Research in Developmental Disabilities 32 (2011) 37–46

Contents lists available at ScienceDirect

Research in Developmental Disabilities

A visual aid to decision-making for people with intellectual disabilities

Rebecca Bailey [a], Paul Willner [a,b,*], Simon Dymond [b]

[a] Directorate of Learning Disability Services, Abertawe Bro Morgannwg University Health Board, United Kingdom
[b] Dept. of Psychology, Swansea University, United Kingdom

ARTICLE INFO

Article history:
Received 3 August 2010
Accepted 19 August 2010

Keywords:
Decision-making
Intellectual disability
Temporal discounting
Financial decision-making task
Real-life decision-making
Visual aid

ABSTRACT

Previous studies have shown that people with mild intellectual disabilities have difficulty in 'weighing-up' information, defined as integrating information from two different sources for the purpose of reaching a decision. This was demonstrated in two very different procedures, temporal discounting and a scenario-based financial decision-making task. In the present study, both tasks were presented to 24 participants who attended day services for people with learning disabilities (mean Full-Scale IQ = 59.8), half of whom were trained to use a visual aid to support decision-making. Performance of control participants did not change over repeated testing, but use of the visual aid substantially improved the quality of decision-making on both tasks: temporal discounting performance became more orderly, and participants were able to provide more information to justify their decisions in the financial decision-making task. The visual aid also substantially improved participants' ability to justify decisions they made about their own lives. We suggest that, while the visual aid was designed and evaluated as a means of increasing the quality of reasoning that supports a decision, it may also have potential as an aid to therapeutic interventions aimed at encouraging wiser decision-making.

1. Introduction

Decision-making is only possible if the decision-maker has the mental ability to engage in reasoning and manipulate information rationally, so as to weigh the pros and cons of the alternative outcomes (Buchanan & Brock, 1989; Grisso & Appelbaum, 1998; Mental Capacity Act, 2005). There are numerous factors that influence the difficulty of any particular decision (British Psychological Society, 2006), but one factor that bears particularly on the ability to weigh information is the dimensions in which the elements of the decision are expressed. Weighing-up two items of information is very simple when they are expressed in the same dimensions (e.g. the choice between paying £10 or £100 for the identical outcome), but becomes much more problematic when there is a need to integrate information from two or more sources that are expressed in different dimensions (Green & Myerson, 2004).

The problem of integrating information that is expressed in different dimensions is captured by a popular laboratory decision-making task, temporal discounting (TD), in which decisions are based on both the magnitude and the delay of an expected reward. In TD tasks, participants are presented with a series of choices between small immediate and large delayed rewards. The overwhelming majority of typically developing adult participants produce an orderly trade-off between magnitude and delay, such that larger rewards are preferred at short delays, but smaller rewards are preferred when there is a long wait for the larger alternative (Chapman & Elstein, 1995; Critchfield & Kollins, 2001; Estle, Green, Myerson, & Holt,

* Corresponding author at: Community Support Team, The Laurels, 87 Lewis Rd, Neath SA11 1DJ, United Kingdom.
E-mail address: p.willner@swansea.ac.uk (P. Willner).

0891-4222/$ – see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ridd.2010.08.008

2007; Green & Myerson, 2004; Reynolds, 2006; Wileyto, Audrain-McGovern, Epstein, & Lerman, 2004). Using a version of the TD task designed for young children to use without prior training (Scheres et al., 2006), we found that, unlike typically developing participants, almost all participants with intellectual disabilities either behaved randomly, or used only a single source of information: there was very little evidence that participants were taking both sources of information into account and 'weighing' them. Furthermore, when a single source of information was used, this usually took the form of impulsive responding: choosing the immediate alternative, irrespective of the pay-off (Willner, Bailey, Parry, & Dymond, 2010a, 2010c). The ability of participants with intellectual disabilities to respond consistently in the TD task was strongly related to executive functioning, but was not significantly related to IQ (Willner et al., 2010a, 2010c).

Very similar results were seen in a second, more realistic, financial decision-making task (FDMT) that was developed for use with people with intellectual disabilities (Suto, Clare, Holland, & Watson, 2005). The task consists of five scenarios, of increasing complexity, describing choices that people identified in the scenario need to make, each followed by a structured interview, based loosely on the MacArthur Competence Tool (Grisso, Appelbaum, & Hill-Fotouhi, 1997). While participants with intellectual disabilities were usually able to make a decision, they were very rarely able to provide more than a single pro or a single con to justify it: there was very little evidence in either task that information from two sources was being 'weighed'. As in the TD task, there was a strong relationship between performance in the 'reasoning' component of the FDMT and executive functioning, but no significant relationship to IQ (Willner et al., 2010c).

Taken together, these two studies suggest that executive functioning, rather than IQ, underpins reasoning abilities in people with intellectual disabilities, and that, as a result of problems in executive functioning (Willner, Bailey, Parry, & Dymond, 2010b), they may have a general difficulty in integrating information from two sources. In the present study, we have sought to use these insights to design and evaluate a decision-making aid aimed at improving reasoning ability.

Executive functioning refers to the complex set of cognitive processes that regulate an individual's ability to organize thoughts and activities, prioritize tasks, manage time efficiently, and make decisions. They include goal setting and planning, organization of behaviour over time, response initiation, response inhibition, attention, working memory, set shifting and fluency (Lezak, 1982; Meltzer, 2007; Pennington & Ozonoff, 1996). The executive functioning system uses internal resources to manage situations where responding in habitual, automatic ways to external stimuli would not produce the desired outcome (Norman & Shallice, 1986). Programmes to assist people with problems of executive dysfunction (e.g. following a traumatic brain injury) typically include external practical aids (e.g. alarms or diaries) to compensate for deficient internal processes. Research has shown that executive functioning encompasses three broad sets of skills: inhibition of impulsive responding, mental flexibility (initiating actions or changing strategies under internal control), and using working memory to monitor one's own behaviour (Miyake et al., 2000). The visual aid described here has features that are relevant to each of these areas.

If what makes 'weighing-up' difficult is the need to integrate information that is expressed in different dimensions (Green & Myerson, 2004), then the solution to this problem is to translate all of the information into a common currency. The most familiar example of a common currency is money: a choice between two alternative outcomes is often made by estimating and comparing their respective monetary values. Here, we taught participants to translate information about the pros and cons of different choices into a single evaluative dimension by manipulating coloured bars, where the lengths of the bars corresponded to the values ascribed to the different items of information. On the basis of the cultural connotations of green as good (traffic lights, environment), green and red bars were used to represent benefits and costs, respectively, and participants were taught to 'choose the greenest' option.

We describe an evaluation of the decision-making aid using the two tasks described above, and an extension to real-life decision-making. It was predicted that use of the visual aid would improve participants' ability to 'weigh-up' information, and that by so doing, would also help participants to inhibit impulsive responding.

2. Method

2.1. Design

The study involved two groups of participants (initially, $n = 12$ per group) who performed a series of decision-making tasks. One group was supported for each task by the use of a visual decision-making aid; the other was not.

2.2. Participants

The participants attended day services for people with mild to moderate learning disabilities. [The term 'learning disability' is used in the UK to refer to people with significant impairments of both intellectual and functional abilities, acquired in childhood (British Psychological Society, 2000). Participants' disabilities were of mixed etiology, and the etiology was typically unknown.] All participants provided informed consent and the study was approved by the Local National Health Service Research Ethics Committee. Participants were screened using a simple test of financial knowledge (Coins and Costs: Willner et al., 2010a), with a threshold value of 4. All potential participants met this criterion.

Participants were assessed for intellectual ability using the Wechsler Abbreviated Scale of Intelligence (WASI), so as to confirm that they met the IQ criterion for a diagnosis of 'learning disability' (Full-Scale IQ < 70), and for receptive language ability using the British Picture Vocabulary Scale (2nd edition) (BPVS).