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Citation: Lovell, Brian, Newman, Amy and Wetherell, Mark (2023) Seeing it my way: A perspective taking intervention alleviates psychological distress in caregivers of autistic children. *Research in Developmental Disabilities*, 133. p. 104396. ISSN 0891-4222

Published by: Elsevier

URL: <https://doi.org/10.1016/j.ridd.2022.104396>  
<<https://doi.org/10.1016/j.ridd.2022.104396>>

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## Seeing it my way: A perspective taking intervention alleviates psychological distress in caregivers of autistic children

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### ARTICLE INFO

#### Keywords:

Autism  
Caregiving  
Empathy  
Intervention  
Perspective taking  
Psychological distress

### ABSTRACT

Cognitively empathic caregivers are able to take the perspective of their autistic child(ren) without experiencing vicarious distressing emotions, and typically report lower psychological distress. Taking the perspective of the autistic child might, through fostering cognitive empathy, might relieve caregivers' psychological distress. Here we explored whether autism perspective taking videos developed by the National Autistic Society (NAS), intended to raise public awareness about autism, might be effective, packaged as an intervention, for increasing caregivers' cognitive empathy and reducing their psychological distress. A sample of 24 caregivers of autistic children completed questionnaires capturing psychological distress and cognitive empathy at baseline. For three consecutive days, for two-three minutes per day, caregivers watched perspective taking videos. Follow up assessments were collected 7, 14, and 21 days post intervention. Psychological distress was lower after seven days, and stayed lower 14 and 21 days post intervention compared with baseline. Cognitive empathy was higher after 14 days, and remained higher 21 days post intervention compared with baseline. Taking the perspective of the autistic child, achieved here with publically available NAS videos, seems to be effective for increasing caregivers' cognitive empathy and reducing their psychological distress for up to three weeks. Future research might use more rigorous methodologies, incorporating control groups and larger samples, to explore moderators of intervention efficacy.

#### What this study adds.

Stress is typically high in the context of caring for an autistic child, and caregivers' stress can negatively impact quality of provided care. Cognitively empathic caregivers, able to take the perspective of the care recipient without experiencing vicarious distressing emotions, typically report lower stress. The stress buffering effect of cognitive empathy, however, has scarcely been explored in the context of parenting an autistic child, with most research focusing on dementia caregivers. Caregivers' cognitive empathy has been shown to be sensitive to change, with simulation type interventions, especially those allowing caregivers to take the perspective of the care recipient, found to be especially useful. Again, however, this research has focused almost exclusively on dementia caregivers. Here we explored whether taking the perspective of the autistic child, achieved via simulation videos designed by the National Autistic Society (NAS) to increase public awareness of autism, might be effective, used as an intervention, for increasing cognitive empathy and, by association, reducing stress in caregivers. Results indicated the intervention was effective, for up to three weeks, for increasing caregivers' empathy and reducing their stress. The study is first, we believe, to show that simulating the autism experience via video,

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<https://doi.org/10.1016/j.ridd.2022.104396>

Received 28 July 2022; Received in revised form 28 November 2022; Accepted 13 December 2022

Available online 27 December 2022

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allowing caregivers to take the perspective of their autistic child, improves empathy. Whether the intervention is effective, in modified form, for improving empathy in educators and health professionals, and how this affects quality of life for caregiver and autistic child, might be explored.

## 1. Introduction

It has been widely demonstrated that psychological distress, of which anxiety and depression are common markers, is elevated in the context of caring for an autistic child (Bonis, 2016; Porter & Loveland, 2019). Not all caregivers, however, are equally affected, with some at particular risk for, and others relatively protected from, psychological distress. Family dynamic type variables, of which cohesion, communication and empathy are examples, have been shown to account for much of the variation in familial caregivers' psychological distress. Empathy, particularly cognitive empathy (i.e., seeing things from the perspective of the care recipient without experiencing vicarious distressing emotions), in fact emerged as one unique predictor (Sutter et al., 2014). However, studies assessing how the psychological well-being of familial caregivers might be impacted by empathy have been scarce to date, focusing almost exclusively on caregivers of older adults with dementia. Research to date indicates that depressive symptoms, as one widely used marker of psychological distress, are lower, and life satisfaction higher, in empathic caregivers. Perceiving the caregiving role to be threatening was also less likely among empathic caregivers (Lee et al., 2001; Shim et al., 2012; Sutter et al., 2014). Empathy, therefore, seems to be an important protective factor against psychological distress in familial caregivers. The psychological effects of empathy, however, have been shown to vary as a function of empathy type. For example, cognitively empathic caregivers are able to take the perspective of the care recipient and, staying emotionally neutral in the process, understand their feelings from an objective point of view, and typically report lower psychological distress (Jütten et al., 2019; Lee et al., 2001). Emotional (i.e., affective) empathy on the other hand has been shown to be closely related to sympathy, and emotionally empathic caregivers, vicariously experiencing the distressing emotions of the care recipient, typically report greater psychological distress (Hua et al., 2021).

Only one quantitative study to date, completed by Ruiz-Robledillo et al. (2015), has explored the psychological impact of empathy in caregivers of autistic children, finding affective empathy to be positively associated with self-reported depression scores. Qualitative research has also demonstrated that caregivers of autistic children, if themselves autistic, felt better equipped to cope with caregiving related challenges. They also speculated that increased empathy, cultivated through shared experiences and mutual understanding of the condition, likely mediated this (Crane et al., 2021). Caregivers' empathy has been found to be influential for quality of life of the autistic child. Indeed, caregivers' feelings of empathy were found to be inversely associated, two-three years downstream, with child autism symptomology (Hasegawa et al., 2015). Autistic children themselves have reported that interactions with their autistic peers, more than their neuro-typical peers, were easier and helped them feel better understood. These findings indirectly speak to the importance of empathy for promoting quality of life for autistic children (Crompton et al., 2020). The importance of empathy for quality of care outcomes has also been highlighted more generally in research involving clinical populations, with treatment outcomes found to be better for patients treated by more empathic health practitioners (Hojat et al., 2011; Trzeciak et al., 2017). More research exploring the psychological impact of empathy, and particularly whether interventions might reduce psychological distress through increasing empathy, seems warranted.

Research has shown that cognitive empathy is in fact amenable to change via psychological intervention, with simulation type interventions, allowing caregivers to see things from the perspective of the care recipient, found to be particularly useful. For example, empathic concern increased, and reports of stress decreased, in spousal dementia caregivers who engaged for 10 weeks, 30 min per day, with the STAR e-learning intervention, part of which involved watching simulation videos designed to increase education about dementia (Hattink et al., 2015). More recently, Wijma et al. (2018) found videos simulating core symptoms of dementia, watched in panoramic virtual reality, were effective for increasing cognitive empathy, competence and resilience in this same caregiving population. Studies with other high stress populations have also reported on the beneficial effects of engaging with simulation type interventions. For example, it was recently concluded, following comprehensive review, that simulation type interventions were effective for improving cognitive empathy in student nurses, with beneficial effects particularly salient for interventions that allowed student nurses to 'take the perspective' of their patients (Bearman et al., 2015; Levett-Jones et al., 2019). A meta-analysis composed of 18 studies recently reported on the effectiveness of empathy training programs for health care professionals, with effect sizes falling in the medium range. Intervention efficacy, however, was moderated by intervention type, with large effect sizes noted for interventions that focused on understanding things from the patients' point of view (van Berkhout & Malouff, 2016).

From 2015 to 2018, as part of their 'Too Much Information' educational campaign, the National Autistic Society (NAS), the leading charity for autism in the United Kingdom, developed a series of simulation type videos to increase public awareness about autism and how it manifests (e.g., sensory overload, anxiety induced by unexpected change, hypersensitivity to environmental stimuli). These videos were recorded from the perspective of the autistic child and might be effective, packaged as an intervention, for increasing cognitive empathy and, by association, reducing psychological distress in caregivers of autistic children. This was explored in the current study. It was hypothesised that cognitive empathy would increase, and psychological distress decrease, in caregivers of autistic children who were exposed to a series of autism perspective taking videos developed by NAS.

## 2. Methods

### 2.1. Participants

A priori power analysis, with GPower, indicated that 24 participants would be needed to provide adequate power (80%;  $\alpha = 0.05$ )

to detect a moderate ( $f^2 = 0.15$ ) effect size (Cohen, 1988). Here, a sample of  $N = 42$  participants were recruited via adverts placed on caregiving support and information groups on the social media site Facebook. Each of these groups were set up by caregivers of autistic children with the aim of providing caregivers an online space to come together and benefit from social, informational and emotional support. Caregivers who saw the advert online were directed to email the research team if they wanted more information or wanted to take part in the study. Inclusion criteria stipulated that participants should be aged  $> 18$  years, informally (i.e., unpaid) caring for at least one autistic child (aged 3–21 years and living at home full time), as clinically diagnosed by GP or paediatrician, and not providing informal care for another person (e.g., partner, parent, other relative, friend) with longstanding illness. Participants were also recruited on the basis of not currently experiencing, or in the last 12 months experienced, any clinically diagnosed mental health condition. A total of 18 participants were removed, providing either no data following consent (16 participants) or, less commonly, providing baseline assessments only (two participants). The remaining 24 participants provided full data, completing all assessments at all study time points, and their data were taken forward for statistical analysis. Sample characteristics are displayed in Table 1.

## 2.2. Measures

### 2.2.1. Potential confounds

Data with respect to characteristics of the caregiver (e.g., age, gender, relationship status, alcohol, exercise, sleep, diagnosed autistic) and care recipient (e.g., current age, diagnosed age, number of siblings living at home) are known to be influential for caregivers' psychological distress and cognitive empathy (Jones et al., 2013; Rivard et al., 2014). We collected data with respect to these variables and, where appropriate, adjusted for their effects.

### 2.3. Psychological distress

The 14 item Hospital Anxiety and Depression Scale (HADS), composed of two 7-item subscales, one for depression (e.g., *'I have lost interest in my appearance'*) and one for anxiety (e.g., *'I feel tense or wound up'*), was used to assess caregivers' psychological distress (Zigmond & Snaith, 1983). Items are scored on a four point Likert type scale (0 = *not at all*, 3 = *all the time*), with total scores, calculated by summing across relevant subscale items, ranging between 0 and 21. Higher scores are indicative of greater psychological distress. Scores 0–7 are deemed normal, with scores 8–10 representing borderline clinical, and scores  $> 11$  representing clinical, cases. HADS subscale scores, highly correlated here ( $r = .70$ ,  $p < .001$ ), were combined to produce a composite measure of general psychological distress in accord with researchers' recommendations (Norton et al., 2013). Internal consistency for this composite measure was good ( $\alpha = .87$ ).

**Table 1**  
Sample Characteristics.

	<i>N</i> = 24
<b>Gender (%)</b>	
Male	1 (4.2%)
Female	23 (95.6%)
<b>Mean age (SD)</b>	41.3 (5.9)
<b>Level of education (%)</b>	
No university education	2 (8.4%)
University education	22 (91.6%)
<b>Relationship status (%)</b>	
Partnered	21 (87.5%)
Not partnered	3 (12.5%)
<b>Mean number of alcoholic drinks per week (SD)</b>	2.5 (2.6)
<b>Smoker (%)</b>	
Yes	21 (87.5%)
No	3 (12.5%)
<b>Mean days exercising per week (SD)</b>	2.9 (2.4)
<b>Mean hours of sleep per night (SD)</b>	6.2 (1.1)
<b>Number of children living at home (%)</b>	
One	9 (37.5%)
Two	14 (58.3%)
More than two	1 (4.2%)
<b>Mean age of autistic child (SD)</b>	8.0 (4.5)
<b>Mean age autistic child was diagnosed (SD)</b>	5.0 (3.7)
<b>Number of autistic children living at home (%)</b>	
One	24 (100%)
Two or more	0 (0%)
<b>Caregiver diagnosed autistic (%)</b>	
Yes	0 (0%)
No	24 (100%)

## 2.4. Cognitive empathy

The 31-item Questionnaire of Cognitive and Affective Empathy (QCAE) is composed of several subscales, two of which, perspective taking (PT) and online simulation (OS), capture cognitive empathy (Reniers et al., 2011). Items attached to the OS subscale (e.g., 'I sometimes try to understand my friends better by imagining how things look from their perspective'), easily modified for use with caregivers of autistic children (e.g., 'I sometimes try to understand my autistic child(ren) better by imagining how things look from their perspective'), were used to assess cognitive empathy. Several items making up the PT subscale focused on speech (e.g., 'People tell me I am good at understanding how they are feeling', 'I can easily tell if someone wants to enter a conversation'), and these were inappropriate for caregivers of autistic children who are, in an estimated 25–30% of cases, either minimally or non-verbal (Posar & Visconti, 2021). The modified OS subscale items were scored on a four point Likert-type scale (1 = *strongly disagree*, 4 = *strongly agree*). Total scores, calculated by summing across seven items, ranged between seven and 32, with higher scores reflecting greater cognitive empathy. The modified OS subscale achieved good internal consistency in the current sample ( $\alpha = .75$ ).

## 2.5. Utility and satisfaction

A series of items taken from the Usefulness, Satisfaction, and Evaluation Questionnaire (USE) were modified for the purposes of this study and used to assess caregivers' perceived utility of, and satisfaction with, the perspective taking intervention (Lund, 2001). For perceived utility, three statements were used: 1) the perspective taking intervention helped me understand what it would be like to have autism, 2) the perspective taking intervention helped me better understand my autistic child(ren), and 3) the perspective taking intervention provided insight into the perspective of my autistic child(ren). Items, all highly correlated (all  $r_s > .60$ , all  $p_s < .01$ ), produced a reliable scale ( $\alpha = .85$ ). Caregivers' satisfaction with the intervention was assessed via three items: 1) I am satisfied with the perspective taking intervention, 2) I have learned something valuable from the perspective taking intervention, and 3) I would recommend the perspective taking intervention for other parents of autistic children. Items were all highly correlated (all  $r_s > .81$ , all  $p_s < .001$ ), and internal reliability was good ( $\alpha = .91$ ). All items were scored on a five point Likert-type scale (1 = *strongly disagree* - 5 = *strongly agree*).

## 2.6. Intervention

Simulation videos developed by the National Autistic Society (NAS) as part of their 'too much information' educational campaign (2015–2018), intended to raise public awareness about autism and its manifestations, were used to support the perspective taking intervention. These videos, developed to allow members of the public to see the world through the eyes of the autistic child, dovetailed perfectly with our emphasis on cognitive empathy. Each simulation video lasted approximately 2–3 min and was captured from the perspective of the autistic child. The backdrop to each video was everyday social settings, e.g., at a shopping centre, travelling on a public bus. Videos were developed using panoramic 360° technology that allowed viewers to see, from the perspective of the autistic child, all around their environment. The videos were developed in response to qualitative research, in which parental caregivers called for knowledge about autism by the general public, often poor and led by misconception, and sometimes leading to stigma, to be improved. Autistic individuals themselves have reported, in other qualitative research, how they often feel misunderstood, perceiving that members of the public do not understand enough about the condition (McGeer, 2004). Parents' knowledge of autism, assessed via the competence of their children, has also been shown to be incomplete, with parents sometimes overestimating the social limitations of their autistic child. Interestingly, autistic children predicted their parents would overestimate their social limitations (Heasman & Gillespie, 2018). Other studies have also documented how neuro-typical individuals, inclusive of caregivers, often experience difficulties understanding facial expressions in autistic individuals (Brewer et al., 2016). The video series used to support the intervention were designed by NAS to help take the perspective of the autistic child and, through simulating core manifestations of the condition such as sensory overload, anxiety induced by unexpected change, and sensory elicited distress (e.g., light, noise), improve awareness of autism. The videos were publically available, free of charge, from the NAS website. NAS consented to their use for the purposes of supporting this research.

## 2.7. Procedure

Electronic packs containing study information and consent forms, and questionnaires for measuring baseline cognitive empathy and psychological distress, were sent to participants via email, with completed packs returned the same way. Participants were instructed to find a quiet area in their home and for three consecutive days, at the same time each day, watch one of three perspective taking videos. Links to the videos were provided via email. All participants were instructed to watch the same videos, in the same order, across the three days. Seven days following the intervention, and again at 14 and 21 days, post-intervention packs containing follow up assessments of cognitive empathy and psychological distress, and questions relating to perceived intervention utility and satisfaction, were emailed to participants. Completed post-intervention packs were returned to the research team by email. All study procedures were approved by the institutional ethics committee, with participants entered into a prize draw to win an Apple iPad as compensation for their time.

### 2.8. Treatment of data

A series of bivariate correlations were used to explore whether cognitive empathy (OS scores) and psychological distress (HADS scores) at baseline might be related to characteristics of the caregiver and care recipient. One way repeated measures ANOVAs were used to assess change in cognitive empathy and psychological stress across the follow up period. Violated assumptions were corrected as required. Bivariate correlations, exploring relationships between change scores in cognitive empathy and psychological distress from baseline, was used to infer whether any positive psychological effects of the intervention might be mediated by increased cognitive empathy.

## 3. Results

### 3.1. Preliminary analysis

Psychological distress (HADS scores) at baseline (all  $ps > .21$ ), and all post-intervention time points (all  $ps > .08$ ), was unrelated to characteristics of the caregiver or care recipient. Gender related differences in cognitive empathy (OS scores) emerged at baseline ( $r = -.46, p = .02$ ), with mothers ( $M = 24.0$ ) more likely to be cognitively empathic than fathers ( $M = 17.0$ ). Participants consuming more alcoholic drinks at seven days post intervention were less likely to be cognitively empathic ( $r = -.43, p = .04$ ), as were those sleeping more hours at 14 and 21 days post intervention (all  $ps < .03$ ). Cognitive empathy was unrelated to other characteristics of the caregiver and care recipient at all study time points (all  $ps > .06$ ). Gender, alcohol, and sleep, therefore, were adjusted as appropriate in subsequent analyses.

### 3.2. Utility and satisfaction

Participants found the intervention useful as indicated by average scores  $> 4.1$  on all three utility items. Participants were also satisfied with the intervention, with mean scores on all three satisfaction items also  $> 4.1$ . Means and standard deviations for perceived utility of, and satisfaction with, the intervention are presented in Table 2.

### 3.3. Intervention efficacy

A main effect of time, reflecting significant reduction in HADS scores across time, was observed ( $F(2.72, 62.59) = 4.38, p < .01, \eta_p^2 = .16$ ). Post hoc probing with paired samples  $t$  tests found HADS scores to be significantly lower seven ( $t(23) = 3.44, p < .01$ ), 14 days ( $t(23) = 2.54, p = .02$ ) and 21 days ( $t(23) = 3.50, p < .01$ ) post intervention compared with baseline. HADS scores at all post intervention time points, lower compared with baseline, were comparable (all  $ps > .20$ ). Caregivers' mean HADS score at baseline ( $M = 9.2, SD = 3.9$ ), and at 7 ( $M = 8.3, SD = 3.6$ ) and 14 ( $M = 8.2, SD = 4.3$ ) days post intervention, placed them in the range for borderline clinical mood disorder. By the end of the intervention, however, at 21 days, caregivers' mean HADS scores ( $M = 7.7, SD = 3.9$ ) no longer satisfied criteria for a borderline clinical case.

A main effect of time, reflecting significant increase in OS scores across time, was observed ( $F(3, 69) = 5.40, p < .01, \eta_p^2 = .19$ ). Post hoc probing revealed OS scores were significantly higher 14 days ( $t(23) = -3.37, p < .01$ ), and stayed higher 21 days ( $t(23) = -3.43, p < .01$ ), post intervention compared with baseline. OS scores at 14 and 21 days post intervention, higher compared with baseline, were comparable ( $t(23) = -.12, p = 0.90$ ). Means and standard deviations for psychological distress and cognitive empathy at

**Table 2**  
Intervention Utility and Satisfaction.

<i>N</i> = 24	Mean (SD)
<b>Utility</b>	
The perspective taking intervention:	
Helped me understand what it might be like to have autism	4.3 (.64)
Helped me better understand my autistic child(ren)	4.1 (.68)
Helped give insight into the perspective of my autistic child(ren)	4.3 (.64)
<b>Satisfaction</b>	
I am satisfied with the perspective taking intervention	4.1 (1.0)
I have learned something valuable from the perspective taking intervention	4.3 (.76)
I would recommend the intervention to other parents of autistic children	4.6 (.65)

**Note:** All items scored on Likert type scale (1 = strongly disagree, 5 = strongly agree)

baseline, and all post-intervention points, are presented in Table 3. Changes in HADS scores calculated between baseline and 21 days post intervention were unrelated with changes in OS scores over the same period ( $r = -.33, p = .11$ ), suggesting increased cognitive empathy did not mediate the positive psychological effects of perspective taking.

#### 4. Discussion

This study sought to explore whether a perspective taking intervention simulating core autism manifestations, developed as part of the NAS educational campaign 2015–18, might be effective, for increasing cognitive empathy and, by association, reducing psychological distress in caregivers of autistic children. Caregivers found the intervention useful, agreeing it helped them better understand autism and the experience of their autistic child(ren), and offered insight into the autism experience. Caregivers were also satisfied with the intervention, agreeing it provided them valuable learning and recommending that other parents of autistic children engage with it. Results indicated the intervention was effective for promoting positive psychological change, with HADS scores significantly lower seven days, and staying lower 14 and 21 days, post intervention compared with baseline. Caregivers' mean HADS score at baseline were  $> 8.0$ , placing them in the range for a borderline clinical case. By the end of the intervention, however, caregiver' mean HADS score was  $< 8.0$ , no longer falling in the range for borderline clinical mood disorder. The beneficial effect of taking the perspective of the autistic child on caregivers' cognitive empathy was also observed, with OS scores lower at 14 days, and staying lower 21 days, post intervention compared with baseline. Positive changes in cognitive empathy were observed 14 days post intervention, and these were slower to manifest than positive psychological adjustments, evident after seven days post intervention. Findings reported here are commensurate with studies that have demonstrated how simulation interventions, especially those allowing for taking the perspective of the care recipient, can be effective for increasing cognitive empathy and engendering positive psychological change (Wijma et al., 2018). The palliative psychological effects of the intervention do not appear to be mediated by increases in cognitive empathy, with increased HADS scores from baseline being unrelated with increased OS scores across the same period. This was a surprising finding. Indeed, previous studies have showing cognitive empathy to be amenable to improvement via perspective taking interventions and, in the context of familial caregiving, inversely related with psychological stress (Hattink et al., 2015; Lee et al., 2001; Jütten et al., 2019). One limitation of the current study however, and potentially explaining the absence of mediation effects, was that affective empathy, closely related to sympathy, was not assessed. Increased affective empathy has been associated with greater psychological distress in other caregiving samples, and research has shown the beneficial psychological effects of cognitive empathy to be negated when affective empathy (or closely related constructs such as emotional reappraisal) are higher (Bos & Stokes, 2019; Hua et al., 2021; Powell, 2018). Failing to assess affective empathy in the current sample was a notable limitation precluding the assessment of moderated-mediation. Indeed, the beneficial psychological effects of the intervention, as mediated by increased cognitive empathy, might have emerged in sub-groups of caregivers with lower affective empathy.

Findings reported here could have important implications. Indeed, accessing interventions outside of the home is challenging for caregivers, requiring considerable free time (Fowler & O'Connor, 2021). The current intervention, quick to use and accessible from home, circumvents these practical barriers. A series of studies recently demonstrated that perspective taking interventions using panoramic videos, some of them supported with virtual reality, were not only feasible for use with familial caregivers, producing low attrition rates and high satisfaction scores, but advantageous for fostering positive psychological change (Hattink et al., 2015; Wijma et al., 2018). For the current sample, the intervention was effective for up to 21 days for reducing psychological distress. The perspective taking intervention used here, free to use and accessible from home, might be effective, through alleviating caregivers' stress, for reducing the severity of autism related symptomology. This might be one direction for future research. Indeed, the relationship between caregivers' psychological well-being and child autism symptomology have been found to be transactional, with one affecting the other and vice versa (Neece et al., 2012; Rodriguez, Hartley, & Bolt, 2019). Moreover, research has shown the effectiveness of early teaching interventions for autistic children, intended to promote communication and social skills, to be attenuated when caregivers' psychological distress is high (Osborne et al., 2008). Several studies have shown simulation type interventions to be advantageous for promoting cognitive empathy in healthcare professionals, especially nurses, with these positive effects augmented when perspective taking was included (Levett-Jones et al., 2019; Van Berkhouit & Malouff, 2016). Perhaps the perspective taking intervention used here, effective for increasing cognitive empathy in caregivers, could be adapted for use with clinicians and educators to provide a snapshot into the lived reality of autism, and perhaps this would promote positive changes in child treatment outcomes. Indeed, in studies with nurses, cognitive empathy, increased by perspective taking, was found to be associated with better understanding of care recipients' needs, and also mediated the increased vigour and engagement of mindful healthcare workers (Pérez-Fuentes et al., 2020; Se-Won & Eun-Jin, 2020).

Findings of this study should be considered in the context of several limitations. The possibility that positive changes observed here were non-specific, manifesting in response to temporary respite from caregiving, cannot be ruled out. We did not recruit a control

**Table 3**

Means and standard deviations for psychological distress and cognitive empathy for all time points.

Outcome	Baseline	7 days	14 days	21 days	<i>p</i>
Psychological Distress (HADS) <sup>a</sup>	9.2 (3.9)	8.3 (3.6)	8.2 (4.3)	7.7 (3.9)	$< .01$
Cognitive Empathy (OS) <sup>b</sup>	21.4 (2.7)	22.1 (3.0)	23.2 (2.9)	23.2 (2.6)	$< .01$

<sup>a</sup>Hospital Anxiety and Depression Scale

<sup>b</sup>Online Simulation

group here, wanting as many caregivers as possible to benefit from any palliative psychological effects of the intervention, and this was a notable limitation. Recruiting a control group would increase sample numbers and rule out non-specific positive effects, and would be advantageous in future research. Caregivers of autistic children sometimes struggle to find free time and find it hard, despite their willingness, to take part in research studies (Ludlow et al., 2012). Recognising this, in an effort to minimise study attrition, the follow up period here was relatively short, extending only 21 days post intervention. Sustainability of positive effects beyond 21 days, therefore, is unclear. Whether caregivers continue to benefit psychologically from the intervention beyond 21 days, and whether 'top up' sessions with the videos might buffer against any gradual deterioration in psychological well-being beyond this point, might be the subject of future research. Adherence with intervention protocol was not assessed here, and this represents a further limitation. Indeed, whether caregivers watched the videos, and whether watched videos were watched in full each day, is unknown, as is whether caregivers watched the videos more than directed. It is possible the positive effects of the intervention observed here are accounted for by either non-specific effects, as a result of general respite from caregiving in non-adherent participants, or by a small subgroup of caregivers who, finding them useful, engaged with the videos at greater doses. Measuring adherence with health based interventions in the home, relying on participants' self-reporting deviations from agreed protocols, remains challenging (Frost et al., 2017). Autism diagnosis in the current study was via parent-report only, and while studies have demonstrated parent reports of autism diagnosis to be in keeping with clinical diagnosis (Rosenberg et al., 2011), future studies might use more rigorous methods to verify autism diagnosis. Characteristics of the autistic child such as problematic behaviour and autism severity, known to be influential for caregivers' psychological distress, have the potential to moderate intervention efficacy (Lovell & Wetherell, 2015; Siu et al., 2019). Future researchers, therefore, might measure these variables and explore whether intervention efficacy is independent of, or possibly differentially affected by, these care recipient characteristics.

In conclusion, taking the perspective of the autistic child, achieved here with NAS developed 360 panoramic videos, was effective for increasing cognitive empathy and reducing psychological distress in parents of autistic children. The beneficial psychological effects of the intervention, however, did not appear to be mediated by improvements in cognitive empathy. Whether the intervention might promote positive changes in quality of care outcomes for the autistic child, and whether this comes about via reductions in parents' distress, might be the topic of future research. Exploring whether the intervention is effective for increasing cognitive empathy in health professionals and educators, and how this might affect child and family outcomes, might also be explored.

#### **Funding Statement**

Authors thank the British Academy/Leverhulme small research grants for funding this research (grant reference: SRG1819 \190669).

#### **Conflict of interest**

Authors declare no conflict of interest.

#### **Data Availability**

Data will be made available on request.

#### **Acknowledgements**

We thank caregivers for taking their time, at the conceptualisation stage, to offer their valuable feedback about feasibility and utility, and we thank all caregivers who took part in the study.

#### **CRediT author statement**

Dr Brian Lovell, affiliated with the Department of Psychology, Northumbria University, conceptualised the study and collected data, and completed all analysis. Prof Mark A. Wetherell, also affiliated with Department of Psychology, Northumbria University, collaborated on study conceptualisation and data collection, and co-wrote the paper with Dr Lovell. Dr Amy Newman, also affiliated with the Department of Psychology, Northumbria University, collected data and liaised with the NAS to seek relevant permissions to use video content.

#### **IRB Statement**

Approval was obtained from the Faculty of Health and Life Sciences Ethics Committee, Northumbria University (UK), with all procedures and protocols adhering with the tenets of the Declaration of Helsinki. All participants provided fully informed consent to take part.

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