Australia. Participant characteristics are provided in Table 1. A letter from a general practitioner confirming diagnosis was provided by each participant in order to establish eligibility for the employment program, and participants confirmed that they had been diagnosed with ASD as part of the study. The most commonly self-reported lifetime diagnosis of co-morbid conditions were anxiety and depression, followed by Attention Deficit Hyperactivity Disorder (ADHD). Approximately 10% of participants also reported having been diagnosed at some time with intellectual disability.

**Table 1** Participant characteristics ( $N = 76$ )

Variable	<i>n</i> (%)
Self-reported ASD diagnosis	
Autism spectrum disorder	13 (17.1%)
Asperger's syndrome	55 (72.4%)
High functioning autism	7 (9.2%)
Not specified	1 (1.3%)
Self-reported co-morbid diagnoses	
Anxiety	30 (39.5%)
Depressive disorder	28 (36.8%)
ADHD	14 (18.4%)
Speech or language impairment	9 (11.8%)
Intellectual disability	8 (10.5%)
Global developmental delay	5 (6.6%)
Seizure disorder	3 (3.9%)
Cultural background	
Australian	66 (86.8%)
Other <sup>a</sup>	8 (10.5%)
Prefer not to answer	2 (2.6%)
Highest education	
Completed primary school	1 (1.3%)
Some secondary	3 (3.9%)
Completed secondary	27 (35.5%)
Certificate	18 (23.7%)
Diploma	5 (6.6%)
Bachelor's degree	17 (22.4%)
Other	5 (6.6%)
Living	
Alone or share house	13 (17%)
Spouse or partner	6 (8%)
Family member or carer	57 (75%)
Employed (part- or full-time)	42 (55.3%)
Mean ( <i>SD</i> ; range) hours worked per week	
Unsupported employment <sup>b</sup>	17 (10.85; 4–36)
Supported employment <sup>b</sup>	22.43 (11.21; 2–37)

<sup>a</sup>Participants in this category identified as British, Chinese, Greek, Irish, Salvadorian, Spanish (all  $n = 1$ ) and North American ( $n = 2$ )

<sup>b</sup>Not all participants provided hours worked:  $n = 11$  and 14 for unsupported and supported employment, respectively

### Procedures

The research was approved by the relevant human ethics committees. Informed consent was obtained from all individual participants included in the study. Participants provided demographic information and completed study questionnaires online via the Qualtrics survey platform (Qualtrics 2017). Data presented here represents the first data point from the longitudinal study.

**Table 2** Study variables (internal reliability, *M*, *SD*, range) and correlations (*n* = 76)

Variable	$\alpha$	<i>M</i>	<i>SD</i>	Range	Shapiro Wilk	1	2	3	4	5	6
1. AQ-Short <sup>a</sup>	0.810	76.15	9.88	54–97	0.98	–					
2. W-ADL <sup>a</sup>	0.769	30.45	3.62	20–34	0.86**	–0.019					
3. ISEL-12 appraisal	0.755	6.79	2.91	0–12	0.97*	–0.168	–0.034				
4. ISEL-12 belonging	0.801	5.41	3.11	0–11	0.95**	<b>–0.294*</b>	–0.041	<b>0.518**</b>			
5. ISEL-12 tangible	0.775	8.03	3.08	0–12	0.91**	–0.086	0.018	<b>0.532**</b>	<b>0.456**</b>		
6. Depression (PHQ-8)	0.836	6.16	4.98	0–19	0.93**	0.045	–0.015	–0.214	–0.144	<b>–0.294*</b>	
7. Suicidal ideation (PHQ item 9)	–	0.263	0.619	0–3	0.48**	–0.061	–0.066	–0.065	–0.209	–0.158	<b>0.558**</b>

Significant correlations are in bold

AQ-Short autism spectrum quotient-short, W-ADL Waisman activities of daily living, ISEL-12 interpersonal support evaluation list-12, PHQ patient health questionnaire

\**p* < .05, \*\**p* < .001

<sup>a</sup>*n* = 75.  $\alpha$  = Cronbach's alpha

## Measures

The *Abridged Version of the Autism Spectrum Quotient* (AQ-Short) (Hoekstra et al. 2011) is a 28-item, self-report measure of ASD traits based on the original 50-item version (Baron-Cohen et al. 2001). Respondents answer statements (e.g., “I enjoy meeting new people”) on a 4-point Likert-type scale ranging from 1 (“definitely agree”) to 4 (“definitely disagree”) (range 28–112). Using a cut-off  $\geq 65$ , sensitivity and specificity to ASD is reported as 0.97 and 0.82, respectively, and Cronbach's alpha is 0.77–0.86 (Hoekstra et al. 2011).

The *Waisman Activities of Daily Living scale* (W-ADL) (Maenner et al. 2013) is a 17-item self- or parent-completed scale designed to assess daily living skills in individuals with developmental disability, including ASD, which is strongly associated with IQ. In the present study the scale was completed by the participant. Items are rated as 0 (“do not do at all”), 1 (“do with help”) or 2 (“independent or do on own”) and are summed to provide a total score (range 0–34), with higher scores indicative of greater independence. Cronbach's alpha for people with ASD is 0.90 (Maenner et al. 2013).

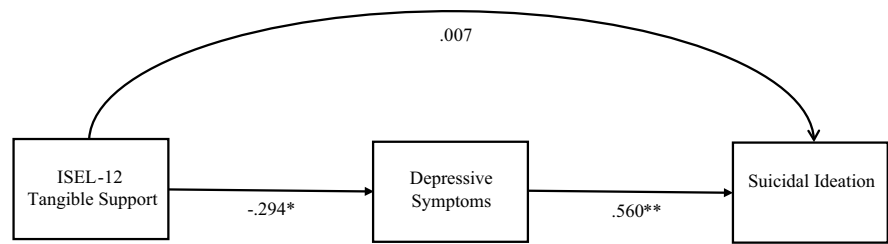
The *Interpersonal Support Evaluation List-12 Item Version* (ISEL-12) (Cohen and Hoberman 1983; Cohen et al. 1985) is a brief measure of three types of perceived social support including: Appraisal Support (“I feel that there is no one I can share my most private worries and fears with”); Belonging Support (“I don't often get invited to do things with others”); and Tangible Support (“If I were sick, I could easily find someone to help me with my daily chores”). Items are rated on a 4-point Likert-type scale ranging from 0 (“definitely false”) to 3 (“definitely true”), with four items comprising each subscale (subscale range 0–12). Cronbach's alphas for the subscales range from 0.66 to 0.76 (Merz et al. 2014).

The *Patient Health Questionnaire-9* (PHQ-9) (Kroenke et al. 2001, 2009) is a self-report questionnaire aimed at detecting major and subthreshold depressive disorder and suicidal ideation (Cameron et al. 2008; Kroenke and Spitzer 2002; Kroenke et al. 2001; Martin et al. 2006). Respondents indicate how often they have been affected by problems over the previous two weeks using a 4-point Likert-type scale ranging from “not at all” to “nearly every day”. Items 1–8 (range 0–24) provide a reliable measure of depression while item 9 (“Thoughts that you would be better off dead, or of hurting yourself”) can be used as an independent measure of suicidal ideation (Corson et al. 2004; Simon et al. 2013; Uebelacker et al. 2011). Using a cut-off  $\geq 10$  based on items 1–8 only, the PHQ returned sensitivity and specificity for major depressive disorder of 1.00 and 0.95, respectively, and 0.70 and 0.98, respectively, for any depressive disorder (Kroenke et al. 2009).

## Results

Data were analyzed using SPSS (Version 24; IBM Corp. 2016) and AMOS (Version 24; Arbuckle 2016). Descriptive statistics and correlations, Cronbach's alpha, and normality tests for the study variables are provided in Table 2. Internal reliability was within the acceptable to good range for all scales and no extreme outliers were identified. Tangible support ( $z_{\text{skewness}} = -3.31$ ) and the W-ADL ( $z_{\text{skewness}} = -4.25$ ) were significantly negatively skewed and PHQ depression ( $z_{\text{skewness}} = 2.44$ ) and ideation ( $z_{\text{skewness}} = 10.45$ ) were positively skewed. Data transformation failed to improve skewness and subsequent analyses were performed with 5000 resamples bootstrapping to provide more robust statistics (Efron and Tibshirani 1993; Tabachnick and Fidell 2007). Correlations and the full Structural Equation Modeling

**Fig. 1** Structural equation modelling analysis of the indirect effect of tangible support on suicidal ideation through depressive symptoms. Values provided are standardized beta coefficients. \* $p < .01$ , \*\* $p < .001$



(SEM) analyses were used to characterize the nature of the inter-relationship between the variables of interest.

### Descriptive and Correlation Results

Twelve participants (16%) had AQ-Short scores  $< 65$  (range 54–64). Scores on the W-ADL ranged from 20 to 34 suggesting the sample was characterized by a relatively high level of independence and adaptive functioning (Maenner et al. 2013). Nineteen participants (25%) scored within the range of clinical depression ( $\geq 10$ ) based on PHQ items 1–8, and 15 (19.7%) reported recent suicidal ideation. PHQ depression scores were higher for participants self-reporting a diagnosis of anxiety or depression ( $M = 8.54$ ,  $SD = 4.65$ ) than those who did not ( $M = 3.90$ ,  $SD = 4.20$ ),  $t(74) = 4.57$ ,  $p < .001$ , BCa 95% CI (2.67, 6.59). Similarly, there was a significant relationship between self-reported anxiety or depression and reporting of any (versus no) suicidal ideation,  $\chi^2(1, N = 76) = 4.55$ ,  $p = .033$ , with those reporting a co-morbid diagnosis more likely to report suicidal ideation. In terms of ASD traits and level of functioning, the AQ-Short was only significantly associated with ISEL-12 Belonging, and the W-ADL was not significantly correlated with any of the study variables.

### Model Results

Given the lack of significant correlations between the ISEL-12 Appraisal and Belonging subscales and either depression or suicidal ideation, there was no support for the direct model. A significant negative correlation of moderate effect size was identified between Tangible Support and PHQ depressive symptoms; however, Tangible Support was not significantly associated with suicidal ideation. A full SEM analysis was then conducted in order to further characterize the inter-relationship between suicidal ideation, ISEL-12 Tangible Support, and depression. Full SEM, compared to other analytical strategies, accounts for measurement error. The analysis showed that depression had a direct effect on suicidal ideation ( $\beta = 0.56$ ,  $p < .001$ ), ISEL-12 Tangible Support had no direct effect on suicidal ideation ( $\beta = 0.007$ ,  $p = .947$ ), but showed an indirect effect through depression ( $\beta = -0.294$ ,  $p = .008$ ), with depression and ISEL-12 Tangible Support accounting

for 31.1% of variance.<sup>1</sup> The overall fit of the model was good,  $\chi^2 = 0.004$ ,  $p = .947$ ; RMSEA = 0.04; CFI = 0.99, TLI = 0.99, no suppression effect was noted. Therefore, the indirect model was supported. The full model is shown in Fig. 1.

### Discussion

In this study we examined the inter-relationships between social support, depressive symptoms, and suicidal ideation in adults with ASD. Despite the high prevalence of symptoms of depression and suicidal ideation in this population (Cassidy et al. 2014; Hirvikoski et al. 2016; Hofvander et al. 2009), the mechanisms or processes underlying the relationships between risk and protective factors in the development of suicidality are not well understood. It thus remains unclear whether processes that have been identified in the general population are similarly applicable to people with ASD.

### Rates of Depression and Suicidal Ideation

Twenty-five percent of individuals in the present study returned scores in the clinical range for depression and 20% reported recent suicidal ideation. Furthermore, 36.8% of participants self-reported being diagnosed with depressive disorder at some stage in their life (almost 40% also self-reported having been diagnosed with an anxiety disorder). The rate for depression was similar to that reported elsewhere for adults with ASD, although the rate of suicidal ideation was lower; for example, Cassidy et al. (2014) reported depression in 35% of respondents and lifetime suicidal ideation in 66%. Nonetheless, reported suicidal ideation in the present study was double that reported in a European multisite general population study using a similar single item assessment of

<sup>1</sup> The full SEM was run excluding participants ( $n = 12$ ) who did not meet the recommended cut-off for ASD ( $\geq 65$ ) on the AQ-Short (refer to “Appendix” for the figure). The exclusion of participants who did not meet the recommended cut-off did not affect the model. Result showed that depression had a direct effect on suicidal ideation ( $\beta = 0.61$ ,  $p < .001$ ). ISEL-12 Tangible Support had no direct effect on suicidal ideation ( $\beta = 0.046$ ,  $p = .664$ ), but showed an indirect effect through depression ( $\beta = -0.261$ ,  $p = .037$ ). Therefore, the indirect model was supported.



ideation (9.5%), and depression was also higher in the present study compared to the general population (7.6%) (Casey et al. 2008). In Australia, using the World Health Organization's (WHO) Composite International Diagnostic Interview (CIDI), 12-month population prevalence of affective disorders (including depression) in people aged 16–85 years was estimated to be 6.2%, and suicidal ideation was 2.3% (Australian Bureau of Statistics 2007). Our results are therefore consistent with the literature concerning rates of depressive symptoms, and the increased risk of suicidality, in the ASD population.

### Social Support as a Protective Factor Against Depression and Suicidal Ideation

We hypothesized that social support would have both direct and indirect effects on mental health outcomes (Cohen and Wills 1985). Neither Appraisal nor Belonging support were significantly associated with either depressive symptoms or suicidal ideation. These results failed to support the hypothesis that social support, in terms of appraisal or belonging, would be a protective factor for suicidality in people with ASD, as has been suggested for the broader population (Bjarnason 1994; Cohen and Wills 1985). The finding that appraisal and belonging support may be less beneficial in terms of improving mental health outcomes in this population when compared to typical or other groups has practical implications for social support programs. These results suggest that it is vital to consider the needs of individuals with ASD, and what he or she perceives to be important, when developing or recommending particular support programs. What may seem a useful target from the perspective of someone without ASD may not necessarily be in the best interests of the person with ASD. However, social support may nonetheless be a viable target for the development of support programs that provide or facilitate provision of tangible support as our findings suggest that perceived availability of material support by others had an indirect effect on suicidal ideation through depression. This finding was consistent with Bjarnason's (1994) finding for the effect of material support by family on depression and suicidal behavior. Therefore, although increasing tangible support might not directly reduce risk for suicidality, it can have a positive effect on depression, and through this mechanism, act as a buffer to reduce risk indirectly. Indeed, Santomauro, Sheffield, and Sofronoff (2016) identified a trending treatment effect on the Depression Subscale of the Depression Anxiety Stress Scale (but not the Beck Depression Inventory) of a cognitive behavioral intervention in 20 adolescents with ASD, with participants noting that the group setting was most helpful and helped to combat loneliness.

### Limitations

Several limitations should be considered when interpreting the findings reported here. First, there was a potential

sample bias as participants in this study were applying for employment training and therefore were most likely to be unemployed. However, the sample may still be reasonably representative of the broader ASD population which is characterized by high levels of unemployment (Shattuck et al. 2012). Labor force participation rate of 55.3% is similar, if not slightly higher, to that reported by the Australian Government for adults with ASD (42%) (Australian Bureau of Statistics 2014). In addition, the fact that participants were seeking a job could have led to them underreporting suicidal ideation or depressive symptoms, but as noted, the rate of depressive symptoms was similar to that reported elsewhere for adults with ASD (Cassidy et al. 2014). Given the difficulty often encountered in recruiting adults with ASD for research, and also difficulty in obtaining a truly representative sample, we suggest the opportunity to collect and report these data represents a reasonable trade-off. Nonetheless, our results need to be replicated in a larger representative sample. Second, we were unable to independently confirm diagnosis of ASD and, apart from the AQ-Short, we did not have a measure of ASD symptom severity. Thus, we were unable to determine whether ASD severity might have impacted mental health outcomes and, furthermore, it is not possible to determine whether any participants might have been misdiagnosed. It is important to acknowledge that 12 individuals scored below the cut-off on the AQ-Short, which is also limited as it is not a diagnostic instrument (Hoekstra et al. 2011). However, it is possible that reduced insight into their condition may lead to some individuals with ASD returning lower scores on the AQ. Third, our assessment of suicidal ideation was based on a single questionnaire item rather than on a comprehensive clinical interview, although single item assessments have been reported elsewhere (Casey et al. 2008; Corson et al. 2004; Horowitz et al. 2017; Simon et al. 2013; Uebelacker et al. 2011). Reduced insight or self-awareness, or other cognitive differences present in individuals with ASD, might potentially limit the validity of a single rating scale in this population. Although beyond the scope of the present study, recommendations for future studies include the use of targeted instruments for the assessment of suicidal thoughts and behaviors, assessment of other risk and protective factors, as well as administration of a clinical risk assessment (for potential methodology and instruments, please refer to Bryan and Rudd 2006; Gutierrez 2006; Segers and Rawana 2014). Fourth, due to the cross-sectional design of this study, directionality of relationships is difficult to establish. Fifth, our measures have not been validated for use in people with ASD, however it should be noted that this reflects a general lack of validated instruments for use in this population (Wigham et al. 2017). Furthermore, caution may be required when interpreting self-report measures completed by individuals with ASD (Mazefsky et al. 2011), who may exhibit difficulties identifying and describing their emotions (Hill

et al. 2004). These issues highlight the critical need for developing valid and reliable screening instruments to identify risk of suicidality in ASD, and in determining who the best reporter (e.g., self, parent) might be (Horowitz et al. 2017). Finally, we have only focused on social support as a protective factor against depression and suicidal ideation. In light of the present findings it would be beneficial to examine the interrelationships between type of social support and other socially oriented protective factors identified in the literature, for example the number and quality of supporting relationships available to the person, being a caregiver, or fear of social disapproval, along with interpersonal risk factors including loneliness, social isolation or peer victimization (Bryan and Rudd 2006; Segers and Rawana 2014) on suicidality and other mental health outcomes of people with ASD. Moreover, future research should assess a broader range of both protective and risk factors to understand how ASD traits, specific risk factors, and comorbid mental health issues interact and contribute to the expression of suicidality in individuals with ASD (Segers and Rawana 2014).

Of relevance to the present study is how people with ASD perceive and value social support, and how this may differ from people without an ASD. As discussed above, the finding that neither Appraisal nor Belonging support were significantly associated with depression or suicidal ideation differs from findings in the general population. Interestingly, we also found that Belonging, which asks whether the respondent would be likely to find someone to participate in activities together, was negatively associated with the AQ-Short. This suggests that participants reporting higher ASD traits reported being less likely to report having someone available to join them in social activities. Nonetheless, these variables were not significantly associated with depression or suicidal ideation, potentially suggestive of a lesser role for social support in the mental health of individuals with ASD than in the general population.

Difficulties perceiving or interpreting social cues may also affect the validity of questionnaire data, such as that yielded by the ISEL-12. For example, although Bauminger and Kasari (2000) found a relationship between loneliness and friendships in children with ASD, they also reported that participants had difficulty understanding the concept of loneliness. Thus, it is not clear how individual differences including, for example, level of functioning or symptom severity, might influence outcomes. The present study did not examine other aspects of social support, including the number of people that can be turned to for support, the provider of the support (e.g., family, other; see Bjarnason 1994), the satisfaction with the support received (Sarason et al. 1987), or self-esteem support (Cohen et al. 1985). It will therefore also be beneficial to explore the impact of individual differences, and the role of different dimensions of social support, in future research.

## Conclusions

Despite the aforementioned limitations, our results do have clear implications for practice and support. The functions served by social networks, the relationship between stress and resources, and the impact of supports on well-being, all need to be considered when developing interventions or recommendations. It may be that people with ASD benefit more from the availability of material support than other forms of social support. These findings do need to be replicated in a carefully designed longitudinal study, with a larger, well-characterized sample, ideally using multimethod assessments. We hope to be able to collect more data from the present sample to examine longitudinal predictors of mental health outcomes, including suicidal ideation, to partly address this question. Given the current lack of validated instruments for the assessment of depression and suicidal ideation or behavior in ASD (Wigham et al. 2017), we strongly recommended inclusion of a clinical interview to assess for suicidality in research and clinical settings.

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**Author Contributions** DH, MU, AR and CD designed the study. DH and MW collected the data. DH and MU conceived of the report. DH, MU and MW analyzed the data and drafted the manuscript. All authors reviewed and approved the final submitted version of the manuscript.

## Compliance with Ethical Standards

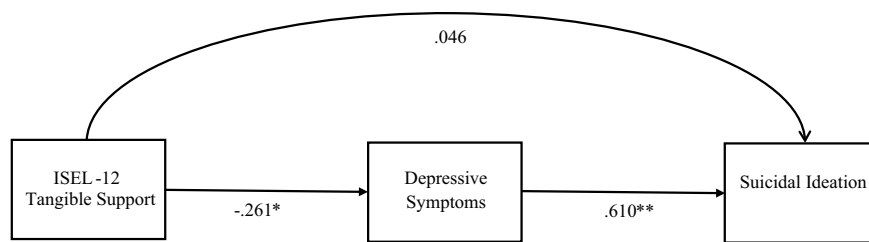
**Conflict of interest** The authors declare no other actual or potential conflicts of interest.

**Ethical Approval** This research was approved by La Trobe University Human Ethics Committee No. 14–101 and the Australian Defence Human Research Ethics Committee No. 825-16. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

## Appendix

See Fig. 2.



**Fig. 2** Structural equation modelling analysis of the indirect effect of tangible support on suicidal ideation through depressive symptoms for participants who met the recommended cut-off for ASD ( $\geq 65$ )

on the AQ-short ( $n = 64$ ) only. Values provided are standardized beta coefficients. \* $p < .05$ , \*\* $p < .001$

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