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Title

An open randomised controlled trial of the effects of linguistic simplification and mediation on the comprehension of 'easy read' text by people with intellectual disabilities.

Corresponding Author:

Susan Buell PhD, - University of Dundee, 11 Airlie Place, Dundee DD1 4HJ
s.buell@dundee.ac.uk +44 (0)1382 385964

Co-authors:

Karen Bunning, PhD - Reader, University of East Anglia, Norfolk and Norwich Research Park, Norwich NR7 4TJ k.bunning@uea.ac.uk

Gabrina Pounds, PhD - University of East Anglia, Norfolk and Norwich Research Park, Norwich NR7 4TJ g.pounds@uea.ac.uk

Peter E Langdon DClinPsy, PhD – Tizard Centre, University of Kent, Canterbury & Broadland Clinic, Hertfordshire Partnership University NHS Foundation Trust – Norfolk.

P.E.Langdon@kent.ac.uk

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Conflict of Interest

No conflict of interest is declared.

Abstract

Background: This trial aimed to measure the effects of extrinsic and intrinsic factors on users' comprehension of health information provided in adapted written 'easy read' material.

Method: Sixty adults with intellectual disabilities undertook The Easy Read Task, randomly allocated with stratification by reading ability to one of four conditions (with and without simplified language/ with and without mediation).

Results: Neither linguistic complexity of the text nor mediation independently or combined made a significant difference to the understanding of information. Posthoc testing revealed that the group who received simplified language with mediation performed significantly better than the group that had complex text with mediation. None of the other differences between the remaining groups were significant.

Conclusions: Constructing meaning needs to extend beyond a consideration of form as found in 'easy read' documents to recognise the role of individual capacity for language processing.

Key words

Easy read, intellectual disabilities, language, understanding, health, reasonable adjustments

Title

An open randomised controlled trial of the effects of linguistic simplification and mediation on the comprehension of 'easy read' text by people with intellectual disabilities.

Introduction

People with intellectual disabilities are more vulnerable to health inequalities compared to the general population (Dejong et al., 2002), with many having an elevated risk of comorbid and complex health-related difficulties (Cooper et al. 2015). Poorer health outcomes are associated with fewer opportunities to develop knowledge about health, and generally reduced understanding of health-related information (Gal & Prigat, 2005). This is related to lower literacy abilities and communication problems, which are relevant to self-determination regarding health (Emerson & Baines, 2010; Enderby & Davies, 1989; Law & Lester, 1991).

Legislation in England and Wales over the last 10-15 years has attempted to address some of these challenges. For example, the Disability Discrimination Act (2005) was developed to provide 'reasonable adjustment' in all areas of engagement with health. This was further reinforced through the Equality Act (2010) and the Accessible Information Standard (NHS England, 2016), which was added retrospectively to the Health and Social Care Act (2012). There is now a legal obligation for 'reasonable adjustment' of written and verbal *information* to be implemented by all organisations in England and Wales. In Scotland there are moves to legislate for inclusive communication within the Social Security (Scotland) Bill (RCSLT 2018). The adaptation of written material has become one of a number of approaches toward fulfilling this requirement, popularised particularly by people with intellectual disabilities often within user-led self-advocacy groups and national organisations in the voluntary and statutory sectors (e.g. Mencap, Change, NHS England). Such material is generated and used for a variety of purposes including minutes of meetings, reports, campaigns, health and safety information and guidance on access to services (Easyhealth 2010, United Response 2013).

Easy read material

'Easy read' is the term in the U.K. given to the range of documents that are written with simplified language in large print, usually produced with pictorial or photographic support and

targeted to an audience of people with intellectual disabilities. Its creation frequently involves 'the participation of end-users' (Voorberg et al 2015:1334) with reports of positive political and personal gain for those involved (Ward and Townsley, 2005, Owens 2006). Questionnaire data from a total of 119 UK Trusts (Hatton et al. 2011:17) about reasonable adjustments in healthcare settings revealed that information was four times more commonly presented in 'easy read' format than in DVD or audio formats, especially evident in primary care and mental health services for people with intellectual disabilities. Similarly, Tuffrey-Wijne et al. (2014) reported that hard copies in 'easy read' were the main adjustment to information in acute hospital settings for people with intellectual disabilities, despite little evidence of use.

Several sets of guidelines (e.g. MENCAP, 2002; the Department of Health, 2011; Inclusion Europe, n.d.) for creating 'easy read' material have been produced with recommendations about the use of basic words, simple grammar, and the avoidance of negative constructions and 'jargon'. They also advocate using pictures and symbols and give guidance on layout. To date, the wide variety of 'easy read' styles and designs published have suggested an equally variable interpretation of these and other guidelines (Waight & Oldrieve, 2015). Chinn (2014) argued that the production processes of 'easy read' material continues to concentrate minds on the functional (or surface) aspect of health literacy and less on communication and critical aspects of understanding.

Evidence for the value of adapting 'easy read' material and mediation: (extrinsic) factors

It could be argued that the complex processes involved in understanding both spoken and written information are not entirely addressed by the current focus on production of 'easy read' documents (Chinn 2014) adapted in line with current common guidelines. Over the last ten years there has been a proliferation of 'easy read' material but the question of effectiveness remains. Chinn & Homeyard's (2016) meta-narrative review of forty-two papers

revealed limited support for 'easy read' material in processes of involving people with intellectual disabilities in health care and in addressing health inequalities.

In a separate systematic review, Sutherland & Isherwood (2016) acknowledged that despite being a central characteristic of 'easy read' material there was a lack of evidence that images (e.g. pictures, photographs and symbols) increased understanding for people with intellectual disabilities. Hurtado et al (2014) has demonstrated that under certain conditions, picture material may in fact increase cognitive effort for some readers. (While picture material is not a focus of the present study, images have been included in task materials to credibly replicate typical 'easy read' documents as used in the UK.)

The simplification of language, also characteristic of 'easy read' material, has received less attention. Common surface readability measures such as Flesch-Kincaid (Poncelas & Murphy 2007, Fajardo et al. 2014) have provided some evidence that language generally used is 'simpler' in 'easy read' material than documents that are not adapted. However, Fajardo et al. (2014) found that the repeated use of nouns and verbs within 'easy read' documents (co-reference) had a negative rather than positive effect on participant comprehension scores, implicating a possible increase in cognitive effort compared to cognitive gain in terms of understanding the information. These findings directly challenge the UK Department of Health guideline that 'repetition is better than variety' (2010:28). Other experimental studies have further isolated and manipulated specific linguistic features of reading material prepared for people with intellectual disabilities. Fajardo et al. (2013) found that inferential understanding was positively influenced by the type and familiarity of the connectives used ('and, because, so, but'), while word frequency (use of more commonly-used words) did not have a significant effect on understanding. Tavares et al. (2014) also found that people with intellectual disabilities were less able to identify grammatical cues in written material than participants without intellectual disabilities. Such research suggests that a complex interplay of extrinsic linguistic factors in 'easy read' material could be influencing

the understanding of such information by people with intellectual disabilities and this is not well recognised in current commonly used guidelines.

For some people with intellectual disabilities, hearing spoken language may be easier to process than written language. The Accessible Information Standard (NHS England 2016) encourages the use of audio and video substitutes. Providing audio information may support some users of accessible information. However, using spoken language in conversation to create verbal mediation can more readily be adjusted (as a further extrinsic factor) with the aim of facilitating the process of understanding 'easy read' material. Nash and Heath (2011) investigated reading comprehension amongst people with intellectual disabilities and reported relative strengths in listening and understanding compared to reading and understanding. Mander (2016) showed that providing external mediating support through face to face explanation of the information in an 'easy read' document could be improved by making links to individual experience. She also found that outcomes were variable and depended largely on the quality of the support provided. Nonetheless, both studies boost the argument for the joint construction of a schema (or a story that relates to individual experience) around an 'easy read' document through conversation. Making adjustments to these two extrinsic factors (the written material and mediation) could circumvent cognitive (intrinsic) barriers to understanding. Reichenburg (2013), Alfassi et al. (2009) and van den Bos et al. (2007) made successful adjustments to mediation processes based on a model of Reciprocal Reading devised by Palinscar & Brown (1984). This takes the form of a brief verbal summary of the information, the clarification of text content page by page, an example of a question that could be asked about the information, and an example of predictive reasoning from the text. Verbal mediation that creates a schema can support the building of a personally relevant internal situation model (Mcnamara & Magliano 2009) that is considered central to readers' ability to derive meaning from a text.

Understanding 'easy read' information: cognitive (intrinsic) factors

Understanding information involves a complex interaction between environmental (extrinsic) factors already mentioned, and cognitive (intrinsic) factors. These coalesce within a person's cognitive environment. Wilson & Sperber's (2002) relevance theory asserts that we naturally engage most effectively with information (spoken, written or symbolic) that requires the least cognitive effort for the biggest and fastest cognitive effect. This will lead to the most successful relevant personal understanding of information. The reader's intrinsic cognitive abilities are therefore key to ensuring understanding. In children with intellectual disabilities, Nash & Heath (2011) showed that language abilities (specifically vocabulary knowledge) were correlated with reading comprehension, whilst Snowling et al. (2008) revealed phonological awareness to be a strong predictor of a wide variation in reading ability. Executive functioning skills such as working memory (Henry & Winfield 2010), phonological memory (van der Molen et al. 2007), recall, and visuo-spatial awareness (Numminen et al. (2002), are also critical to literacy. Carretti et al. (2010) observed that using these skills to update information and make inferences during reading is more demanding on people with intellectual disabilities than their typically functioning counterparts. Incorporating these elements, The Simple View of Reading (Hoover & Gough 1990) provides a two-strand model where the skill for decoding information using orthographic and phonological skills to recognise words and units from printed matter, sits alongside grammatical and semantic/vocabulary knowledge, which underpin the meaning of language.

As mentioned, psycholinguistic models of reading support the construction of a schema. They incorporate a situation model (McNamara & Magliano 2009) where the cognitive assembly of current information builds on prior knowledge. More life experience and added practice of interpreting information may positively contribute to constructing meaning from text. Numminen et al., (2002) revealed evidence that people with intellectual disabilities scored more highly on tasks that relied on long-term memory related to skill and knowledge base compared to younger typically developing participants who relied on working memory.

Positively capitalising on long-term memory by actively building on reader experience through mediation could lead to improved understanding.

People with intellectual disabilities, when challenged to read and understand an 'easy read' document will naturally gather as much information as possible by any route to make sense of what is in front of them. The process will be influenced by their executive functioning skills, their knowledge and interpretation of the picture or symbol systems being used and their level of interest and motivation. They may also be affected by the linguistic level and nature of the vocabulary and grammar used in the document, whether they have someone supporting them with an explanation, how well they can read, and their capacity for receptive and expressive language.

The current study aimed to investigate the effects of some of these extrinsic and intrinsic factors on users' understanding of 'easy read' material. A randomised experimental design addressed the following research question: How do adults with intellectual disabilities understand health-related 'easy read' information when extrinsic factors (i) linguistic complexity of the text, and (ii) literacy mediation, (in this case, help from a supporter), are considered, taking into account participants' (i) receptive vocabulary, and (ii) reading comprehension abilities (intrinsic factors)? It was hypothesised that differences in linguistic simplicity between texts would result in increased scores on The Easy Read Task for people with intellectual disabilities. Those who received mediation from a supporter were also hypothesised to score more highly on the Easy Read Task than participants who were given no mediation.

Method

Participants

Recruitment was kept as broad as possible to include a representative sample of people with intellectual disabilities who lived in the local community and who would be likely to receive 'easy read' health material. As a first stage in sample recruitment, approaches were made to day services for people with intellectual disabilities. In the UK, anyone attending such a service would have a diagnosis of 'intellectual disability' or 'learning disability' on their social service and health records. As such, they would be expected to have an IQ of below 70. Receptive vocabulary measures were used (Table 1) and these are known to correlate with IQ scores (Tilborg et al. 2014). Individuals were invited to participate if they: 1) were aged between 16 and 75, and 2) self-identified as having intellectual disabilities. Exclusions were made as follows: 1. difficulties with hearing or language that prevented one to one conversation in a familiar environment, and 2. inability to see font size 18 for reading. At a second stage, further inclusion criteria were applied after initial assessment measures were taken. These were that participants were able to: 3. complete a receptive vocabulary assessment (The British Picture Vocabulary Scales (BPVS II), Dunn et al., 1997) and 4. read 'Beginner Level' text (York Assessment of Reading Comprehension (YARC) 2nd edition, Snowling et al., 2011). Fifteen participants were excluded at this assessment stage or early in the experimental activity (The Easy Read Task). Twelve of these did not reach 'Beginner Level' reading on assessment, one was unable to continue with the vocabulary assessment, and two declined to continue after the reading assessment. The final sample comprised sixty participants with intellectual disabilities ($M_{age} = 38$ years, 9 months; $SD = 16$ years, 1 month; 43% men). Fifty-nine participants were of white British ethnicity, and one participant self-identified as British Asian.

Design and randomisation

The participants were randomly assigned to one of four conditions by the principal investigator using permuted-block sizes of four, stratified according to individuals' reading abilities, in order to ensure that groups were well matched. The four conditions were: 1)

Linguistically Simple Text with Mediation, 2) Linguistically Complex Text with Mediation, 3) Linguistically Simple Text with No Mediation, and 4) Linguistically Complex Text with No Mediation. Data were collected over a six month period in six urban and semi-rural community settings in the east of England with adults with intellectual disabilities.

A power calculation was made from estimates based on reading comprehension outcomes from two pilot trials of The Easy Read Task. Parametric ANOVA was considered likely to be used for the analysis. This data resulted in an effect size of $f = .56$; setting the significance level at 0.05, with power set to 0.80 which resulted in an estimated sample size of ten participants per group, or a minimum total sample size of forty.

Figure 1. Design and allocation Insert around here

Materials

Two texts were designed for The Easy Read Task. These aimed to replicate the 'most linguistically complex' and 'most linguistically simple' texts identified from all the available 'easy read' health literature produced by the Department of Health (DoH) in England up to March 2012 and available online (Buell et al. in preparation). Both texts were produced using images and layout to retain the face validity and thus credibility to participants, of typical 'easy read' documents produced in the UK. The content was based on information about food and keeping healthy with reference to 'You and Your Health' (MENCAP 2003) and 'Healthy Lives Healthy People' (DoH, 2011). This topic was chosen to provide a theme that could be familiar to a large number of participants with the potential to decrease cognitive effort for reading and understanding. Morgan & Moni (2008) described that learners' who were familiar with the relevant vocabulary, concepts and topics in a document demonstrated increased interest. Participants were not screened for their individual motivation towards completion of The Easy Read Task.

The two texts were matched in format, font type and size, and number of pages. Each document contained around two hundred and eighty words. Bullet points were used for word lists in both texts. The same content was supported with the same pictures as far as possible, contingent on the vocabulary used in the texts (Appendix 1). Initial versions of these texts were shown to the members of the project advisory group for feedback on face validity. Suggestions on layout, images and font were implemented based on group consensus. The content of these versions was then reviewed by a professional, familiar with 'easy read' material, and any further amendments were made as required. Finally, Flesch Kincaid (1948) readability measures, commonly used in the development of such material (Benjamin, 2012; Estrada et al., 2000; Gal & Prigat, 2005; Hurtado et al., 2014; Iacono et al., 2001; Moni & Morgan, 2008; Poncelas & Murphy, 2006) was then applied to four consecutive iterations of The Easy Read Task documents. **Vocabulary, syntax and sentence length were adjusted after each iteration. This continued until the surface level measures of linguistic complexity and simplicity in the texts were in line with the benchmark levels of linguistic difference found in excerpts from the most complex texts (USA Grade 14: university or college level) and the most simple texts (USA Grade 4: aged 8-9 years) measured from a cohort of all available DoH 'easy read' online documents. Notably, the 'easy read' DoH documents used as templates that measured as USA Grade 14 on the Flesch Kincaid Readability Scale (1948) contained linguistically complex material, long sentences, infrequent vocabulary or a combination of these despite being presented as the simplified versions of mainstream documents.**

Mediation procedures were prepared in the form of a script, based on a model of Reciprocal Reading (Palinscar & Brown 1984), previously shown to improve reading comprehension and motivation when used with adults with Intellectual disabilities (Alfassi et al., 2009; van den Bos et al., 2007, Reichenburg 2013). This process included four steps: a summary, the

clarification of text content page by page, an example of a question, and an example of predictive reasoning from the text.

Primary outcome measure

Eight questions were formulated to tap superficial recall, deep recall and the inferential application of information from within the text, based on the YARC (Snowling et al., 2011) model for assessing reading comprehension. Question-answer sequences ranged from being closely related to the text content (Question 1: What foods give you energy?) and graduated in difficulty to those that required inferential reasoning (Question 8: Imagine someone you know has broken her arm. What are the best foods for her to eat?). The scoring template was closely based on a validated method used in the YARC reading assessment. It was similarly designed to measure gradings of literal to inferential understanding of the 'easy read' material through the semantic closeness of answers to target information from within the text. For scoring purposes, each targeted response was accompanied by a definition, elaboration and examples to guide the assessor. A final total score out of a possible twenty-eight was calculated for each participant. Finally, the Easy Read Task was piloted with four volunteers from The Opening Doors Easy Read Advisory Group. Subsequently, minor procedural issues were addressed.

Procedure

Recruitment was undertaken and interventions were carried out in single sessions over a nine-month period from March to September 2014. The participants were seen individually in a quiet room in their usual day service setting. After a general explanation about The Easy Read Task, participants were given the choice of reading aloud or silently, with optional help to orthographically decode (read) words from the page aloud if required.

Delivery of mediation included pointing to relevant pictures and words and use of gesture as appropriate. Verbal explanations were closely aligned to the document with consistent vocabulary usage. Conditions 1 (Simple text) and 2 (Complex text) entailed four steps using the prepared scripts: (i) providing a summary of the topic; (ii) clarifying each point and any textual inferences; (iii) giving an example question related to the content; and (iv) a prediction of 'what might happen' was inferred by the mediator from the text information.

Conditions 3 (Simple text) and 4 (Complex text) who received No Mediation were reassured about performance prior to reading. They were given positive feedback for completing the reading but no structured explanations or verbal support to understand the text were provided.

Across all conditions, the researcher responded without elaboration to any questions, comments or queries initiated by the participants on reading completion. The participants were then asked the eight pre-prepared questions. Up to two repetitions of each question was allowed, triggered by 'no response' after 5 seconds. If there was still no response after a further 5 seconds, a non-text related prompt was given such as 'do you need more time?' or 'it's ok – you're doing this really well' to reassure the participant. If, after a further 5 seconds there was still no response, participants were given the option of hearing the question a fourth time or moving to the next question.

Figure 2 Procedure for The Easy Read Task Insert around here

Reliability

Inter-rater reliability of the scoring process was conducted on a random sample of the data representing a third of the participants (n=20) in two stages. Independent scoring was carried out **on this sample by a** professional skilled in linguistics and familiar with 'easy read' material. Inter-rater reliability was found to be, $k = 0.71$, indicating good to substantial agreement (Fleiss 1981 in Pring, 2005: 207).

Analysis

Data from all three measures (BPVS, YARC and The Easy Read Task) were entered into a database and analysed using SPSS Version 22 (IBM 2013).

A two-way ANOVA measured main effects of linguistic complexity and support on The Easy Read score, followed by ANCOVA with the inclusion of two covariates: reading comprehension and receptive vocabulary scores, both of which were anticipated to affect performance. The assumption of homogeneity of regression slopes was not violated for either receptive vocabulary, $F(1, 53) = 3.34, p = .073$, or reading comprehension, $F(1, 53) = <1, p = .638$, thus indicating that the assumptions governing the use of ANCOVA were not violated. Data were inspected for substantial departures from normality, and data associated with Condition 3 (Linguistically Simple with No Mediation) was found to be non-normal, and attempts to transform the data were unsuccessful. Therefore, nonparametric bootstrapping using 5000 samples with replacement was used to calculate both the p -value and bias corrected and accelerated confidence intervals around the parameter estimate. The p -value and confidence intervals reported throughout were calculated using bootstrapping. Nonparametric bootstrapping provides an estimate of the sampling distribution that is based on an original sample and is appropriate to use if the original sample is representative of the population being studied (Efron & Tibshirani, 1993). Posthoc testing was undertaken using the Sidak method and the associated p value was reported.

Results

Testing was carried out for matching across conditions on age, gender, vocabulary (BPVS) and reading comprehension (YARC). Means are shown in Table 1 below.

Levene's test showed normal distribution of data for participant age ($p > 0.05$). The distribution of gender across groups was evaluated using a Chi square test and no

significant differences were found, $X(3) = 5.7, p = .127$. Using ANOVA, there was also no significant difference found between the four groups on mean vocabulary levels (BPVS), $F(3, 56) = .465, p = .708$, or on reading comprehension scores (YARC), $F(3, 56) = 1.38, p = .260$. Levene's test for homogeneity of variance was non-significant ($p > 0.05$) for both tests, hence assumptions were not violated.

Table 1. Comparison of characteristics and pre-test measures for participants across conditions Insert around here

Mean scores for each group on receptive vocabulary (BPVS) and reading comprehension (YARC) are provided as age equivalent measures in months alongside standard deviation in months. No reading tests or receptive vocabulary assessments are available that are standardised on a population of adults with intellectual disabilities, so standard scores are not provided. The mean vocabulary score across all participants was 9;04 years ranging from <3;09 years to 15;09 years. Reading comprehension age-equivalent ranged from 4;10 years to >12;05 years. The mean age-equivalent reading comprehension across all participants was 7;01 years.

Table 2. Comparison of The Easy Read Scores across conditions Insert around here

Effects of Linguistic Complexity and Mediation on The Easy Read Task Scores

Unexpectedly, scores on The Easy Read Task did not differ significantly between those who were randomised to receive Mediation and those who received No Mediation, $F(1, 57) = < 1, p = .770, 95\% BC_a CI [-3.06, 2.17]$. Also unexpectedly, scores on The Easy Read Task did not differ significantly between those who were randomised to either the Linguistically Complex or Simple Text, $F(1, 57) = 1.63, p = .213, 95\%, BC_a CI [-.98, 4.32]$. There was no

significant interaction between Linguistic Complexity or Mediation, $F(1, 57) = 3.12, p = .084$, 95% $BC_a CI [- 9.50, 0.50]$.

Effects of receptive vocabulary and reading comprehension

There was a significant positive correlation between The Easy Read Task scores and receptive vocabulary, $r(60) = .686, p < .001, R^2 = .471$, and reading comprehension $r(60) = .579, p < .001, R^2 = .335$. The assumptions were met for ANCOVA as previously described and planned. Receptive vocabulary and reading comprehension were included as covariates separately in the subsequent analysis.

Controlling for receptive vocabulary (BPVS II scores), there was no difference in The Easy Read Task scores for those randomised to either the Linguistically Complex or Simple Text, $F(1, 57) = 1.18, p = .277, 95\% BC_a CI [-.84, 2.9]$, nor for those randomised to receive either Mediation or No Mediation, $F(1, 57) = 1.71, p = .186, 95\% BC_a CI [- 3.11, 0.72]$.

However, there was a significant interaction between Linguistic Complexity and Mediation, $F(1, 57) = 4.64, p = .039, 95\% BC_a CI [- 7.42, - 3.69]$ (see Figure 5.2.5). Posthoc testing revealed that the group who received the 'Simple Text with Mediation' performed significantly better on The Easy Read Task than the group that had the 'Complex Text with Mediation', $p = .011$. None of the other differences between the remaining groups were significant, $p > .05$.

When reading comprehension (YARC) ability was controlled, no significant main effect for Linguistic Complexity, $F(1, 57) = 1.28, p = .265, 95\% BC_a CI [- .98, 3.38]$, or Mediaton, $F(1, 57) = < 1, p = .400, 95\% BC_a CI [- 3.22, 1.27]$, was found. The interaction was not significant. $F(1, 57) = < 1, p = .371, 95\% BC_a CI [- 6.54, 2.26]$.

Discussion

It was hypothesised that an increase in linguistic simplicity within the current study would result in an improvement in readers' scores on The Easy Read Task, and that those who received mediation would also score more highly on the Easy Read Task than participants who were given no mediation. However, neither part of the intervention (mediation and linguistic simplicity) as extrinsic factors, had any significant effect on participants' understanding of the easy read texts. Mediation did not have an effect on participant performance on the task regardless of whether they received simple or complex text. As anticipated, a substantial portion of the variance within comprehension performance on the Easy Read Task was explained by both receptive vocabulary and reading comprehension scores, indicating that language ability was a critical factor. When the influence of receptive vocabulary was controlled, those who received the linguistically simple text with mediation performed significantly better than those who received the linguistically complex text with mediation, while there was no difference between groups when reading ability was controlled. It appears that the critical factors in participant performance were linked to intrinsic language abilities rather than to the extrinsic factors which comprised the intervention (simplified written language and standardised mediation).

The intrinsic factors of influence under scrutiny in this study were reading comprehension ability and vocabulary knowledge. Constructing relevant understanding (Sperber & Wilson 1986) from The Easy Read Task material relied on reducing the cognitive demand on reading and language skills, to optimise cognitive gain. Average scores for participants on vocabulary (BPVS) testing were higher overall than reading comprehension scores (YARC) which indicated that vocabulary knowledge may have been used to compensate for weaker reading skills. Word recognition and understanding of vocabulary have been demonstrated to underpin reading comprehension skills in people with intellectual disabilities (Snowling et al., 2008; Nash & Heath, 2011). It was therefore not surprising that vocabulary knowledge was shown in this study to be the variable with most influence on overall understanding.

Applying language abilities to reading involves a range of other cognitive skills such as phonological and working memory, recall, visuo-spatial awareness and the ability to continually update information while reading. People with intellectual disabilities have been shown to find the integration of these skills for successful reading challenging (Henry & Winfield, 2010; Van der Molen et al., 2011; Numminen et al., 2002; Carretti et al., 2010). The complex processing of these extrinsic influences through the integration of intrinsic skills during any given moment in real time is suspended, either when cognitive overload is reached, or when personally relevant meaning is established (Wilson & Sperber 2002). The danger with 'easy read' material in its current manifestation is that readers arrive at cognitive overload or erroneous understanding long before establishing accurate relevant meaning.

Alternative explanations possibly lie in the linguistic complexity of the Easy Read tasks. The texts modelled on examples of the least and most complex UK Department of Health 'easy read' documents and required participants to read several pages of text before answering questions. The average reading ability of participants was 7;05 years (Grade 2) which was well below the Flesch Kincaid (1948) Grade Levels 4 and 14 of The Easy Read Tasks (age equivalents of 8-9 years and 16+ years respectively). In line with Relevance Theory (Wilson & Sperber 2002), weak readers faced with a relatively high cognitive reading load would perceive low cognitive gain in taking part in this task. Thus some readers may have stopped searching for relevant information when the task became too demanding. Others possibly interpreted information from available images. Indeed, although the same picture material was used in both texts, individual interpretation could have varied considerably across participants in support of their understanding of the text and this was not directly measured here. Participants may also have interpreted information from verbal cues and familiar key words in an attempt to construct personal meaning from the documents. Furthermore, attentional focus by weaker readers may have centred on decoding relevant single key words at an orthographic level (letters) at the cost of being able to make inferences from the

whole text for deeper understanding. Reducing cognitive load by adjusting linguistic complexity (extrinsic factor) to make the 'Linguistically Simple' document easier to read may therefore have had less impact on reducing participants' cognitive effort than the presence of familiar vocabulary that was recognisable and relevant to the reader.

The creation of situation models during reading occurs by recognising key words and conceptualising them through personal experience (Mcnamara & Magliano 2009). Although mediation (extrinsic factor) in this study incorporated an inferential example to 'real life', links were not personalised to the individual. It could be argued that mediation delivered as part of the intervention served only to reinforce surface understanding for some readers. According to Relevance Theory, increasing the possibility of creating relevance quickly and easily and how well it leads to a better level of understanding is also contingent on the unique background and profile of that individual (Wilson & Sperber 2002). Studies have shown that people with intellectual disabilities with increased life knowledge and experience (Numminen et al. 2002) out-performed their cognitively-matched participants without Intellectual disabilities on vocabulary tasks. As adults, they continued to develop new vocabulary particular to their own experiential understanding of the world. This points to the need for a more integrated model of producing 'easy read' material that does not solely rely on format alongside an adjustment of the processes by which it is presented to readers and used thereafter to expand and embed understanding. It expands on Chinn's (2014) argument that deeper level understanding of health information were consistently less well addressed compared to surface level aspects. Harnessing the previous personal experience and vocabulary knowledge of individual readers through mediation and supporting new learning could play an important part in the ongoing construction of meaning and relevant understanding of complex concepts.

Manipulation of extrinsic factors: linguistic complexity and standardised mediation as an intervention for improved understanding contributed to shaping The Easy Read Task but neither had a significant effect on comprehension outcomes for participants. As expected, adjusting linguistic complexity made no difference to participant performance. Repetition of vocabulary resulting from the simplification process may have reinforced concepts at a superficial level, but it did not appear to impact on deeper understanding. This corroborated Fajardo et al.'s findings (2014) where increased use of referents (repetition of words) led to reduced reading comprehension scores in participants with intellectual disabilities. It further calls into question recommendations to use repetition by the Department of Health 'easy read' guidelines (2012) in the UK. Whether through common practice or unintended outcome, the increased repetition of words and phrases cannot always be considered to effect better understanding of 'easy read' material.

Mediation as part of the intervention based on reciprocal reading (Palinscar & Brown 1984) comprised a structured summary, an explanation of the text, clarification of points and an example of inferential information. It incorporated the reinforcement of key words and their corresponding images through pointing, giving explanations that aimed to make inferences explicit and the use of gesture where appropriate. At the very least, it allowed participants in Conditions 1 and 2 (with mediation) to have exposure to the text content more than once, and extra time to process the information compared to those in Conditions 3 and 4.

Providing a summary, explanation and clarification of points compensated for participants who had weak phonological and orthographic decoding skills (Snowling et al. 2008).

However, processing the verbal summary still required good vocabulary knowledge (Nash & Heath 2011) and the integration of executive functions such as memory (Henry & Winfield 2010; van der Molen et al., 2011) and visuo-spatial awareness (Numminen et al., 2012).

Furthermore, giving an example of how the information might be inferred in an imaginary situation did not necessarily trigger the personal assembly of a situation model (McNamara

& Magliano 2009) that was relevant to the reader's own life. Developing active role play through drama (Donaghey and Anderson, 2015) and board games (Montenegro and Greenhill, 2015) or facilitating real-life experiences through visits, discussion and story-telling (Cameron, 2015; Grove, 2014) alongside the use of an 'easy read' text could encourage an easier and more effective assembly of a situation model from text.

While mediation as an intervention might have benefited some participants, it focused on only one channel of support in the form of auditory-verbal-gestural repetition of the content with little reciprocity in the conversation. Although mediation allowed for responses to any number of participant initiations, participants were informally observed to be mainly passive during mediation as evidenced by the lack of communicative initiations. Although this has been identified as a pattern in the reading behaviour of people with intellectual disabilities (Chinn, 2016; Gersten et al., 2001; Reichenburg, 2013), the extent of the passive response to mediation in this experiment was unexpected. Alfassi et al. (2009) relied on repeated and shared dialogue in their successful implementation of reciprocal reading which led to increased reading comprehension in adults with intellectual disabilities. It could be argued that those participants trying to read and understand the linguistically complex text in The Easy Read Task found that mediation, became simply another source of input and ultimately increased cognitive load as Hurtado et al. (2014) have also evidenced. This is one possible explanation for why mediation seemed to be more effective when combined with the Linguistically Simple text, where cognitive demand was lower overall, than with the Linguistically Complex text where more competing stimuli were present. According to Relevance Theory (Sperber & Wilson 1986), every personal interaction brings with it a number of additional and variable stimuli, many of which can be construed as implicit and these will require interpretation and inference. In line with this model of communication, mediation could have the effect of either *reducing* or *increasing* cognitive effort.

The centrality of the document within The Easy Read Task interactions may have been unrepresentative of common practice. Mander (2013) found that 'easy read' material was useful in establishing joint attention in observed health consultations, but she gave more prominence to the level, choice and accuracy of the *language* used by the mediators. Although the 'easy read' documents functioned as one corner of Mander's triad model (mediator - document - reader), they did not feature centrally in the analysis of interactions. This raises questions concerning the role that 'easy read' documents played out within those interactions and the role that they are expected to play by producers.

It should be noted that while this study has a number of strengths, it was a relatively small scale study. The material in The Easy Read Task was created to maintain face validity and included coloured images and text, increased amounts of white space, bullet points and larger font. It must be acknowledged that these and other typical features present could have contributed positively or negatively to participant outcomes but their roles were not examined in this study. Similarly, although care was taken to choose a current and common topic, familiar to most participants, groups were not compared on their exposure to this information pre-intervention. Varying personal experience could have impacted on the outcomes. It should also be acknowledged that differing levels of motivation to engage with The Easy Read Task may also have affected performance. This was not a direct focus within the scope of the present study and was therefore not specifically measured. There were also inherent difficulties in structuring experimental work in the field of literacy where there are a range of possible confounding effects due to the number of competing cognitive variables at play. As part of The Easy Read Task, participants had to retain the information they had read for long enough to process and respond to questions. Those with poorer working memories or verbal receptive skills might have achieved less well on the questions due to memory lapses or receptive language abilities rather than because of reading comprehension difficulties. Further, the researcher completing the assessments was not

blind to participant allocation, bearing in mind that all participants received an intervention that varied according to two factors. It is also important to note that randomisation and data management were not managed independently. A more strictly validated template for scoring may have captured the range of variability within the sample more reliably.

Conclusion

Intervention through manipulating mediation and linguistic simplification made no difference to participants' ability to understand 'easy read' documents. Emerging from this study is the message that 'easy read' material, while it might contain important and specific information relevant to people with intellectual disabilities, as a stand-alone artefact, it does not ensure anything more than possible surface level understanding of its content. The key to deeper level understanding of such documents is to ensure that the reader has a way of constructing relevant meaning from the presented information. This depends on adjusting contingent mediation processes to account for readers' individual levels of language capacity, vocabulary knowledge and life experience through making textual inferences explicit, expanding and elaborating meanings, teaching new vocabulary and relating text content to the lived experience of the reader. Without a better appreciation of the complex interactions between the intrinsic and extrinsic factors involved in understanding health information, 'easy read' documents risk continuing to function superficially as no more than 'a cosmetic device' (Walmsley 2013:17).

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Table 2. Comparison of characteristics and pre-test measures for participants across conditions

	Condition 1 Simple Text with Mediation	Condition 2 Complex Text with Mediation	Condition 3 Simple Text with No Mediation	Condition 4 Complex Text with No Mediation	<i>p</i>
<i>Background Characteristics</i>					
Gender					
Male	n = 3 (20%)	n = 8 (53%)	n = 6 (40%)	n = 9 (60%)	.127
Female	n = 12 (80%)	n = 7 (47%)	n = 9 (60%)	n = 6 (40%)	
	M (SD)	M (SD)	M (SD)	M (SD)	
Age (years; months)	39;03 (15)	43;08 (17;08)	38;05 (20;02)	36;01 (14;06)	.676
<i>Language and Reading Pre-Test Variables</i>					
Vocabulary (BPVS)_a	113.07 (35.75)	118.60 (44.95)	102.60 (39.21)	115.07 (35.59)	.708
Range					
Reading Comprehension (YARC)_a	113.07 (35.75)	118.60 (44.95)	102.60 (39.21)	102.60 (39.21)	.260

a = Scores given in months as used in data analysis

Table 2. Comparison of The Easy Read Scores across conditions

Easy Read Task score (possible 28)	Condition 1 Simple Text with Mediation	Condition 2 Complex Text with Mediation	Condition 3 Simple Text with No Mediation	Condition 4 Complex Text with No Mediation	<i>p</i>
Mean (SD)	16.8 (4.43)	12.87 (5.17)	14.13 (5.18)	14.73 (5.05)	.245
Range	9-23	4-21	5-21	5-24	