The Association between Contact and Intellectual Disability Literacy, Causal Attributions and Stigma

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Abstract

Background

Contact is seen as a key route to tackling stigma and discrimination. Contact theory states that the quality and type of contact, as well as circumstance of the contact experience, influence the effect of contact on prejudice. The majority of research in intellectual disabilities though has focused on contact as present or absent only.

Method

1264 adult members of the UK general population completed measures of symptom recognition, social distance (as measure of external stigma) and causal beliefs in response to a diagnostically unlabelled vignette, depicting someone with intellectual disabilities.

Results

A nuanced contact variable, including frequency of contact and closeness and nature of the contact relationship, explained more of the variance in social distance, compared to the binary variable (contact as present or absent). Only the closeness of the relationship was individually predictive though and the models explained only relatively small amounts of the variance. Structural equation modelling of contact, recognition, social distance and causal beliefs demonstrated that the model including the nuanced variable was an adequate fit for the data.

Conclusions

Future research aimed at increasing our understanding of intellectual disability stigma should avoid assessing contact as a binary variable only, but consider other factors, particularly the closeness of contact relationships. Anti-stigma interventions may benefit from focussing on causal attributions as a method of reducing stigma.

INTRODUCTION

Stigma has been defined as an attribute that is deeply discrediting and the process by which the reaction of others spoils normal identity (Goffman, 1963). Stigma exists when labelling, stereotyping, status loss, and discrimination occur together in the context of a power imbalance (Link & Phelan, 2001). Research in the intellectual disability field has mostly focused on attitudes, yet regardless whether attitudes or stigma are under investigation, contact is viewed as one of the key routes to tackling negative attitudes or stigma (Seewooruttun & Scior, 2014). Research into the relationship between contact and stigma is limited though by a lack of a clear operational definition of contact (Alexander & Link, 2003) and frequent measurement of contact in simplistic terms as either present or absent (Couture & Penn, 2003).

Contact, defined as personal experience with members of a stigmatised group, and its effect on prejudicial attitudes, have been the focus of research for a number of decades. Intergroup contact theory (Allport, 1954) developed from observations of racial prejudice, and detailed optimal conditions under which contact leads to improved attitudes towards members of stigmatised groups. These conditions are that contact: a) is between members of different groups who are of equal status in the situation; b) supports the realisation of a common, valued goal; c) involves members of higher status within the minority group; d) is promoted by officials/the social climate; e) is intimate and pleasurable; and f) occurs by choice (Livneh et al. 2013). Research continues to provide evidence to suggest that these conditions are optimal, but that contact *per se* has a positive effect in reducing negative attitudes (Pettigrew & Tropp, 2006). Contact is thought to provide opportunities for the individual to encounter a member of a stigmatised group who does not meet the negative expectations of the individual's stereotypes. This challenge to the individual's belief system

is reconciled by an improvement in attitudes and a generalisation to other members of the same group (Desforges et al. 1991).

Stigma research has also drawn extensively on attribution theory (Weiner, 1985), which acknowledges that people make causal inferences to explain events on dimensions of control and stability. It is proposed that stigma increases when lay people infer that a symptom or behaviour is stable over time and that the individual concerned is in some way to 'blame' for the symptom. Accordingly, promoting external attributions that are outside of the person's control should result in reduced stigma (e.g. see Corrigan, 2000).

Stigma and contact with people with intellectual disabilities

Evidence indicates an association between contact and positive attitudes to people with (intellectual) disabilities in children and adults (Ouellette-Kuntz et al. 2010; Tarrant et al. 2014). However, the relationship may be more complex than contact *per se* promoting more positive attitudes (see Scior, 2011 for a review). For example, the quality of the contact is indicated as an important variable, with negative contact experiences, especially at an early age, possibly leading to an increased desire for social distance (Narukawa et al. 2005). The closeness of the relationship has also been found to be associated with lower stigma (e.g. Ouellette-Kuntz et al. 2010), and the voluntary nature of the relationship may be important (Tachibana & Watanabe, 2004). This suggests that while contact *per se* is predictive of stigma, a more nuanced understanding of the complex contact-stigma relationship may have implications for interventions designed to reduce stigma.

Intellectual Disability Literacy

The concept of 'intellectual disability literacy' (Scior & Furnham, 2011) addresses someone's understanding of intellectual disability, typical symptoms, possible causes and suitable interventions. Research, particularly in the mental health field, indicates that literacy and causal attributions are closely linked to stigma. The very limited evidence available

suggests this may also hold true regarding intellectual disability and that a better understanding of intellectual disability is associated with increased endorsement of biomedical attributions (Scior et al. 2013) and reduced stigma (Connolly et al. 2013). There is a need for associations between literacy, attributions and social distance to be modelled and tested to provide greater clarity.

This Study

This study set out to examine the role of contact in relation to lay responses to people with intellectual disabilities. The central aim was to examine whether a model that accounts for contact as a nuanced variable, is better at explaining the relationships between stigma (social distance), causal beliefs (attributions) and literacy (recognition) for intellectual disabilities, than a model that only considers contact as either present or absent, see Figure 1. To do justice to the complexity of contact, it was defined and measured not only as present or absent, but also its nature (voluntary or involuntary), frequency and closeness of the contact relationship. It was hypothesised that by including these aspects in the model, more variance in the contact - literacy - attributions - stigma relationship would be explained than when looking only at the presence or absence of contact.

-FIGURE 1 ABOUT HERE-

METHOD

Participants

The sample consisted of 1264 UK lay people aged 16 years or over. From an initial data set of 1397, any participants whose work role implied specialist knowledge on intellectual disability were deleted, and missing cases were deleted listwise. Calculations for the structural equation models for a small effect size of 0.1 indicated a required sample size of 152 for contact as a nuanced variable and of 400 for contact as a binary variable.

The mean age of respondents was 26.2 years (range 16 to 74 years), with 66.1% of the sample female and 33.9% male. Previous contact with people with intellectual disabilities was reported by 43.4% (n=549). Of the total sample, 3.7% (n=47) had been educated to age 16 or less, 68.4% (n=864) to age 18, and 27.9% (n=353) were graduates. With regards to ethnicity, 58.4% (n=738) identified themselves as White, 25.4% (n=321) as Asian, 6.7% (n=85) as Black, 8.4% (n=106) as 'other' and 1% (n=13) of responses were missing.

Of those who reported prior contact with someone with intellectual disabilities, this was through the immediate or wider family in 10.8% of cases (n=171), as friend in 10.9% (n=138), acquaintance in 5.6% (n=71), class mate or co-worker in 9.1% (n=115), and someone they were employed to work with (i.e. service user) in 4.2% (n=53). The fact that nearly 11% said they knew someone with an intellectual disability as a friend could be seen as very encouraging; however, we suspect that this figure is an overestimate resulting from confusion between 'learning disability' (the term used in the survey) and specific learning difficulties, despite providing participants with a clear definition that explicitly excluded specific learning difficulties.

Procedure

Potential participants were invited to take part in the study by email and through postings on web forums. In addition to providing brief information about the study, these linked to an online survey, hosted using the e-survey software Opinio. Upon visiting the survey site, they were presented with the information sheet and questionnaire pack. The invitation to participate was circulated via email to the student body at the authors' institution, via social networking sites with a request to forward the invitation to others, and through postings on web discussion forums. To encourage participation, respondents were given the chance to enter a prize draw for a retail voucher.

Participants were presented with a diagnostically unlabelled vignette depicting someone presenting with signs of mild intellectual disability. They were asked "*what would you say is going on with X?*" to assess their recognition of the condition before completing further items. Participants were asked to provide their socio-demographic information, including details about their contact with people with "learning disabilities" (after having been provided with a definition of 'learning disabilities', the most commonly used term in the UK). The entire survey typically took 15 to 20 minutes to complete.

Measures

Contact

Frequency of contact was measured using seven categories: daily/almost daily, once or twice a week, once or twice a month, more than 3 times a year, once or twice a year, less than once a year and no contact. Closeness of contact was measured using a 9 point Likert scale, where 1 = not at all close and 9 = extremely close, with 0 representing no contact. The nature of the relationship was coded from open ended responses into three categories: voluntary (friend/partner, employed to work with), involuntary (close relative, distant relative, acquaintance, fellow student/work colleague) and no contact. For analysis these were re-coded as binary variables - voluntary contact versus anything else (involuntary and no contact) and involuntary versus anything else (voluntary or no contact). Relationship types were collapsed into four categories, with contact either: through employment; with a more distant relative, fellow student/work colleague or acquaintance; friend/partner; or a close relative. These variables were used to assess whether the 'nature' of contact variable, could be improved.

Intellectual Disability Literacy Scale

Recognition, social distance and causal beliefs were assessed using the Intellectual Disability Literacy Scale (IDLS, Scior & Furnham, 2011). This is a self-report questionnaire,

designed for use with the general population to assess stigma towards people with intellectual disabilities.

Recognition: The unlabelled vignette presented a male in his 20s with symptoms of mild intellectual disability thus: *James is 22 and lives at home with his parents and younger brother. He found school a struggle and left without any qualifications. He has had occasional casual jobs since. When his parents try to encourage him to make plans for his future, James has few ideas or expresses ambitions that are well out of his reach. Rather than having him at home doing nothing, his mum has been trying to teach James new skills, such as cooking a meal, but James has struggled to follow her instructions. He opened up a bank account with his parents' help, but has little idea of budgeting and, unless his parents stop him, will spend all his benefits on comics and DVDs as soon as he receives his money.*

Questions assessed whether participants could recognise typical markers of the condition. Responses were coded as correct or incorrect. 'Correct' included reference to intellectual disability or a synonym, as well as other developmental disabilities, namely specific learning difficulty (LD) or autism spectrum disorder (ASD), as previous research using the IDLS indicated people who identified any of these categories were distinct from those who failed to identify a possible intellectual or developmental disability on social distance (Scior et al. 2013).

Social Distance: Participants rated their willingness to engage with the person in the vignette in four social situations of increasing intimacy on a 7 point scale (1=strongly disagree to 7=strongly agree). A total score for the social distance scale was calculated as the mean of the four items, reversed so that higher scores indicate a greater desire for social distance.

Causal Beliefs: Participants responded to 22 causal belief items on a 7 point Likert scale (1=strongly disagree to 7=strongly agree). Items load on four factors (Scior & Furnham,

2011): biomedical (five items), adversity (five items), supernatural (five items) and environment (seven items).

Data Analysis

The data were analysed using SPSS version 21. Outliers were examined by using standardised scores; any value with $z > 3$ was replaced with the mean value for that variable +/- two standard deviations, as suggested by Field (2009). Four outliers were identified for supernatural causal beliefs. Due to the large positive skewness for this subscale (the majority of participants disagreed with the items) this was log transformed.

Hierarchical regression analyses and logistic regression analyses were conducted to examine the relationship between the binary and multi-faceted contact variables, recognition and social distance. These analyses informed the mapping of structural equation models which were subsequently tested. Structural equation modelling (SEM) was conducted using AMOS version 21.0.0. The model with contact as a multi-faceted variable included two latent variables, contact and causal beliefs (unobserved) and nine observed variables (indicators). The model with contact as a binary variable only included one latent variable, causal beliefs (unobserved), and seven observed variables (indicators). The models included both continuous and categorical variables. The assessment of multivariate normality for both models was not held (multivariate kurtosis critical ratio > 5.00) so analyses were based on asymptotic distribution free (ADF) estimation (Browne, 1984), instead of the usual maximum likelihood estimation suggested for sample sizes of over 1000 (Byrne, 2010).

The indices of fit used to assess the models were an overall chi-squared fit (χ^2), the comparative fit index (CFI) (>0.9 acceptable, >0.95 good fit; Hu & Bentler, 1999), the Tucker-Lewis Index (TLI) (values between 0 and 1, values close to 0.95 suggesting good fit; Tucker & Lewis, 1973) and the root mean square error of approximation (RMSEA) (< 0.05 considered a good fit, 0.08 to 1.0 mediocre fit, > 1.0 model not accepted; Byrne, 2010).

Standardised parameter estimates, which correspond to effect-size estimates, were used to compare pathways in the model.

Initially the models were run without accounting for any covariance, however on inspection of the modification indices one value, between the error terms for biomedical and adversity causal beliefs, was egregiously high for both. A covariance pathway was therefore included between biomedical and adversity attributions for both models. A direct pathway between recognition and biomedical causal beliefs was included, given previous evidence of this effect (Scior, 2013).

RESULTS

A hierarchical regression analysis was conducted to examine contact and social distance, see Table 1. Contact as a binary variable was entered at step 1; frequency, closeness and nature of contact were added at step 2. The 'nature' variable entered at step 2 was binary (voluntary versus involuntary and no contact), in conjunction with the contact binary variable (contact versus no contact) participants who reported no contact were accounted for, leaving the nature variable to assess the value of 'involuntary or voluntary'. Although contact was the key variable of interest, it was expected that whether participants recognised the disorder depicted in the vignette would have an effect on social distance and therefore recognition was added to the model at step 3.

-TABLE 1 ABOUT HERE-

Prior contact with someone with intellectual disabilities predicted social distance; those reporting no contact scored higher on social distance than those reporting contact. More of the variance in the model, albeit only a small increase, was explained by including the three indicators of contact, with 'closeness' of the contact relationship emerging as the only contact variable that individually predicted social distance. Adding recognition to the model increased the amount of variance explained, with closeness and recognition both

predicting social distance. Of participants 37.7% correctly identified the vignette; recognition was associated with a reduced desire for social distance. Frequency of contact and the nature of the relationship did not predict social distance. The overall model, including recognition, accounted for 12.6% of the variance in social distance.

To assess whether the 'nature' variable could be improved by taking a more detailed account of the type of relationship, beyond the distinction of it as either voluntary or involuntary, the regression was repeated, replacing 'nature' with the four binary relationship categories (employed to work with vs. everything else; other relative and fellow student/colleague and acquaintance vs. everything else; friend/partner vs. everything else and close relative vs. everything else). The inclusion of these variables altered the model slightly $\Delta R^2 = 0.03$; only 'close relative' was significant and only just at the 5% level ($p = 0.05$ at step 2 only). Given the increased risk of type 1 error due to multiple calculations, the nature of the contact relationship variable was not included in any further analyses.

Whether a lay person identifies that the presentation in the vignette might relate to an underlying intellectual disability is likely to be affected by prior contact. To examine this relationship, a logistic regression was conducted; see Table 2, with recognition as the dependent variable and aspects of contact as the independent variables.

-TABLE 2 ABOUT HERE-

The analysis indicated that participants who reported prior contact were almost twice as likely to recognise that the vignette might depict someone with intellectual disabilities, compared with those reporting no prior contact. The predictive power of contact was not increased by adding frequency, closeness and nature of the contact relationship.

The previous hierarchical regression (see Table 1) examining predictors of social distance, only accounted for a modest amount of the variance. In line with the hypothesis that attributions, referred to here as causal beliefs, may improve our understanding of social

distance, these were added to the model, see Table 3. Contact, and in particular recognition, emerged in preceding analyses as important in explaining the variance in social distance and therefore were entered in block 1, with the further indicators of contact added in step 2. Causal beliefs were added to the model in step 3, to examine whether more variance in the model was explained by these factors.

-TABLE 3 ABOUT HERE-

Prior contact and recognition of intellectual disabilities predicted reduced social distance. The model explained more variance in social distance when indicators of contact were included, however this was small and individually only closeness, not frequency or nature of contact, predicted social distance. Adding causal beliefs increased the variance explained by the model; biomedical, adversity and environmental causal beliefs were individually significant predictors, whilst supernatural beliefs were not. Endorsement of biomedical and adversity related causes of the presentation in the vignette, were associated with lower social distance, whilst endorsement of environmental causes was associated with increased social distance. The model including causal beliefs accounted for 19.1% of the variance in social distance.

In summary, regression analyses demonstrated a nuanced contact variable explains more of the variance in social distance than a binary variable, although only closeness of relationship was individually predictive. This was not the case for recognition where the nuanced variable did not explain more variance than the binary variable. To examine the relationships between contact, recognition, causal beliefs and social distance fully, and to determine whether a nuanced variable explained significantly more of the variance in the model, two structural equation models were developed and compared. The model presented in Figure 2 includes contact as a binary variable only, whereas Figure 3 includes contact as a

nuanced variable, including frequency, closeness and nature of contact. The paths of the models were based on previous theory and the results of the regression analyses.

-FIGURE 2 ABOUT HERE-

For the model presented in Figure 2, the assessment of normality indicated a multivariate kurtosis critical ratio of -7.04 therefore ADF estimation methods were used. The hypothesised model appeared to be a poor fit for the data, $\chi^2 = 197.41$ (df = 9), p<0.001; CFI = 0.85; TLI = 0.64; and RMSEA = 0.13. All individual pathways were significant at the 5% level.

- FIGURE 3 ABOUT HERE-

For the model presented in Figure 3, the assessment of normality indicated a multivariate kurtosis critical ratio of 7.01 therefore ADF estimation methods were used. The hypothesised model appeared to be an adequate fit for the data, $\chi^2 = 209.43$ (df = 21), p<0.001; CFI = 0.92; TLI = 0.86; and RMSEA = 0.08. All individual pathways were significant at the 5% level.

The model with the nuanced variable appeared to be a better fit for the data, Δ CFI = 0.07. However, a comparison of the chi-square values demonstrated the difference in fit not to be significant, $\chi^2 = 12.02$ (df=12), p = 0.45

DISCUSSION

This study examined whether contact as a nuanced variable, including frequency, closeness and nature of the contact relationship, is better at explaining recognition/literacy, causal attributions and social distance than contact solely as present or absent. Contact as a nuanced variable was found to explain a greater amount of variance in social distance, although only closeness, not frequency or nature, was individually predictive of social distance. It was not better at explaining intellectual disability literacy than the binary variable though. When contact, causal beliefs, recognition and social distance were modelled, the

nuanced contact variable did not provide a better model than the binary variable. A surprising finding was that contact explained relatively little variance in social distance. Future research should examine whether accounting for factors not considered here might improve our understanding of intellectual disability stigma, including emotional reactions (e.g. Angermeyer et al. 2010; Pettigrew & Tropp, 2006), personality (e.g. Swami et al., 2011) and stereotypes (e.g. Corrigan & Watson, 2002).

The results of the study provide partial support for concerns raised about stigma research that assesses contact as present or absent only (Couture & Penn, 2003), as this approach limits our understanding of the complexity of the role of contact. This study found little evidence for the intentional/unintentional distinction ('nature' in the current study) drawn by Alexander & Link (2003), but provides some support for their personal/impersonal continuum ('closeness' in this study). Perhaps surprisingly, frequency of contact was not associated with reduced stigma or increased intellectual disability literacy, when closeness and nature of the contact relationship were taken into account simultaneously. Whilst contact *per se* is likely to have a positive effect on attitudes (Pettigrew & Tropp, 2006), its positive effects may be enhanced by optimal conditions including those suggested by intergroup contact theory (Allport, 1954). As this study was a retrospective examination of contact, whether or not contact met Allport's optimal conditions could not be examined. This study does however provide evidence relating to two of Allport's conditions; the findings support the importance of the intimacy of contact, whilst they raise questions about the importance of nature being volitional, accounted for in this study by the 'nature' variable and appeared to have little effect.

It has been widely acknowledged in the literature that contact is likely to be important in reducing stigma, but a surprising result of this study is that contact only explained a small amount of variance in the models. The results indicate that closeness of the contact

relationship may be more important than frequency and nature of contact. Whilst this is important in considering future research into contact, it could question the practicalities of using contact in anti-stigma interventions. If direct contact has only a modest effect on stigma, it needs questioning whether it is viable to make contact a cornerstone for anti-stigma efforts, given the challenges inherent in fostering close relationships between the general public and people with intellectual disabilities. Contact of any form was associated with increased recognition and increasing lay people's understanding of the condition may be helpful in tackling intellectual disability stigma. Of note, the vignette depicted a person with a mild intellectual disability. Previous research indicates that severity of intellectual disability is positively correlated with stigma (Ouellette-Kuntz et al. 2010) and that contact may have the greatest influence in reducing stigma for people with moderate to severe disabilities, while education may be most important in reducing stigma towards people with mild intellectual disabilities (Antonak et al. 1995).

Attributions relating to adversity, as well as biomedical causal beliefs, were associated with reduced social distance. Interestingly, endorsement of environmental causes was associated with increased social distance. Targeting specific causal attributions through education may be a fruitful component of anti-stigma efforts. In the mental health field, education has been found to demonstrate significant but smaller changes in stigma in comparison to contact, with combined contact and education suggested to be the most effective anti-stigma intervention (Corrigan et al., 2012). It may be more feasible to educate the public about the important role of adversity, hardship and biomedical factors in the aetiology of intellectual disability as a route to achieving reductions in stigma, than to foster close contact relationships.

Limitations

One of the limitations of previous research into contact, highlighted by Alexander & Link (2003) was that much of the literature lacked a clear operational definition of contact. Whilst this study has improved on previous measurement of contact by considering various factors which make up such a 'latent variable', the measurement of contact has some limitations. The questions used to measure the facets of contact in the study were not standardised and relied on self-report – it is entirely possible that participants were not aware that someone they knew had an intellectual disability, or they may have over- or understated the frequency and closeness of contact. The study did not control for the number of people with intellectual disabilities known by participants and asked those who knew more than one person with intellectual disabilities, to respond in regards to the person they felt closest to. Future research would benefit from using and developing a standardised measure of contact, such as the Contact with Disabled Persons (CDP) scale (Yuker & Hurley, 1987), which would enable greater comparisons to be made across different areas of stigma research.

The IDLS measure, although standardised with a high level of validity and reliability, does have limitations. The vignettes were unlabelled and as a consequence the responses to the question were based on participants' understanding of the primary difficulty represented by the vignette, rather than intellectual disabilities per se. Whilst this allowed an assessment of literacy/recognition, providing an intellectual disability label has been found to reduce social distance and increase biomedical attributions (Connolly et al. 2013).

Another limitation relates to the convenience sample - participants were relatively young, well educated overall and women outnumbered men. Respondent age, educational attainment and gender may not only affect self-reported attitudes (see Scior, 2011 for a review) but also how people view and respond to contact with someone with an intellectual disability. Thus caution needs to be exercised in generalising the findings to the general population.

Structural equation modelling was a sound method to build up an understanding of how the factors examined interact and was used as a strictly confirmatory approach. The use of categorical variables in the model was not ideal and is likely to have had an effect on the interaction between variables. The models could be developed with output provided by AMOS, which suggests pathways which could improve the fit of the model. Whilst common, there is controversy over the use of structural equation modelling as an exploratory tool (Howell, 2011), especially given the increased risk of type 1 error. Given limitations in previous research on the role of contact, there was little evidence for making adaptations suggested by modification indices. As stigma research develops, the models can be adapted to improve the fit. Demographic characteristics of participants were also not included in the model. Whilst these are of obvious importance when studying social phenomena, this had to be balanced against increasing pathways and calculations in the model and increasing type 1 error. Examination of demographic factors in a comprehensive model looking beyond the effect of demographics on attitudes or stigma in isolation should be an area for future research.

Conclusions

This study has furthered our understanding of the role of contact in the area of intellectual disabilities. Research in the future should avoid looking at contact as a binary variable and consider a variety of factors, particularly the closeness of the contact relationship in assessing the likely effects of contact on stigma. Anti-stigma interventions may not viably be able to improve prejudicial attitudes through the use of personal contact, if a close relationship is required. Interventions may benefit from paying close attention to causal attributions associated with lower stigma and focus on encouraging these through education.

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Table 1

Hierarchical Regression for Intellectual Disability Vignette: Contact and Recognition as

Predictors of Social Distance.

Variable	*B* (95% CI)	*SE B*	*β*	*p*
Step1				
Constant	4.36 (4.26, 4.47)	0.05		<.001
Contact (yes/no)	-0.67 (-0.83,-0.51)	0.08	-.22	<.001
Step 2				
Constant	4.39 (4.28, 4.50)	0.06		<.001
Contact (binary)	-0.20 (-0.50, 0.10)	0.15	-.07	.20
Frequency	-0.08 (-0.15, 0.00)	0.04	-.10	.06
Closeness	-0.07 (-0.11, -0.02)	0.03	-.11	.01
Nature (voluntary)	-0.04 (-0.30, 0.21)	0.13	-.01	.74
Step 3				
Constant	3.85 (3.70, 4.00)	0.08		<.001
Contact (binary)	-0.09 (-0.38, 0.20)	0.15	-.03	.53
Frequency	-0.06 (-0.14, 0.02)	0.04	-.08	.11
Closeness	-0.08 (-0.12, -0.03)	0.02	-.12	<.01
Nature (voluntary)	-0.05 (-0.29, 0.20)	0.12	-.01	.71
Recognition	0.79 (0.63, 0.95)	0.08	.26	<.001

Note:
R^2= .050 for Step 1, ΔR^2= .012 (R^2= .062) for Step 2 ($p < .001$), ΔR^2= .064 (R^2= .126) for
Step 3 ($p < .001$)
Contact: 0 = no, 1 = yes; Frequency: 0 = no contact, to 6 = daily or almost daily contact;
Closeness: 0 = no contact to 9 = extremely close; Nature: 0 = no contact or involuntary, 1 =
voluntary; Recognition: 0 = correct, 1 = incorrect.

Table 2

Logistic Regression for Intellectual Disability Vignette: Aspects of Contact as Predictors of

Recognition.

Variable	*B*	*SE B*	Odds Ratio (95% CI)
Model 1			
Constant	0.16	0.86	
Contact (yes/no)	0.61	0.12	1.85 (1.47 – 2.33) ***
Model 2			
Constant	0.22	0.25	
Contact (binary)	0.56	0.22	1.76 (1.15 – 2.68) **
Frequency	-0.07	0.06	0.93 (0.83 – 1.04)
Closeness	0.05	0.04	1.05 (0.98 – 1.13)
Nature (voluntary)	-0.02	0.18	0.98 (0.69 – 1.40)

Note:

*p<0.05 **p<0.01***p<0.001

Model 1: 0.02 (Cox & Snell), 0.03 (Nagelkerke), $\chi^2(1) = 27.482$, $p < .001$

Model 2: 0.02 (Cox & Snell), 0.03 (Nagelkerke), $\chi^2(3) = 2.763$, $p = .43$

Table 3

Hierarchical Regression for Intellectual Disability Vignette: Recognition, Contact and Causal Beliefs as Predictors of Social Distance.

Variable	B (95% CI)	SE B	β	p
Step1				
Constant	3.82 (3.67, 3.98)	0.08		< .001
Recognition	0.78 (0.62, 0.95)	0.08	.26	< .001
Contact (binary)	-0.56 (-0.72, -0.40)	0.08	-.19	< .001
Step 2				
Constant	3.85 (3.70, 4.00)	0.08		< .001
Recognition	0.79 (0.63, 0.95)	0.08	.26	< .001
Contact (binary)	-0.09 (-0.63, 0.53)	0.15	-.03	.53
Frequency	-0.06 (-0.14, 0.02)	0.04	-.08	.11
Closeness	-0.08 (-0.12, -0.03)	0.02	-.12	<.01
Nature	-0.05 (-0.29, 0.20)	0.12	-.01	.71
Step 3				
Constant	3.65 (3.31, 3.99)	0.18		< .001
Recognition	0.35 (0.16, 0.54)	0.10	.11	< .001
Contact (binary)	-0.06 (-0.34, 0.23)	0.14	-.02	.70
Frequency	-0.06 (-0.13, 0.02)	0.04	-.07	.14
Closeness	-0.07 (-0.11, -0.02)	0.02	-.11	.00
Nature	-0.07 (-0.30, 0.17)	0.12	-.02	.59
Biomedical	-0.09 (-0.16, -0.03)	0.03	-.09	.00
Adversity	-0.17 (-0.25, -0.10)	0.04	-.15	< .001
Supernatural	0.27 (-0.17, 0.72)	0.23	.04	.23
Environment	0.37 (0.29, 0.46)	0.04	.30	< .001

Note:
R^2= .114 for Step 1, ΔR^2= .013 (R^2= .126) for Step 2 ($p < .001$), ΔR^2= .065 (R^2= .191) for Step 3 ($p < .001$)
Contact: 0 = no, 1 = yes; Frequency: 0 = no contact, to 6 = daily or almost daily contact; Closeness: 0 = no contact to 9 = extremely close; Nature: 0 = no contact or involuntary 1 = voluntary; Recognition: 0 = correct, 1 = incorrect.
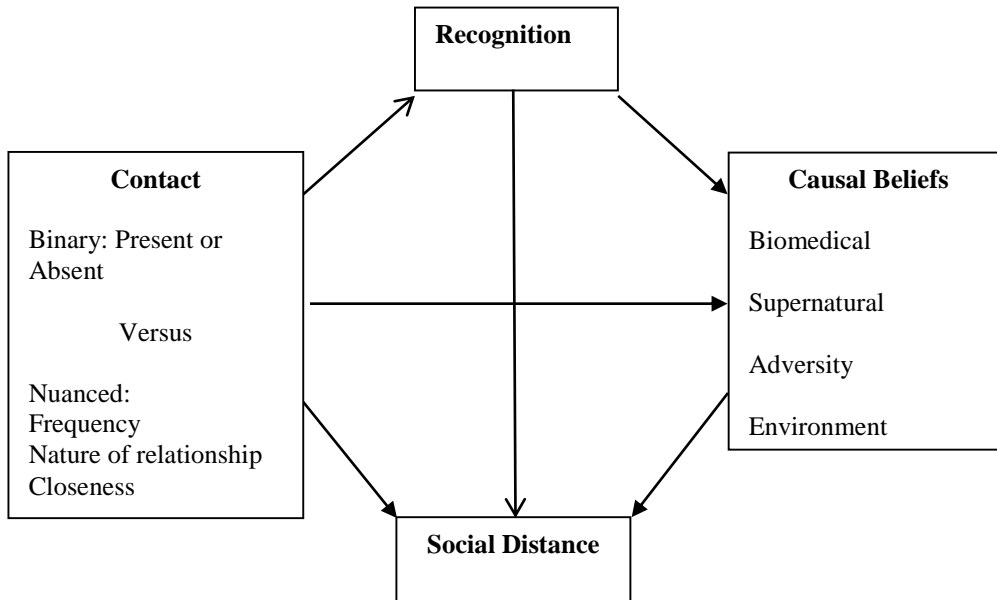
FIGURES

Figure 1. Proposed model of the relationship between contact (binary vs nuanced), recognition, social distance and causal beliefs
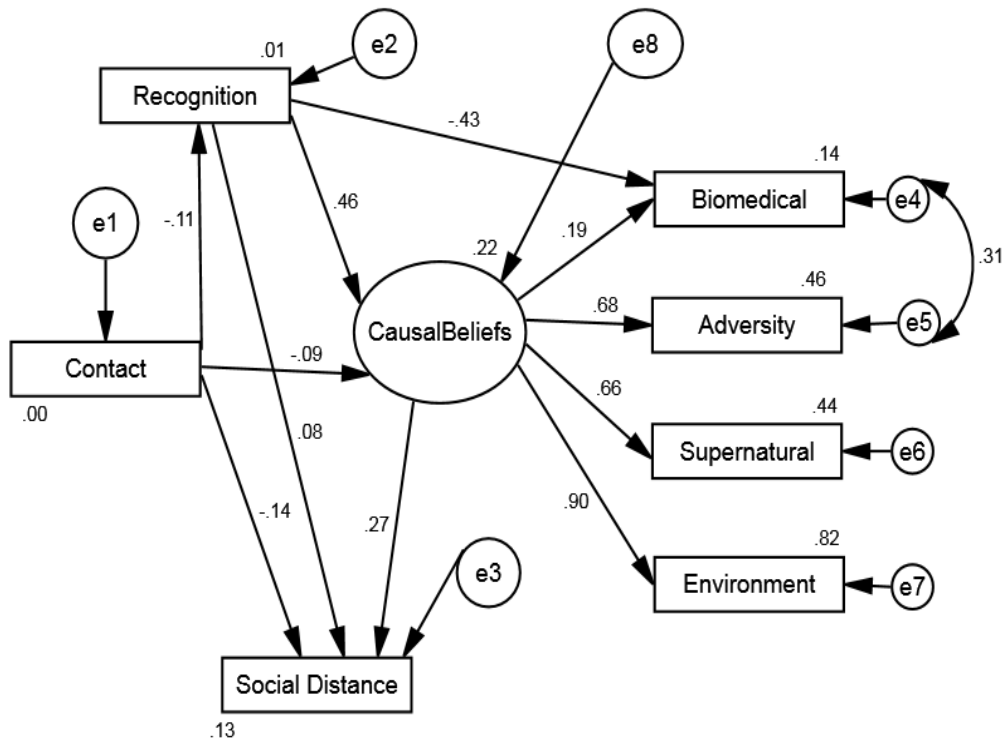
Figure 2. Structural Equation Modelling for Intellectual Disability Vignette: Contact as a

Binary Variable, Recognition, Social distance and Causal beliefs, with Standardised
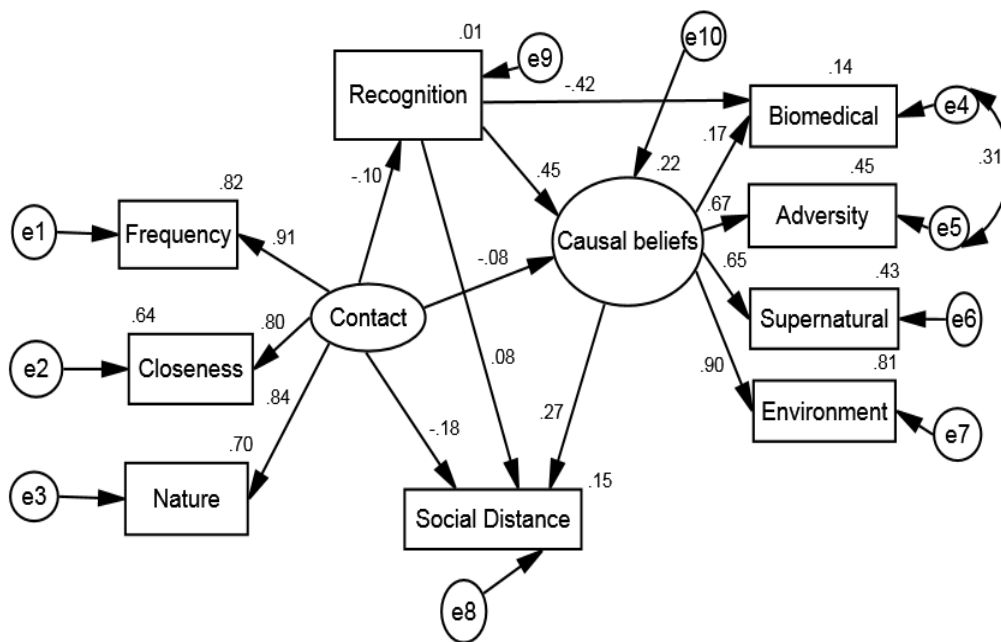
Coefficients.

Figure 3. Structural Equation Modelling for Intellectual Disability Vignette: Contact as a

Nuanced Variable, Recognition, Social distance and Causal Beliefs, with Standardised

Coefficients.