

**USING VIDEO SELF-MODELLING TO
IMPROVE THE READING ATTITUDES OF
STUDENTS WITH DYSLEXIA**

A thesis submitted in partial fulfilment of the requirements for the Degree

of

Master of Science in Psychology

James Maguire

University of Canterbury

2015

Supervisors:

Professor Neville Blampied, Department of Psychology

Mr Lawrence Walker, College of Education

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Abbreviations

VSM:	Video Self-Modelling
PSR:	Positive Self-Review
FFVSM:	Feedforward Video Self-Modelling
WRAT-4:	Wide Range Achievement Test –Fourth Edition
SARA:	Survey of Adolescent Reading Attitudes
AD:	Academic Digital
AP:	Academic Print
RD:	Recreational Digital
RP:	Recreational Print
DRD:	Daily Reading Diary
RCI:	Reliable Change Index
RCCrit:	Reliable Change Criterion
PA:	Phonological Awareness

Acknowledgements

I would like to thank my supervisors Neville Blampied and Lawrence Walker for their feedback and guidance over the past year. I would also like to thank Liz Waugh for her training in administering the WRAT-4 and Robyn Daly and Janet Cumberpatch for their administrative support.

I would like to express my gratitude to The Dyslexia Foundation of New Zealand for advertising my study and also to the principals and teachers for their help finding participants and for letting me use rooms at their schools to carry out the pre- and post- intervention sessions.

Thank you to the participants who volunteered to take part, I appreciated the effort they put into watching their videos and filling in their daily reading diary everyday during the intervention. Thank you to the parents of the participants for their support ensuring the participants stayed on track.

Thank you to Emily Maguire for her help with my practice videos and tests, and to everyone else who has helped me complete this thesis.

Dedication

I have had many inspiring teachers and lecturers over the years, however, although he is probably unaware of it one teacher passed on some advice that changed my outlook on life and gave me the perseverance to overcome numerous obstacles. For this reason, I would like to dedicate this thesis to Mr Kevin Bradshaw.

If

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Equals

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Then

K + N + O + W + L + E + D + G + E

11 + 14 + 15 + 23 + 12 + 5 + 4 + 7 + 5 = 96%

H + A + R + D + W + O + R + K

8 + 1 + 18 + 4 + 23 + 15 + 18 + 11 = 98%

Both are important, but fall short of 100%. However,

A + T + T + I + T + U + D + E

1 + 20 + 20 + 9 + 20 + 21 + 4 + 5 = 100%

Therefore Attitude is everything.

Abstract

Individuals with dyslexia have an unexpected difficulty learning to read. This difficulty produces other effects, such as poor reading attitudes, meaning many choose not to read. Reading is a valuable source of information and entertainment, therefore individuals with dyslexia require better reading support. This study attempted to develop an intervention to improve reading attitudes using video self-modelling (VSM). VSM involves individuals watching carefully created videos of themselves correctly performing target behaviours. During this 1 month intervention, 14 participants (13 male and 1 female) aged 9-14 who had dyslexia were asked to watch a weekly video of themselves silently reading one of four types of material: academic digital, academic print, recreational digital or recreational print. The participants' reading attitudes and ability were measured before and after the intervention using the Survey of Adolescent Reading Attitudes and the Wide Range Achievement Test–Fourth Edition, respectively. Their reading habits and affect while reading (as a proxy measure of reading attitudes) were monitored during the intervention using a daily reading diary. This study did not detect any systematic or reliable changes in reading habits, affect while reading, reading attitudes and reading skills. This may have been due to limitations in the procedure, or it is possible that VSM cannot affect attitudes and that reading attitudes alone do not have a strong influence on ability. Consequently, future research should use VSM to help individuals with dyslexia by focusing on specific reading skills, such as phonological awareness.

Using Video Self-Modelling to Improve the Reading Attitudes of Students with Dyslexia

Reading is a highly valued skill in our society because it is a lucrative source of information and entertainment. On account of this, one of the main concerns of early education is that children learn to read well. In turn, the ability to read becomes a cornerstone for future academic success. Not only is this essential for employment, but it allows individuals to explore their interests. However, there are many people who, despite an adequate education, have unexpected difficulties learning to read. Because they struggle with reading they are at risk of not reaching their full personal and academic potential. These are individuals with dyslexia.

The study reported in this thesis aimed to find a new way to help individuals with dyslexia read more regularly and with greater accuracy. To understand the intervention used in this study, the following review will explore what dyslexia is, why it is a problem, and how it is treated. The next part of the review will consider what reading attitudes are, whether they are important and if they can be changed. The behavioural intervention known as video self-modelling (VSM) may provide a solution, so this review will go on to elaborate on what VSM is, how it is commonly used, and how it could help individuals with dyslexia. Finally, the current study will be outlined and discussed.

Dyslexia

History. Ever since humans began to use printed symbols to convey words and ideas there must have been individuals who had difficulty learning to read (Shaywitz, Morris, & Shaywitz, 2008). However, the phenomenon of dyslexia has only become the focus of systematic study within the last 150 years. The word *dyslexia* is derived from the Latin word *dys* (difficult) and either the Latin word *legere* (to read) or the Greek word *lexia* (speech); thus, the word dyslexia literally means difficulty with reading (Richardson, 1992). The term was coined in 1887 by the German ophthalmologist, Dr. Rudolf Berlin (Wagner, 1973).

Berlin used the term to describe patients who had acquired a type of wordblindness due to disease in the brain. The first reported case that resembles the modern concept of dyslexia was published in 1896 by the British physician, W. Pringle Morgan (Morgan, 1896). In this report, Morgan described a bright 14 year-old boy who had difficulties spelling in spite of laborious and persistent training. Morgan stated that this was a case of congenital wordblindness, but it is striking how similar his description of the symptoms is to the descriptions of dyslexia that are seen around the world today.

Research on dyslexia during the early 20th Century was based on the theory that dyslexia was caused by a visual deficit that made individuals read words backwards or upside-down. In the 1970s it was suggested that dyslexia stemmed from difficulties in processing the phonological aspects of speech, which results in individuals having problems associating sounds of a word with its written letters. More recently, studies have used neuroimaging techniques to show the differences in the way the brain of an individual with dyslexia develops and functions (Ministry of Education, 2006).

Dyslexia is a controversial topic due to the lack of consensus regarding its definition and characteristics, and the contradictory theories surrounding its causes (Elliott & Grigorenko, 2014). Regardless, there is a clear phenomenon of dyslexia, as many people have an unexpected difficulty in reading. Because reading is important in our society, these people require support.

Definition. Dyslexia is a specific learning disorder (SLD). According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V, American Psychiatric Association, 2013), the diagnostic criteria for a SLD are:

- A. At least one of the following difficulties being persistent for at least 6 months:
inaccurate and slow reading, difficulty comprehending what is read, difficulty

spelling, difficulties with written expression, difficulties mastering numbers and difficulties with mathematical reasoning;

- B. The affected academic skill is substantially and quantifiably below what is expected for the individual's age and it causes interference with academic performance;
- C. The difficulties begin during school years;
- D. There are no other explanations that better account for the difficulties.

All four criteria must be met in order to receive the diagnosis. Additionally the affected academic domains should be specified; for example, if reading skills are impaired then the individual may be diagnosed with a specific learning disorder with impairment in reading. The DSM-V goes on to note that the term dyslexia may be used as an alternative to refer to problems with accurate or fluent word recognition, poor decoding and poor spelling abilities (American Psychiatric Association, 2013).

Individuals with dyslexia have difficulty reading fluently. The lack of fluency requires individuals to read manually rather than automatically. This drains attentional resources, which might explain why individuals who are struggling to read often appear not to be paying attention, or at the extreme have comorbid ADHD (Pennington, Groisser, & Welsh, 1993). Similarly, Snowling (2013) points out that slow and inaccurate reading can lead to poor comprehension, but that this should not be confused with reading comprehension impairment, which can occur in the absence of poor decoding. This suggests that it is a distinct disorder. Bishop and Snowling (2004) conducted a review which proposed that reading disorders should be divided along two dimensions, decoding ability and comprehension ability. This results in four types of readers: non-impaired, those with poor decoding (dyslexia), those with poor listening comprehension (poor comprehenders), and those with impairments in both decoding and listening comprehension.

There are a variety of definitions of dyslexia that appear in the literature. The definitions change over time as research sheds new light on the possible causes of the disorder. A popular definition that recognises the current understandings portrayed in the literature comes from Lyon, Shaywitz, and Shaywitz (2003):

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterised by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary, consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (p. 2).

Characteristics. The characteristic problem individuals with dyslexia have is unexpectedly slow and inaccurate reading. They also experience difficulties in spelling, ability to master a foreign language, handwriting, and attention (Lyon et al., 2003); and possibly even subtle issues with spoken language (Shaywitz et al., 2008). In contrast to these difficulties, other cognitive abilities, including thinking, reasoning, vocabulary, and listening comprehension, are usually intact. As a result, dyslexia has been traditionally defined by a discrepancy between IQ and reading ability. However, the characteristics and severity of dyslexia vary between individuals, and individuals who have difficulties with these skills may not be dyslexic (Ministry of Education, 2006).

Prevalence. The DSM-V claims that the prevalence of SLDs in school-age children ranges from 5%-15% worldwide and the prevalence in adults is approximately 4% (American Psychiatric Association, 2013). It can be difficult to determine the prevalence of dyslexia in New Zealand because it was only formally recognised by the New Zealand Ministry of Education in 2007. Regardless, Chapman, Tunmer, and Allen (2003) reported the New

Zealand data of the International Adult Literacy survey. As part of this study, geographic regions, households, and then individuals were randomly selected to complete the questionnaire. The questionnaire measured several factors, such as occupation and total level of education. However, of importance here, was the question, “Did you ever have a learning disability?” Just over three thousand participants aged between 16 and 65 answered this question. Of these, approximately 7.7% indicated that they had a SLD (the males:females ratio was 3:2). However, this study is limited because it relied on self-report and the experience of having an SLD was not independently verified. Also the questionnaire did not measure dyslexia specifically, therefore, the prevalence of dyslexia in New Zealand is probably lower than 7.7%. Regardless, based on this study the Ministry of Education estimated that 265,000 adults in New Zealand have dyslexia (Ministry of Education, 2006).

Sex Difference. There is also debate over the apparent gender difference. There is a longstanding belief that reading difficulties such as dyslexia are more common in males than females. To test this Shaywitz, Shaywitz, Fletcher, and Escobar (1990), compared school-identified disabled readers with independently-identified disabled readers. Their results indicated that there is a bias in the school referral system that favours males. This is because males tend to be more active and impulsive in childhood and are therefore more likely to be noticed compared with their quiet female counterparts. Thus it is possible that a relatively equal number of males and females struggle to read.

Why Dyslexia is a Problem

Some believe that reading problems are outgrown or somehow represent a developmental lag. However this view has not been supported in the literature. Studies have indicated that reading difficulties are persistent and do not remit with age or time (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Shaywitz & Fletcher, 1999). Early intervention is important because it is more effective compared to when it is administered

later (Torgesen & Hudson, 2006). Unfortunately, many children are not recognised as having dyslexia or are not given appropriate instruction early on. This can lead to a Matthew effect (Stanovich, 1986). This is the phenomenon where the difference in ability between skilled and less skilled readers widens over time until it is nearly insurmountable. This rich-get-richer effect occurs because individuals who have positive reading experiences, read more often, and as a result build their vocabulary and fluency at a faster rate (Chapman & Tunmer, 1997). On the other hand, poor readers tend to avoid reading, which impedes the development of their literacy skills. Because of this, individuals with dyslexia require additional support.

How Dyslexia is Treated

Numerous interventions have been developed to try to treat individuals with dyslexia. These range from traditional reading training programs through to programs that focus on balance and coordination (A. W. Alexander & Slinger-Constant, 2004). Other people even recommend taking dietary supplements such as omega-3; however, this has not been supported by empirical research (Kairaluoma, Närhi, Ahonen, Westerholm, & Aro, 2009). Regardless of the contents of the intervention, any intervention for individuals with dyslexia should aim to improve their reading ability.

Church (2005, December), points out that reading is a combination of decoding written words and comprehending what they mean. Children who have reading difficulties often benefit from fluency or comprehension training. However, the national reading panel review found that accurate reading requires the development of phonological awareness before fluency, vocabulary, and comprehension (2000). Thus, it is no surprise that a large number of studies have found that individuals with dyslexia particularly benefit from interventions that target phonological awareness (Duff & Clarke, 2011; J. M. Fletcher, 2007; Snowling & Hulme, 2011).

Although many of these interventions have been successful, there is still potential to optimise the treatment of individuals with dyslexia. The interventions mentioned above can be classified as skill development interventions; there is also another category of interventions known as self-enhancement interventions. These focus on improving mental constructs such as self-esteem, self-concept and attitudes. This type of intervention should not be used as a replacement for an effective skills training program because self-esteem enhancement in itself is not a solution to the problem of academic failure (Muijs, 1997). However, they could be used as supplementary interventions that do not directly focus on academic skills, which should make them more enjoyable. Hopefully an intervention like this will reinforce positive reading behaviours and give the participants the perseverance to continue with other, more demanding, interventions.

There is substantial research that shows that individuals with learning disorders, such as dyslexia, have more negative academic self-concepts compared to their non-disabled peers (Burden, 2008; Chapman, 1988; Polychroni, Koukoura, & Anagnostou, 2006; Zeleke, 2004). To clarify, self-concept refers to the beliefs people have about themselves; self-esteem refers to how they feel about those beliefs. High academic achievement is correlated with high academic self-concept (Burden, 2008). Burden and Burdett (2005) found that students who attended a school for students with academic difficulties showed an increase in academic self-concepts across the grade levels. Yet, there have not been any successful attempts to improve the academic self-concept of individuals with learning disabilities.

Academic self-concept is a vague term. Attitudes, specifically attitudes towards reading, may be a clearer target for intervention. Before ruling out self-enhancement interventions altogether, prior research should be examined to determine if targeting reading attitudes could provide an additional method to help individuals with dyslexia read better.

Reading Attitudes

Definition of attitudes. According to Kassin, Fein, and Markus (2011), an attitude is an affective, evaluative reaction toward a person, place, issue, or object. These evaluations can vary in strength along both positive and negative dimensions, which results in four types of affective reactions: positive, negative, ambivalent, or indifferent. These evaluations often form immediately and automatically, which can enable individuals to judge quickly without much thought. However, they can also make individuals biased and resistant to change. This study focused on attitudes towards reading.

Definition of reading attitudes. Over the years several specific definitions of reading attitude have been offered. For example, Teale (1980) defined reading attitude as “the disposition to respond in a favourable or unfavourable manner to reading” (p. 80). Because of the persistent problems in how motivation-related constructs are defined Conradi, Jang, and McKenna (2014) conducted a conceptual review of motivation terminology in current reading research. The consensus definition of reading attitude that they found was; “A set of acquired feelings about reading that consistently predispose an individual to engage in or avoid reading” (p. 154). However, McKenna, Kear, and Ellsworth (1995) point out that although general definitions of attitudes can be applied to reading attitude, it might not be ideal to measure global attitude towards reading because individuals will have different attitudes towards different types of reading, such as different genres. Therefore this thesis will follow the advice from Polychroni et al. (2006) and view reading attitude as “a multidimensional concept related to the functions of reading” (p. 417). In other words, rather than focusing on an individual’s attitude towards reading in general, it may be more informative to focus on their attitudes towards different types of reading.

Measures. Attitudes are inferred constructs. They are not tangible and therefore it is difficult to measure them directly. However, there are three general methods for collecting

information that can help in inferring attitudes, namely observation, self-report, and projective techniques (Teale, 1980).

The use of projective techniques has now been largely discredited due to their subjective and highly variable nature (Lilienfeld, Wood, & Garb, 2000). There are several observational techniques that can be used to try to measure an individual's attitudes (Kassin et al., 2011). These include measuring physiological arousal, such as perspiration and heart rate, facial expressions, and neural activity, using EEG or fMRI, or simply recording how often an individual engages in a certain behaviour. But, the most common way reading attitudes, and attitudes in general, are measured, is by self-report scales.

Most self-report scales come in the form of a Likert Scale. This involves giving individuals a list of statements about a person, place, thing, or event and asking them to indicate on a scale (typically 1-5 or 1-7) how strongly they agree or disagree with each statement. The sum or average of their responses to the items is used to indicate the strength of their attitude (Kassin et al., 2011).

Numerous reading attitude scales have been developed over the years (Petscher, 2010). However, it can be difficult to compare questionnaires because each one uses a slightly different operational definition of reading attitude for the purposes of their assessment.

For example, Lewis and Teale (1980) created the Reading Attitude Scale (RAS). This scale comprises 33 items where individuals were asked to rate how they view reading on a four-point Likert scale (1 = strongly agree to 4 = strongly disagree). The items were divided into three 11-item subscales: individual development, utilitarian and enjoyment. The individual development scale considered reading as a means of gaining insight into self, others and/or life in general, (for example, "the more I read, the more I learn about myself"). The utilitarian scale viewed reading as a means of achieving in school or in a career (for

example “people who read do best at school”). The enjoyment scale assesses the pleasure derived from reading (for example “I enjoy reading”).

Alternatively, McKenna and Kear (1990) developed the Elementary Reading Attitude Survey (ERAS). This is a 20 item scale where individuals were asked to rate how they felt about the statements on a four-point emoticon scale that ranged from very happy to very upset (an emoticon scale uses simple pictures rather than numbers to denote the options on the scale). The scale was divided into two 10-item subscales, recreational reading and academic reading. Examples of recreational items in the survey are, “How do you feel about spending free time reading?” and “How do you feel about starting a new book?” Examples of academic items are, “How do you feel about learning from a book?” and “How do you feel when the teacher asks you questions about what you read?”

This study used the Survey of Adolescent Reading Attitudes (SARA) which was developed by McKenna, Conradi, Lawrence, Jang, and Meyer (2012). The authors classified reading according to its purpose (recreational vs. academic) and medium (print vs. digital). As a result, their instrument is comprised of four subscales: attitudes toward recreational reading in print settings, recreational reading in digital settings, academic reading in print settings, and academic reading in digital settings. It was thought that this measure accurately reflects the way young people classify their reading material and therefore using this measure would hopefully provide a comprehensive idea of the reading attitudes of children living in a digital age.

There are inherent limitations in all self-report measures. For example, responses to items can be influenced by their wording, the order and context in which they are presented and other extraneous factors. This is because people are often reluctant to be completely honest, instead opting for more socially acceptable responses (Tourangeau & Yan, 2007). These difficulties can be overcome to some extent by appropriate administration procedures,

such as assuring students that there are no right or wrong answers and that their responses will not be graded (Teale, 1980). Also, corroborating the self-report findings with observational data will increase the probability that the inferences drawn are valid. For this reason, this study will use a combination of self-reported attitude, and an affect and behavioural measure to detect changes in the participants reading attitudes.

Origin of Reading Attitudes. Much research has shown that attitudes are formed by experience and learning, either via reinforcement and punishment, social learning or associations with positive and negative stimuli (Kassin et al., 2011). Moreover, several elaborate models have been proposed to specifically explain how reading attitudes developed and influence behaviour.

The Mathewson model. Mathewson (1994) proposed a model to explain the influence attitudes have during the act of reading and when learning to read. Mathewson (1994) adopted Rosenberg's tripartite view of attitude, which states that attitude toward reading comprises feelings, action readiness, and beliefs about reading (Rosenberg, Hovland, McGuire, Abelson, & Brehm, 1960). Mathewson claims that reading attitude is influenced by cornerstone concepts (which includes personal values, goals, and self-concepts), and persuasive communications, which can affect the reader through a central route (as when a teacher promotes reading) or peripherally (as when a book has an attractive cover). Attitude towards reading, along with external motivators and the individual's emotional state, influence the individual's decision to read (or continue reading). Ideas and feelings the individual has while reading then feed back to influence their cornerstone concepts and their attitude.

Although this represented a significant advancement in reading attitude theory, McKenna et al. (1995) had several criticisms of the Mathewson model. Firstly, they maintain that this model does not clearly explain how attitude develop over time. Secondly, they claim

that the tripartite view of attitude is flawed because it does not postulate any causal relationship between the three components. Thirdly, although it takes personal communication into account it does not recognise the effect of social norms. Because of these reasons they developed their own model.

The McKenna model. McKenna (1994) built on the Mathewson model, however, he rejected the tripartite view of attitude, adopting instead the view that attitude is largely affective in nature. Specifically the McKenna model proposes that attitude toward reading is influenced by the following: beliefs about the outcomes of reading in light of the judged desirability of those outcomes, beliefs about the expectations of others in light of one's motivation to conform to those expectations, and the outcomes of specific incidents of reading. Adapting Ajzen and Fishbein's work on the theory of planned behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975), the McKenna model differentiates beliefs from attitude so that causation from beliefs to attitude is proposed.

The McKenna model then claims that attitude towards reading, along with intention to read and subjective norms, effect an individual's decision to read. Once an individual begins to read, feedback from the metacognitive state that is produced while reading interacts with these factors to determine whether they will continue reading. The metacognitive state is affected by text representation (in other words, comprehension), cognitive states such as affect while reading and judgments about whether the reader's purpose is being satisfied, and decoding fluency. Thus, the McKenna model accounts for how an individual's reading ability affects their attitude towards reading.

McKenna et al. (1995) posits that the McKenna model is superior to the Mathewson model because it is better able to account for the development of reading attitudes over time. They claim that this is because the three causal factors, normative beliefs, beliefs about the outcomes of reading and specific reading experiences are subject to change; influencing one

another as well as influencing attitude. For example, beliefs about the outcomes of reading compete with the outcomes of other activities. As children grow older more leisure activities become available to them, consequently, they may not have strong positive attitudes toward reading if they expect more satisfying results from other activities. Although this is the case for all children, it is especially true for children struggling to learn to read. On the other hand, the Mathewson model apparently leaves the long-term development of attitude to implication.

McKenna et al. (1995), claim that another benefit of their model is that it can also explain how attitudes influence ability. They claim that improvements in ability are linked to beliefs about the expectations of others. If other people in the environment appear to not value reading it will decrease the child's own perception of the outcomes of reading. Due to the influence these factors have on reading attitude, and subsequently, the decision to read, devaluation of reading will cause a decrease in the frequency at which the child reads. This will constrain the development of the child's reading ability, which influences their metacognitive state, and in turn feeds back to their attitudes and beliefs.

Hence, these models show that the development of attitudes towards reading is more complex than simple associations of positive or negative experiences with reading.

Importance of Reading Attitudes

A positive attitude towards reading is important for two reasons. Firstly, it is believed that it is important for achievement in reading (Russ, 1989). Secondly, without such a positive attitude it is likely that even a competent reader will not read when given the opportunity. This condition is generally known as *aliteracy* (McKenna et al., 1995), and it gives them no advantage over someone who cannot read (Teale, 1980). While these reasons seem justified, only the latter is true *a priori*. Whether or not a positive attitude towards reading actually improves reading achievement is debated and the previous literature should be consulted.

Many researchers and teachers acknowledge that a student's attitude towards reading significantly impacts their reading achievement (Russ, 1989). The general consensus is that positive attitudes are a prerequisite for reading. Negative attitudes towards reading will decrease a student's motivation, attention and attributions, which decreases the likelihood that they will read, consequently inhibiting their reading achievement (J. E. Alexander & Cobb, 1992). Conversely, students with positive attitudes towards reading have more successful reading experiences and read more often, which can result in greater reading achievement (Thames & Reeves, 1994).

The largest study to date that examined student's attitudes towards reading and how they relate to achievement was by McKenna et al. (1995). In their study, a total of 18,185 U.S. children in grades one to six were asked to complete the Elementary Reading Attitude Survey (McKenna & Kear, 1990). As mentioned, this survey comprises two subscales; attitude towards recreational reading and attitude towards academic reading. Among other things, the scores on this survey were correlated with teacher ratings of ability. The authors claim that, due to the wide diversity of schools in the study, no universal measure of reading ability was available. Therefore, the teachers were simply asked to categorise students as above average, average or below average.

McKenna et al. (1995) found that, on average, both recreational and academic reading attitudes began at a relatively positive point in grade one and ended in relative indifference by grade six. They also found that students who had been identified as above average had a more positive attitude toward recreational reading than the average and below average groups. Additionally, whilst the average and below average groups' attitude toward recreational reading decreased across the grade levels, the above average group's attitude toward recreational reading remained more stable. In contrast, all three groups' attitude toward academic reading significantly decreased across the grades. The above average group still

had a slightly more positive attitude at each grade level but this attitudinal gap was not significant. In their discussion the authors tried to explain these results. They claimed that attitudes become more negative with age because reading has to compete with other interesting activities such as watching TV. They also claimed that poor readers' attitudes decrease more rapidly due to the negative feedback they receive about their ability.

Accordingly, McKenna et al. (1995) have shown that a positive attitude towards reading is related to above average academic ability, specifically a positive attitude toward recreational reading. However, this was a correlational study and, like all of the correlational studies in this area, it had several limitations. Firstly, the true strength of the relationship between attitudes and achievement is unclear due to the wide range of magnitudes that have been reported. Secondly, some people have been incorrectly using the term attitude synonymously with other terms, like motivation and self-belief, which has caused some confusion (Conradi et al., 2014). Thirdly, the causal nature of the relationship is still debated. Therefore, it is difficult to determine if a positive attitude towards reading causes increased academic achievement.

Petscher (2010) conducted a meta-analysis that reinforced the finding that there is a moderate relationship between reading attitudes and achievement. He reviewed 32 studies, with a total sample size of 224,615, and included a total of 118 effect sizes. The results of the meta-analysis indicated that the mean strength of the relationship between reading attitudes and achievement is moderate ($Zr = .32$), while stronger for students in elementary school ($Zr = .44$) when compared with middle school students ($Zr = .24$). This is consistent with the theories and models of attitudes that have been discussed, which show that an attitude is just one of several factors that predict behaviour.

Although there is a lack of experimental research demonstrating this, the correlational research implies that, improving an individual's attitudes towards reading could improve their

ability to read. Next the reading attitudes of students with dyslexia will be examined to confirm the need for this type of intervention, followed by a discussion of how to improve attitudes towards reading.

Reading Attitudes of Individuals with Dyslexia. A large number of studies have shown that individuals with learning disabilities have more negative academic self-concepts compared to their non-disabled peers (Burden, 2008; Chapman, 1988; Polychroni et al., 2006; Zeleke, 2004). Yet, it is inappropriate to assume that, because of this, individuals with learning disabilities will have negative attitudes towards reading as well. Unfortunately, there are not as many studies that have specifically examined the reading attitudes of individuals with dyslexia or learning disabilities in general. Judging by the attitudes of low-skilled, non-disabled students it could be assumed that students with learning disabilities have negative attitudes towards reading. However, there are only a few studies that support this inference.

Polychroni et al. (2006) compared 32 dyslexic students (22 male and 10 female, aged 10-12) to 210 students (120 male and 90 female) who attended the same classes. The comparison group was divided into two groups based on teacher ratings of reading ability (115 low/average-ability readers, and 95 high-ability readers). They measured participants' reading attitudes using the Reading Attitude Scale (Lewis & Teale, 1980). They found that the dyslexia group consistently valued reading less than both the high and the average/low readers, in terms of the personal development, enjoyment and utilitarian factors. However, only the difference in the utilitarian subscale was statistically significant. Polychroni et al. (2006) concluded that students with dyslexia have negative attitudes towards reading because their participants did not value reading for its enjoyment and they especially did not value reading for its contribution to school success.

Davis Lazarus and Callahan (2000) used the Elementary Reading Attitude Survey (McKenna & Kear, 1990) to measure the reading attitudes of 522 students diagnosed with

learning disabilities. Their participants were randomly selected from 54 special education classrooms with trained teachers. The participants ranged from grade one to five and were apparently representative of the general learning-disabilities population. Davis Lazarus and Callahan (2000) found that the participants in the special education classrooms expressed reading attitudes that equalled or exceeded those expressed by the low and average readers in the McKenna et al. (1995) survey. In fact, while McKenna et al. (1995) found that attitudes towards recreational and academic reading tended to decrease over time, Davis Lazarus and Callahan (2000) found that their participants' attitudes remained indifferent. However, Davis Lazarus and Callahan (2000) recognised that there must be some factors related to the special education classrooms that would have fostered the students' attitudes towards reading, which would have contributed to their finding of equal attitudes. Furthermore, it may not be legitimate to compare the participants in Davis Lazarus and Callahan (2000) to the participants in McKenna et al. (1995) because McKenna et al. (1995) included individuals with learning disabilities in their sample.

In general, these studies have shown that individuals with dyslexia have negative or indifferent attitudes towards reading. They have also indicated that in general their attitudes are not significantly different from their non-disabled peers. It is important to note that not all individuals with dyslexia share this attitude. This point was made clear by Fink (1995), who interviewed 12 successful dyslexics to determine how they seemingly managed to overcome their disability. The sample included a Nobel laureate, a member of the National Academy of Sciences, and other outstanding professionals. Gilligan's clinical interview methodology was used, which entails open-ended conversations to explore cognitive and affective dimensions of development. The in-depth interviews took from 3 to 8 hours. Fink (1995) found that everyone in the sample was an avid reader despite their persistent troubles with basic lower level reading skills. From a young age the individuals in the sample sought out interesting

books and were not worried about how challenging the text was. They were able to develop coping strategies, such as working out difficult words from the context. It appears that as a result of this their basic reading skills improved. In Stanovich's terms, the rich got richer (Stanovich, 1986). Many of the individuals in the sample had successful academic careers which involved a lot of reading and writing. This is contrary to the idea that one must succeed at the basic skills before reading challenging texts. Fink (1995) concluded by discussing how this information can help non-disabled poor readers and other dyslexics. It is important to identify an individual's interests and then capitalise on them. She even mentioned the theory of flow (Csikszentmihalyi, 1991), implying that if a child can get engrossed in a book they will not realise they are practicing.

Although a qualitative analysis of a small group of extraordinary individuals with dyslexia, Fink (1995) showed that individuals with dyslexia can have positive attitudes towards reading. Furthermore it supported the idea that a positive attitude towards reading leads to more reading, which results in greater reading achievement.

To summarise this research, individuals with dyslexia struggle with reading and require help. In general, it has been shown that reading attitudes are initially positive but become indifferent or negative over time. On average, individuals with dyslexia have similar reading attitudes as their non-disabled peers. There is a moderate relationship between reading attitude and reading achievement. Also it appears that successful dyslexics have positive attitudes towards reading. As a result the following conclusion can be drawn from the literature; improving an individual with dyslexia's attitudes towards reading should help improve their reading ability.

Although this argument requires that the individuals with dyslexia must initially have poor attitudes towards reading for there to be an effect, it is not necessary for their attitudes to be different from their non-disabled peers. In fact, it is likely that any intervention that

improves the reading attitude of an individual with dyslexia will also work for their non-disabled peers and vice versa.

Reading Attitude Interventions

Many social psychologists have examined how a wide variety of attitudes are changed. Kassin et al. (2011) states that there are two ways an attitude can be changed; either through persuasive communication from others, or influenced by the individual's own behaviour. There are also many variables that affect these methods. Persuasive communication is influenced by the contents of the message, as well as the characteristics of the source of the message and the audience, whereas cognitive dissonance (the distressing state of having inconsistent thoughts) is the underlying factor that causes an individual's behaviour to influence their attitudes.

However, these social psychology concepts have not been explicitly applied to the improvement of reading attitudes. Many studies have mentioned that participants' reading attitudes improved as a secondary result of an intervention aimed at improving their reading skills. For example Thames and Reeves (1994) found that the attitudes of poor readers could be improved through additional reading training that used books the participants were interested in. Similarly, students that receive special education seem to have more positive attitudes (Burden & Burdett, 2005; Davis Lazarus & Callahan, 2000). In spite of this, very few studies have specifically investigated whether reading attitudes can be improved without additional reading skills training.

J. Fletcher, Grimley, Greenwood, and Parkhill (2012) conducted a qualitative study to investigate how a small number of good teachers motivate and improve their students' attitudes towards reading. Five year seven and eight teachers from a range of schools in the South Island of New Zealand were interviewed about their teaching techniques. The transcripts of these interviews were coded and some common features stood out. These

included the teacher reading interesting books aloud to the class, asking open ended questions to help the students engage with, critique and debate ideas, and even using picture books.

However their findings are subjective and a more objective method is required.

By definition, individuals with dyslexia have difficulty learning to read. Hence, it is likely that they will not enjoy additional reading skills training, but a positive attitude towards reading may provide them with the persistence to keep practicing. Therefore, it would be beneficial if there was an intervention that could increase their reading attitude without intensive reading skills training. This study attempted to develop such an intervention using VSM.

Video Self-Modelling

Definition. VSM is a behaviour intervention that aims to increase the performance of desired behaviours by having individuals watch carefully created videos of themselves correctly performing these behaviours. Typically the videos are only a few minutes long and are reviewed repeatedly in order to learn skills or adjust to challenging environments (Dowrick, 1999).

Types. There are two types of VSM, positive self-review (PSR) and feedforward (FFVSM). PSR involves filming the individual's typical range of behaviours, editing out any undesired behaviours and then showing the example of positive behaviours to the individual. For instance, a video of a student engaged in on-task behaviour with their disruptive behaviours edited out exemplifies the PSR technique. This can be used to increase desirable behaviours that are currently performed alongside non-desired behaviours or are not performed very often. FFVSM involves showing individuals videos of themselves performing behaviours they have not yet mastered. These videos can be created by combining shots of component skills that the individual can already perform to create a video of a complex behaviour, or by filming the individual role-playing the new behaviour. Dowrick

(1999) made this distinction clear when he said “PSR reconstructs an achieved, exemplary behavior, presumably in need of strengthening. Feedforward constructs a previously unachieved but possible future, or target, behaviour.” (p. 26). Also, Dowrick (1999) points out that there are procedures other than VSM that can be classified as self-modelling. These include imaginal self-modelling, self-in-print or biblio self-modelling, audio self-modelling, and picture prompts, also known as photo activity schedules.

History. It was not long after Albert Bandura published his influential works on observational learning (Bandura, 1969; Bandura, Ross, & Ross, 1963) that other researchers developed the idea of using the *self* as a *model*. Bandura’s theory states that a common way individuals learn is by observing and imitating the actions of others. In the technique known as modelling an observer learns how to perform a new behaviour by observing a model. The classic example of this is Bandura’s bobo doll experiment (Bandura et al., 1963). Self-modelling is similar to traditional modelling, except in this case the learner is both the model and the observer.

Creer and Miklich (1970) is cited as the first article on VSM in the literature. This short two page article describes a 10 year-old boy, “Chuck”, who was living in a residential treatment centre for children with intractable bronchial asthma. Chuck displayed concerning non-assertive and immature behaviours. For example, he kept to himself, was bullied by the boys at the hospital and he would try to tickle the staff. VSM was used in an attempt to modify these behaviours. Videos were created of the boy role-playing appropriate behaviours. However they waited 2 weeks before showing him the videos to determine the effect of the role-play. After a period of watching this video daily he was given a video of the inappropriate behaviours to watch each day to determine if a reversal would occur. During the last 2 weeks he went back to watching the video of appropriate behaviour. The authors found that Chuck’s behaviour dramatically improved after watching his tape, that his

behaviour reversed after watching the inappropriate tape and that it improved again after the final phase and was maintained for the next 6 months he spent at the hospital.

Additionally, Ray Hosford developed the "self-as-a-model" as a strategy in the behavioural counselling of adults (Hosford, 1980). In turn, this inspired Peter Dowrick, who was intrigued by the puzzle of producing videos of individuals doing things that they normally cannot do (Dowrick, 1999). Although Hosford and his students produced many publications on the topic, Hitchcock, Dowrick, and Prater (2003) credit Dowrick with the development of VSM. This is because Dowrick developed different methods for creating self models on video and introduced the notion of creating future images of success (Dowrick, 1991). He also expanded the theory of self-modelling (Dowrick, 2012). Along with his colleagues, Dowrick has conducted numerous studies and published several reviews on VSM (Dowrick, 1991, 1999; Hitchcock et al., 2003; Prater, Carter, Hitchcock, & Dowrick, 2012).

Although VSM first appeared in the literature in the 1970s, its adoption was initially slow. This was most likely due to the practical difficulties associated with editing, such as the skills and equipment needed to transfer videos from tape to tape. However, the advent of camcorders, VCR/DVD players and more recently digital cameras and video-editing software, has made the creation process easier. This has contributed to an increase in the use of VSM in recent years (Buggey & Ogle, 2012).

Theory. Over the years the many nuances of Bandura's Social Learning Theory have been explored. Observational learning involves a model who engages in a behaviour and an observer who attends to the model. The observer learns two things from watching the model, what the model did and what happened to the model as a consequence. Finally, the observer imitates the model's behaviour. The observer's behaviour is strengthened via direct reinforcement for imitating the new behaviour or via the vicarious reinforcement of the model's behaviour. Bandura theorised that four factors determine whether imitation will

occur, namely the observer's attention to the model, their ability to remember the behaviour, their ability to physically reproduce the behaviour and their motivation to do so (Bandura, 1969). Other factors also affect the likelihood of imitation, such as certain characteristics of the model. For instance, it has been shown that children are more likely to imitate a model who is the same sex, age or has the same interests as them (Davidson & Smith, 1982). This notion of maximising the similarity of the model is what initially led to the development of self-modelling.

It was originally thought that self-modelling worked because it maximised the similarity of the model (Hosford, 1980). Additionally, the concept of self-efficacy (an individual's belief in their ability to complete a task) has provided support, and it has been proposed that observations of similar models gives individuals the belief that they can imitate the behaviour (Bandura, 1997). However, recently Dowrick (2012), has rejected the previous theories, stating that self-modelling works because humans have the ability to *learn from the future*. This is because humans can mentally combine component behaviours they can already perform and subsequently predict how to perform new behaviours in the future. Dowrick (2012) cites research on mental time-travel and mirror neurons to support his claim. As a result, Dowrick (2012) went on to state that self-modelling is not a special case, but the most fundamental form of observational learning.

Construction. Meharg and Woltersdorf (1990) point out that vague terms such as edited and unedited are inadequate to convey the myriad of creative techniques that are used to create effective VSM videos. Although the increasing accessibility of video recorders and editing equipment continues to make VSM more accessible, successful VSM requires more than just filming an individual. The goals and desired outcomes of the intervention should be clear (Dowrick, 1999). Broad concepts should be expanded to identify what they actually entail and subsequently what should be filmed. The videos should also be edited down so that

only the important parts are present (Buggey, 2005). For example, the goal of Dowrick, Tallman, and Connor (2005) was to prepare disabled teenagers for adulthood. The broad concept of “live independently” was expanded to “have my own apartment with friends visiting but not living there.” As a result a video was created that showed salient aspects of living independently, such as what to do with friends who come over.

Common Applications of VSM

Any observable behaviour can be filmed. Therefore, any observable behaviour can be targeted using VSM. It is not surprising then that VSM has had many applications.

VSM has been used to effectively teach a wide range of skills across a range of ages. For example, Buggey, Hoomes, Sherberger, and Williams (2011), used VSM to teach four autistic preschoolers (all approximately 4 years old) to initiate social interactions in a playground. Hitchcock, Prater, and Dowrick (2004), used VSM to teach four children (aged 6-7 years) who were having difficulties with literacy to read more fluently and successfully answer comprehension questions. Kahn, Kehle, Jenson, and Clark (1990) randomly assigned 68 moderate to severely depressed early adolescents (aged 10-14 years) to one of four treatment-groups. They showed that VSM was just as effective at reducing depression as short-term cognitive-behavioural therapy and relaxation training compared to the waitlist-control group. Cihak and Schrader (2008) compared VSM with videos of adult models. Both interventions were used to teach vocational skills to four young adults (aged 16-21 years) with autism spectrum disorders, such as making photocopies, sending faxes and assembling packaged products. They found that both interventions were effective but that the participants learnt the skills more quickly using VSM.

Buggey and Ogle (2012) attempted to conduct a review of every published study on VSM since it first appeared in the literature in the early 1970's. The authors claim that in 2011 they found 49 studies with a total of 422 participants that addressed the effects of self-

modelling. Many of these studies used single-case research designs with relatively small numbers of participants. In fact, 250 of the participants were from four studies that used between-groups designs with large control groups. Buggey and Ogle (2012) found that VSM has produced positive results across an array of behaviours, disability types, and ages. Also, that the majority of the research has seemed to focus on persons with disabilities or challenging behaviours.

Buggey and Ogle (2012) found that the VSM studies were overwhelmingly positive, with 44 reporting positive gains and only three showing no change. The only group without consistently positive results was very young children. However, it is logical to assume that VSM has a lower age limit, as well as other limitations. Buggey and Ogle (2012) point out that successful VSM is influenced by the following: an individual's ability to self-recognize, the type and severity of their disability, the complexity of the target behaviour, their ability to attend to the video, and their ability to recognize the salient features of the video.

Dowrick (1999) divided the applications of self-modelling into seven categories: increasing adaptive behaviour currently intermixed with non-desired behaviours, transfer of setting-specific behaviour to other environments, use of hidden support for disorders that may be anxiety-based, improved image for mood-based disorders, recombining component skills, transferring role-play to the real world, and (re)engagement of disused or low-frequency skills. These categories show how diverse the applications of VSM can be.

Relevant Applications of VSM

The previous section provides a brief overview of the wide variety of circumstances in which researchers have used VSM, but because this review is aiming to determine if VSM can help improve the reading attitudes of students with dyslexia, the following section will examine the results of academic applications of VSM, as well as providing more in depth descriptions of studies that have attempted to use VSM to improve reading skills.

There have been two literature reviews examining how well VSM has been applied to school based settings. Hitchcock et al. (2003) reviewed eighteen studies in which VSM was applied in school-based settings. In some of these studies VSM was used to target academic skills, such as reading and mathematics, but most of the studies focused on classroom behaviours, such as fighting, disruptive behaviours, time on task, and hand-raising. Hitchcock et al. (2003) concluded that “all 18 of these studies provided clear evidence of positive outcomes related to the intervention” (p. 43).

A decade later Prater et al. (2012) decided to conduct a similar review. This was because in that time technological tools improved enormously, making videotaping and editing more widely accessible; but more importantly the majority of the studies in Hitchcock et al. (2003) focused on classroom behaviour, not academic skills. The purpose of the Prater et al. (2012) review was to examine how VSM had been used to improve academic performance. To do this their review only included published research reports where the independent variable was VSM, and the dependent variable was proficiency of an academic skill. Only eight studies met these criteria. The studies involved 181 participants aged 6-17 years, all of whom were identified as having disabilities or at risk of academic difficulty. The academic behaviours that were targeted in the studies included oral reading fluency, reading comprehension, writing skills, novel letter identification and arithmetic, as well as voluntary participation and on-task behaviour. Prater et al. (2012) found that VSM increased student performance across the behaviours studied. In most cases, improved performance was maintained through follow-up phases of experiments, with the exception of writing skills (Delano, 2007). Prater et al. (2012) concluded that this indicates that VSM has the potential to improve academic and related classroom learning skills. But they point out that the small number of studies included limits the generalizability of the analysis.

In a study similar to Hitchcock et al. (2004), Dowrick, Kim-Rupnow, and Power (2006) used feedforward VSM to improve student reading abilities. There were 10 participants in their study, six female and four male, aged 6 years 3 months to 7 years 2 months. All the participants were considered at risk for academic failure and were predicted to be diagnosed with a SLD. The participants' oral reading fluency was measured by asking them to read aloud and recording the average number of words they read correctly in 1 minute. A multiple-baseline within-subjects design was used. Each case consisted of a no treatment phase, a tutoring phase, a tutoring and VSM phase and then back to a tutoring phase. During the no treatment phase the participants' baseline oral reading fluency was measured. In the tutoring phase a 25 step tutoring protocol was used to develop the participants' reading skills during 25 minute tutoring sessions. This ensured the tutors helped the participants when needed and praised the participants' efforts. After 3 or 4 weeks of tutoring the VSM tapes were created. This was done by capturing the child echo reading; a process where the tutor reads sentences and the student echoes back, later the tutor's modelling is deleted from the video. The finished tapes were less than 2 minutes long and they showed the participant fluently reading a challenging text with no errors. Between the fifth and eighth week of tutoring the VSM phase was started. This involved the participants viewing their video at the start of each tutoring session for 2 weeks. Following this, the participants returned to regular tutoring for 2 to 3 weeks. Throughout the experiment the participants' oral reading fluency was regularly measured.

The participants made improvements during both the tutoring phase and the tutoring with VSM phase. However, the results showed that all the participants improved more during the VSM phase than with tutoring alone. Dowrick et al. (2006) compared the difference in rate of improvement between the tutoring phase and the tutoring with VSM phase and used the Reliable Change Index as a measure of effect size (Jacobson & Truax, 1991). They found

that the improvements made during the VSM phase were significantly greater than the tutoring phase for 9 out of 10 of the participants. Other factors could have caused this improvement, such as the participants maturing and the regular reading instructions they receive at school. However, because a multiple-baseline design was used it is possible to confidently draw the conclusion that the tutoring plus the VSM improved the participants' ability to read.

In another study, Decker and Buggey (2014) also focused on the oral reading fluency of elementary students with learning disabilities. They used multiple baselines to compare the effects of VSM and video peer-modelling (VPM) to a control group. Echo reading was used to make the VSM movies of the participant apparently reading accurately. An introduction slide, stating whose video it was, as well as an ending slide that had applause and the words "Good Reading" were added. These movies were also used as the video peer model movies. The VSM and VPM groups underwent three phases; baseline, intervention (where they watch their assigned video once per day), and a maintenance phase. The control group received the usual teaching instructions.

The results showed that the participants in both the VSM group and the VPM group made improvements in words read correctly per minute. Notably two of the three participants in the VSM group made the greatest improvements. No significant change was seen in the control group. The authors concluded that this indicates that VSM may be more effective than VPM. Interestingly, Decker and Buggey (2014) also mentioned that both the teacher and parents noted that VSM in particular had a positive effect on attitude. Although they did not specifically mention reading attitude, it was implied because they state that the students were more interested in what they were reading and more eager to start reading.

Similarly, Robson (2013) used VSM to try and improve reading fluency, and subsequently reading comprehension. She also investigated the effect VSM has on self-

efficacy. She used a multiple baseline across participants. Her participants were recruited from three primary schools in New Zealand. The participants were seven males and four females aged between 72 and 108 months. Their teachers identified them based on their need to improve their reading fluency. Again, Robson created the videos by having the participants rapidly echo read and then editing out her voice. Her participants watched the videos six times and changes in their reading fluency, comprehension, and self-perception of their reading ability (a proxy measure of self-efficacy) were measured. Robson (2013) found that 8 out of the 11 participants made some improvement in their fluency and comprehension. However, three participants did not improve and it is not clear if the participants who improved made gains over and above what would be expected in the time frame. But the improvement in the majority of the student's self-perception was clear. Intriguingly, in her thesis there are several instances where Robson (2013) mentions the teachers or the students themselves, stating that their attitude, motivation and engagement in reading had improved.

Although only a few studies have been published on this topic, they show that VSM can be used to improve reading skills like fluency and comprehension. However, they only provide qualitative, anecdotal support that VSM can be used to improve reading attitudes.

To summarise this section, VSM is a behavioural intervention that involves individuals watching carefully created videos of themselves performing target behaviours without any errors. VSM appeared in the literature in the early 1970's (Creer & Miklich, 1970) and since then it has been used to produce positive results across an array of ages, behaviours and disability types (Buggey & Ogle, 2012). VSM has been used effectively in school based settings to improve academic performance (Hitchcock et al., 2003; Prater et al., 2012). Several studies have used VSM to improve reading performance, however these have focused on improving reading skills, such as reading fluency (Decker & Buggey, 2014; Dowrick et al., 2006) or reading comprehension (Hitchcock et al., 2004). Although many

studies have anecdotal evidence that their participant's attitudes improved as a result of the VSM intervention, it appears that no studies have specifically tried to use VSM to change reading attitudes or attitudes in general, therefore, quantitative research is needed to determine if VSM can be used to help students with dyslexia by improving their reading attitudes without using reading skills training.

The Current Study

The current study aimed to determine if VSM can be used to improve the reading attitudes of students with dyslexia. A group of 14 students who had dyslexia and were aged between 9 and 14 were recruited.

McKenna et al. (1995) have shown that generally an individual's attitudes towards reading are initially positive when they are young and learning to read. However, they decrease as individuals get older. In this study the age range of 9-14 was chosen because it was thought that individuals in this age range would have relatively negative attitudes. Also, the reading attitudes measure that was used in this study was validated and standardised using 10-14 year-olds.

The participants attitudes towards reading was measured using the SARA (Conradi, Jang, Bryant, Craft, & McKenna, 2013; McKenna et al., 2012). As already mentioned, this survey comprises four subscales measuring attitudes toward recreational reading in print settings, recreational reading in digital settings, academic reading in print settings, and academic reading in digital settings. This scale was administered before and after the intervention to determine if VSM altered the participants' attitudes.

It was difficult to portray student attitudes on video. However this study attempted to do this by creating four VSM videos for each participant. Each video presented the participant silently reading one of the four types of text before looking directly at the camera and giving a self-affirmation of their reading behaviour.

This study used a multiple-baseline design across behaviours. In other words, the date the participants were given their videos was staggered to determine the effect of each video. Also, the order the participants receive their videos was counterbalanced to control for an order effect.

The participants were given a tablet computer on which to watch their videos and to complete their daily reading diary (DRD). In the DRD the participants were asked if they read anything belonging to the four types of reading that day. If they answered “yes”, then they were asked to rate how they felt while reading on a five-point scale. The participants were also asked how many times they watched their video each day. The DRD revealed whether the participants complied and watched their VSM video as well as the immediate affects each VSM tape had on the participants’ reading habits and affect towards reading.

Because the main focus of any treatment for individuals with dyslexia should be to improve their reading ability, this study also measured the participants’ literacy skills using subtests from the Wide Range Achievement Test–Fourth Edition (Wilkinson & Robertson, 2006). This assessment was administered before and after the intervention to determine if the VSM intervention had affected the participants’ literacy skills.

Based on the literature in this review, there were four hypotheses stated: (1) watching the VSM videos should increase the attitudes towards some if not all kinds of reading measured. (2) After watching each video, the portrayed material will be read more often. (3) Simultaneously, after watching each video, affect while reading the portrayed material will increase. (4) Ultimately, watching the VSM videos will lead to an increase in literacy ability.

Method

Participants

The selection criteria for the study required the participants to already have a diagnosis of dyslexia and to be between 9 and 14 years old. Fourteen participants from

several schools in the Christchurch area were recruited for this study (13 male and 1 female).

Table 1 provides demographic information for the participants. Participants have been given pseudonyms to ensure their anonymity.

Table 1

Demographic Information of participants

Pseudonym	Gender	Initial Age Years(Months)	School Type	School Decile	Video Sequence
Adam	Male	12(2)	Primary	7	1
Albert	Male	9(6)	Primary	9	1
Carl	Male	10(10)	Primary	9	1
Corey	Male	9(5)	Primary	9	1
Earl	Male	10(8)	Primary	9	2
Emma	Female	12(8)	Intermediate	7	2
Francis	Male	12(11)	Intermediate	7	2
Jack	Male	11(3)	Primary	9	3
Jeffrey	Male	11(6)	Primary	9	3
Kevan	Male	10(4)	Primary	6	3
Malcolm	Male	10(2)	Primary	5	4
Michael	Male	10(8)	Primary	9	4
Rory	Male	14(0)	Secondary	5	4
Tyler	Male	10(8)	Primary	8	4

Table 1 shows the mean age of the participants at the start of the study was 11.4 years (SD=1.3), most of the participants attended primary (elementary) schools, and the decile ratings of the schools ranged from 5-9 (New Zealand school decile rankings range from 1 – 10, with higher decile ratings indicating higher socioeconomic status of the families served by the school).

To ensure that the participants were representative of the population of children with dyslexia, objective evidence of the presence of the learning disability was requested. This

was because the measure of academic ability used in this study was not a suitable tool for diagnosing learning disabilities, nor was the experimenter qualified to make such a diagnosis. Usually this was in the form of a diagnostic report from an independent assessor.

At the end of the intervention the participants were told that they could keep their tablet computer as a reward for taking part in the study but they were not told this during the recruitment phase to avoid improper inducement.

Materials

Assessments.

WRAT-4. The Wide Range Achievement Test–Fourth Edition (WRAT-4) is a short, norm-referenced measure of basic academic skills, which has two alternate forms (blue and green) that can be used interchangeably with comparable results (Wilkinson & Robertson, 2006). Because of this the word reading, sentence comprehension and spelling subtests of the WRAT-4 were used to provide a quick assessment of the participants' literacy skills before and after the intervention.

Those parts of the WRAT-4 for individuals younger than seven years old were not used and nor was the math computation subtest. In each subtest the participants were asked to correctly answer as many items as possible until they finished or reach the discontinue criteria.

The word reading subtest measures word decoding by asking the individual to read aloud from a list of 55 words that become progressively more difficult. The sentence comprehension subtest measures the individual's ability to gain meaning from words and to comprehend ideas and information contained in sentences by asking them to identify the missing words in up to 50 sentences. The spelling subtest measures the individual's ability to encode sounds into written form by asking them to spell up to 42 words that are read aloud (Wilkinson & Robertson, 2006).

The WRAT-4 was standardised using a sample of 3007 individuals. The individuals were divided into 19 age groups that matched the 2001 U.S. census data on gender, race/ethnicity, educational attainment, and geographic region (Wilkinson & Robertson, 2006). The results of the standardisation process allow raw scores to be converted to standard scores with a mean of 100 and a standard deviation of 15, which makes comparisons easier.

The WRAT-4 user manual provides the internal consistency and alternate-form reliability coefficients for each subtest across all age groups. The Cronbach's alphas for the subtests range from .87 to .93. More relevant to this study is the alternative form delayed retest reliability coefficients for individuals aged 7-18, which were; word reading = .88, sentence comprehension = .85 and spelling = .89. the user manual also indicates that there is some degree of concurrent validity between the subtests of the WRAT-4 and several other common tests of academic achievement (Wilkinson & Robertson, 2006).

SARA. The Survey of Adolescent Reading Attitudes (SARA) was used to measure the participants' attitudes towards reading before and after the intervention. The scale was developed by McKenna et al. (2012) who categorised reading, and reading attitudes, along two dimensions: purpose for reading (academic vs. recreational) and medium (print vs. digital). Thus their scale has four subscales: attitude toward academic reading of print materials (AP), attitude toward academic reading in digital settings (AD), attitude toward recreational reading of print materials (RP), and attitude toward recreational reading in digital settings (RD). All of the items in the scale began with the phrase "How do you feel," and the participants were asked to rate each statement on a 6-point scale from 1 = "very bad" to 6 = "very good".

There are 18 items in the survey. Of these, five are AP, five are AD, five are RP, and three are RD. A sample AP question is, "How do you feel about doing research using encyclopaedias (or other books) for a class?" A sample AD question is, "How do you feel

about reading online for a class?” A sample RP question is, “How do you feel about reading anything printed (books, magazines, comic books, etc.) in your free time?” A sample RD question is, “How do you feel about being on social websites like Facebook or MySpace in your free time?”

McKenna et al. (2012) administered the survey to a sample that was representative of the U.S. middle school population. By recruiting teachers and other assistants they managed to survey 4,491 students enrolled in grades 6–8 in 23 states and the District of Columbia. Confirmatory factor analysis verified the factor structure of the four subscales. This assured that the four subscales were in fact assessing the types of attitude targeted. The Cronbach’s alpha for each subscale were; AP = 0.78, AD = 0.82, RP = 0.86, and RD = 0.80. The SARA was administered twice before the intervention to determine the stability of each participant’s baseline attitudes.

Daily Reading Diary. The Daily Reading Diary (DRD) was used to track what type of material the participants read each day and how they felt (affect) while reading. The DRD was created using Google Forms and a link to the online form was saved to the home screen of the participants’ tablets. This allowed them to easily submit the form online each day.

The participants were instructed to fill out their DRD once per day, including any reading they did in the last 24 hours and only counting material they read for more than a few minutes.

The DRD had four main questions:

Have you read any books or printed text in your free time today?

This could include a book of your choice, a magazine, the newspaper etc.

Have you read any books or printed text for school today?

For example, reading a story or a non-fiction book because your teacher asked you to.

Have you read anything electronic/online in your free time today?

This could include, reading an ebook, visiting a website, reading an email from a friend, etc.

Have you read anything electronic/online for school today?

For example, finding information online for a school project etc.

If the participants answered “Yes” to one of these questions they were then asked:

How did you feel while reading this type of text?

For example, were you bored and frustrated, indifferent and neutral, or interested and proud of yourself?

They were given a five-point scale to rate how they felt ranging from 1 = very bad to 5 = very good. If the participant answered “No” to one of these questions they were simply moved to the next question.

After this the participants were given the option to leave any comments to help clarify their responses. Finally the participants were asked “How many times did you watch your video today?” and “What videos did you watch?”. These questions were designed to try to verify that the participants were following the procedure correctly.

Most participants filled their DRD out at the same time each day. If a participant failed to submit their diary over several consecutive days they and their parents were sent an email to try resolve any issues. When appropriate they were asked to resubmit their diary as soon as possible and to use the comment section to indicate the day the responses were referring to.

Apparatus.

Filming and Editing. The VSM videos were recorded on a Panasonic SDR-H80 camera and edited on a computer using Windows Movie Maker. Before being imported the videos were converted to a suitable movie file type using the program Total Video Converter.

Watching videos and submitting daily reading diary. The participants were given Audiosonic T-17B 7” tablet computers. These tablets were the cheapest tablets available that ran Android 4.1, could play videos and connect to the internet. The tablets were used by the participants to watch videos and submit their daily reading diary. Some parental controls were installed on the tablets due to the risks involved when giving young people a personal device with access to the internet. The app “AppLock” was installed to prevent the pre-

installed internet browsers and the google play store from being opened without entering a passcode first. The K9 Web Protection Browser was also installed; this is a web browser with an internet filter that blocks adult and potentially offensive sites.

A temporary email account was created for each participant that was synced to their tablet. This allowed the experimenter to send the participants their new videos directly to their tablet via email. Videos attached to emails could be saved to the pre-installed video app with the push of a button. Once downloaded the participants could watch their video *ad lib*.

Video content. Many publications on VSM do not provide detailed descriptions of the videos that were used. Meharg and Woltersdorf (1990) claim that simply saying the videos were edited does not accurately portray the stimulus the participants viewed. So, in an attempt to explain the intervention fully and clearly a description of the videos the participants were asked to watch will be given here.

Each participant had four videos created specifically for them. The videos were very similar except that each video showed the particular participant silently reading a different type of material (a story book for RP, an e-book for RD, a non-fiction book for AP, or an informative website for AD). To create the video the participant was asked to sit at a desk and pretend they were in class or sit on a chair and pretend they were at home. During the filming the participant was asked to make an effort to maintain good posture and positive facial expressions.

The videos were between 60 and 90 seconds long. This is because long shots of the participant sitting still and silently reading do not have a lot of movement and can become boring. It was only necessary that the videos clearly show the behaviour, so they were made short to try to avoid the participants losing interest (Peter Dowrick, personal communication, September 3, 2014).

Each video consisted of four short shots: (1) An establishing shot, showing the participant from the waist up sitting comfortably with the material visible. (2) An over the shoulder shot, showing what the participant was reading and them turning pages/scrolling. (3) A close up of the face, showing a positive expression and the eyes moving. (4) The final shot was the same angle as the first, but this time the participant looked at the camera and affirmed their reading.

In this final shot the participants were asked to say in their own words something like “I am enjoying reading this story”, “I’m learning a lot from this book” or “reading is fun, I want to read more books like this”. A similar technique of talking directly to the camera has been used by Dowrick and Ward (1997) and Buggey (2005). It was thought that this technique would make the reading attitude more salient.

Each 15-20 second shot faded to black before the next shot started. This was meant to create the illusion that some time had passed between the shots. The first three shots were muted to eliminate any background noise. This did not affect the final video because the participants were silently reading. The final shot where the participant talks to the camera was the only shot with sound. There was no background music or anything else that could have made the behaviour less salient.

Each video had a title that appeared at the start for 5 seconds. In the title was written the participants name and what they were reading. The title was needed to make it clear what the focus of the video was as what the participant was reading was not always apparent, and furthermore the videos that were set “at home” were obviously filmed at school with the participant in school uniform. The videos finished with the words “Nice Work (participant’s name)” appearing on the screen.

Procedures

Ethics Approval. The study was granted ethical approval by the Education Research Human Ethics Committee (ERHEC) at the University of Canterbury (Ref: 2014/27/ERHEC).

Recruitment. To recruit the participants the principals, deputy principals, learning support teachers and classroom teachers of dozens of schools in Christchurch were approached and given some information about the study. They were asked if they had students in their school that would fit the inclusion criteria. The teachers who were interested were asked to help advertise the study by giving some information directly to any potential participants. Additionally some information about the study was posted on the New Zealand Dyslexia Foundations Facebook page. Interested parents contacted the experimenter and were given additional information. To be included in the study the potential participants and their parents and teachers were asked to read the information sheets and sign the consent forms that had been approved by the ERHEC.

Pre- Intervention (Initial Testing and Filming). Before the intervention began, each participant's reading ability and attitudes were measured and the videos were created. This initial testing and filming session took approximately 1 hour and 15 minutes and were conducted at the participant's school, except for two participants who came to the University of Canterbury. The testing and filming were carried out in small rooms that were free from distractions and had at least a table and two chairs.

In this session the blue form of the WRAT-4 was used. The word reading, sentence comprehension and spelling subscales of the WRAT-4 were administered following the strict instructions in the WRAT-4 users' manual (Wilkinson & Robertson, 2006). Then, the SARA was administered. The experimenter read the items in the SARA aloud to make the task simpler for the participants and to ensure that they understood all the items in the survey. It

was emphasised that there are no right or wrong answers, and that they should be as honest as possible.

Next, the shots needed to create the participant's four videos were filmed. These shots were recorded in a specific sequence to minimise the number of times that the participant had to move and the camera had to be adjusted. Later, the shots were recombined in the correct order and edited to produce the VSM videos previously described.

The pre-intervention sessions were conducted at the end of the school term and the intervention began at the start of the next term. The 2 week break over the school holidays meant that the effects of the intervention could more confidently be attributed to the viewing of the videos, rather than the filming.

Intervention. The tablet computers were prepared and delivered to the participants at their school. The participants were asked to complete the SARA again online and to watch an instructional video that showed how to take part in the study. The video clearly asked the participants to do two things: complete their DRD each day and watch a specified video at least once per day for 1 week. As each participant had four videos the intervention took just over 4 weeks.

At first the participants were not given a video to watch but were simply asked to complete the DRD each day. An effort was made to collect 3 days of reading diary entries to be used as a baseline before the participants were sent their first video. Apart from two exceptions all the participants were sent their videos via email at the same time.

The final questions in the daily reading diary were designed to try to verify that the participants were following the instructions. However, because the participants were asked to watch their videos and complete their reading diaries at home in their own time it was difficult to know the exact circumstances in which the intervention took place.

Post-Intervention. Following the intervention the participants' reading attitudes and academic ability were measured again. The word reading, sentence comprehension and spelling subscales of the WRAT-4 and the SARA were administered in the same way as the pre-intervention session. But this time the green form of the WRAT-4 was used.

Design

The design was a multiple-baseline across behaviours design, replicated across participants (Cooper, Heron, & Heward, 2007). The participants watched each video one at a time. To avoid a potential order effect, the sequence the four videos were presented in were counter-balanced. This resulted in four different sequences, each element in the sequence representing a different target reading behaviour:

1. AD-AP-RD-RP
2. AP-RD-RP-AD
3. RD-RP-AD-AP
4. RP-AD-AP-RD

Table 1 shows which one of the four sequences the participants were arbitrarily assigned to. Each participant can be thought of as a replication to determine the effect of watching the four videos in a certain order. The independent variable was the VSM intervention. The dependent variables were: reading attitudes (measured by the SARA), literacy abilities (measured by the WRAT-4) and daily reading habits and affect towards reading each day (measured by the DRD).

The participants' reading attitudes and literacy abilities before and after the intervention were measured to determine the overall effect of the intervention. Also, the date the participants were given their videos was staggered to determine the effect that watching each video had on their reading habits and their affect while reading.

Results

The first part of the result section presents examples of data from the participants' DRD. The rest of the results section examines the participants' results collectively to determine if the VSM intervention had an effect on the participants' affect while reading, reading habits, reading attitudes and reading ability. This was done by analysing data from the DRD as well as the pre- and post- intervention results of the SARA and the WRAT-4 respectively.

Unfortunately, several participants did not fully comply with the procedure. The participants were clearly asked to watch their assigned video and to submit their DRD each day. However, nearly all of the participants occasionally failed to submit their DRD. This may have been due to technical difficulties with the tablet computers or it may have been that the participants simply forgot. Although this is not ideal, it is acceptable considering the long duration of the study and the age of the participants. Nevertheless, before examining the data it was assumed that at least three data points are needed to determine a trend. As a result, if the participants did not report that they read at least three times during both the pre-intervention phase and the intervention plus post-intervention phases it was not possible to confidently detect any changes in their affect while reading.

Additionally, Buggey and Ogle (2012) stated that if a VSM intervention has not started to produce a change after the first three sessions it is unlikely that it ever will. Because of this, in order to determine if the VSM videos had an effect, it was decided that each video should be watched at least three times. However, as can be seen in Table 2, Albert, Earl and Rory failed to watch one of their videos enough times, while Emma, Kevan and Malcolm did not watch three of their videos enough times. Rather than excluding these non-compliant participants from the subsequent analyses, their results will be highlighted and utilised as a

post-hoc control group. Additionally, Albert was moved to the fully non-compliant group because during post-testing he revealed he watched his videos without sound.

Examples of DRD Data

Due to the large quantity of data, the figures portraying the results from each participants' DRD are presented in Appendix 1. This subsection only provides examples of these to help explain how the participants complied with the procedure.

The participants were asked to use the DRD to indicate the number of times they watched their video each day, and if they had read, how they felt while reading. This set of data is presented in time series graphs. The dashed lines in the graphs are the phase change lines. These show when the participants were sent their next video to watch *ad lib*. To avoid any potential order effect the order the four VSM videos could be presented was arranged into four counterbalanced sequences. The participants were divided into four groups and assigned to one of these sequences.

There is a large amount of missing data in the figures in Appendix 1. Gaps in the views-per-day part of the graphs indicate that the participants' DRD was not submitted that day. Gaps in the affect-while-reading part of the graphs indicate that either the DRD was not submitted or they did not read that material that day. To clarify this, the following figures are examples of two non-compliant participants and a fully compliant participant respectively.

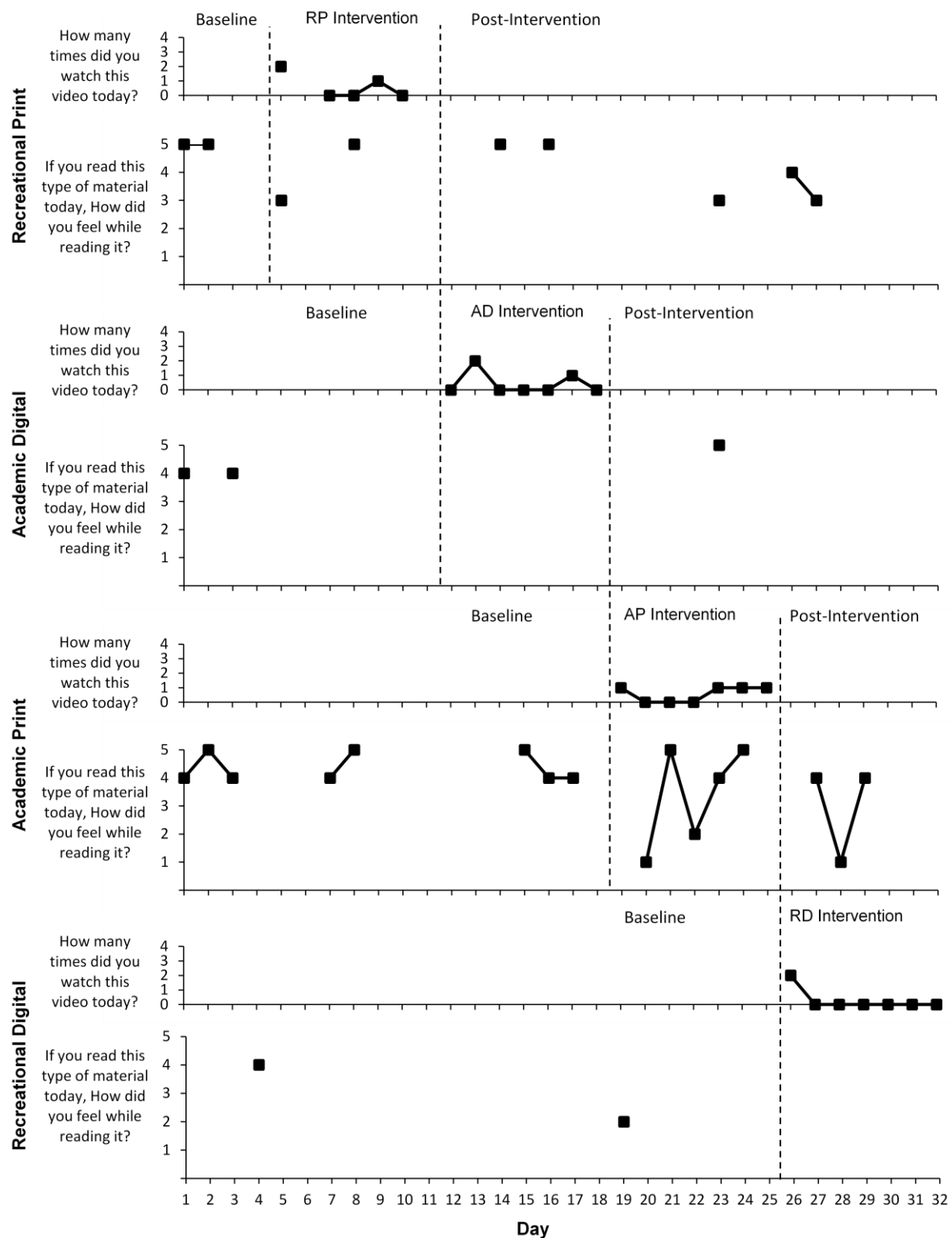


Figure 1. Malcolm's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

Figure 1 shows Malcolm submitted his diary most days, but he did not watch his videos or read some material very often. Because of this, it is not possible to determine if the VSM videos had an effect or if his affect while reading changed.

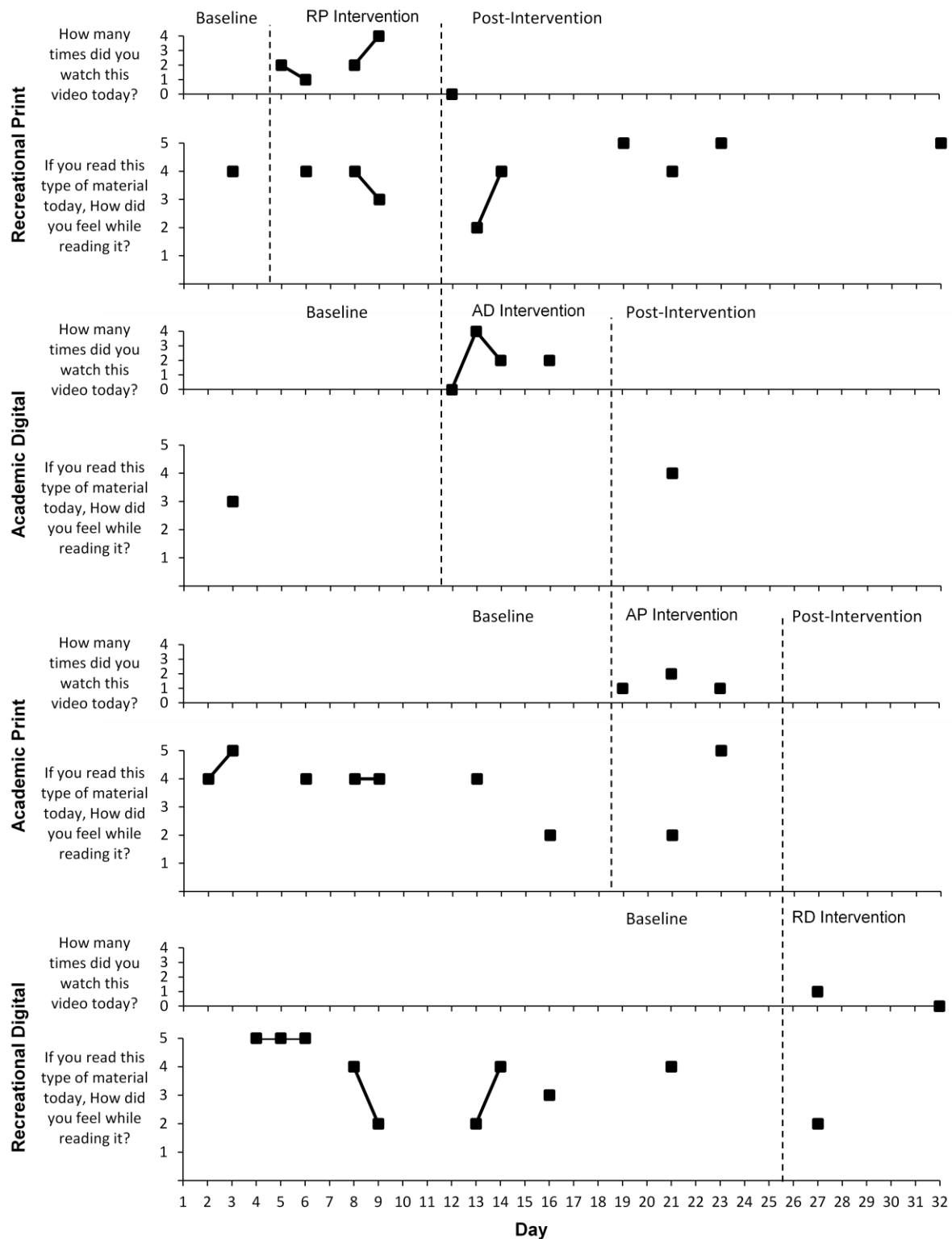


Figure 2. Rory's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

Figure 2 shows that Rory frequently did not submit his DRD. Also, he watched most of his videos enough times, but unfortunately he did not provide enough data points either before or after starting to watch each video to detect a change in affect while reading.

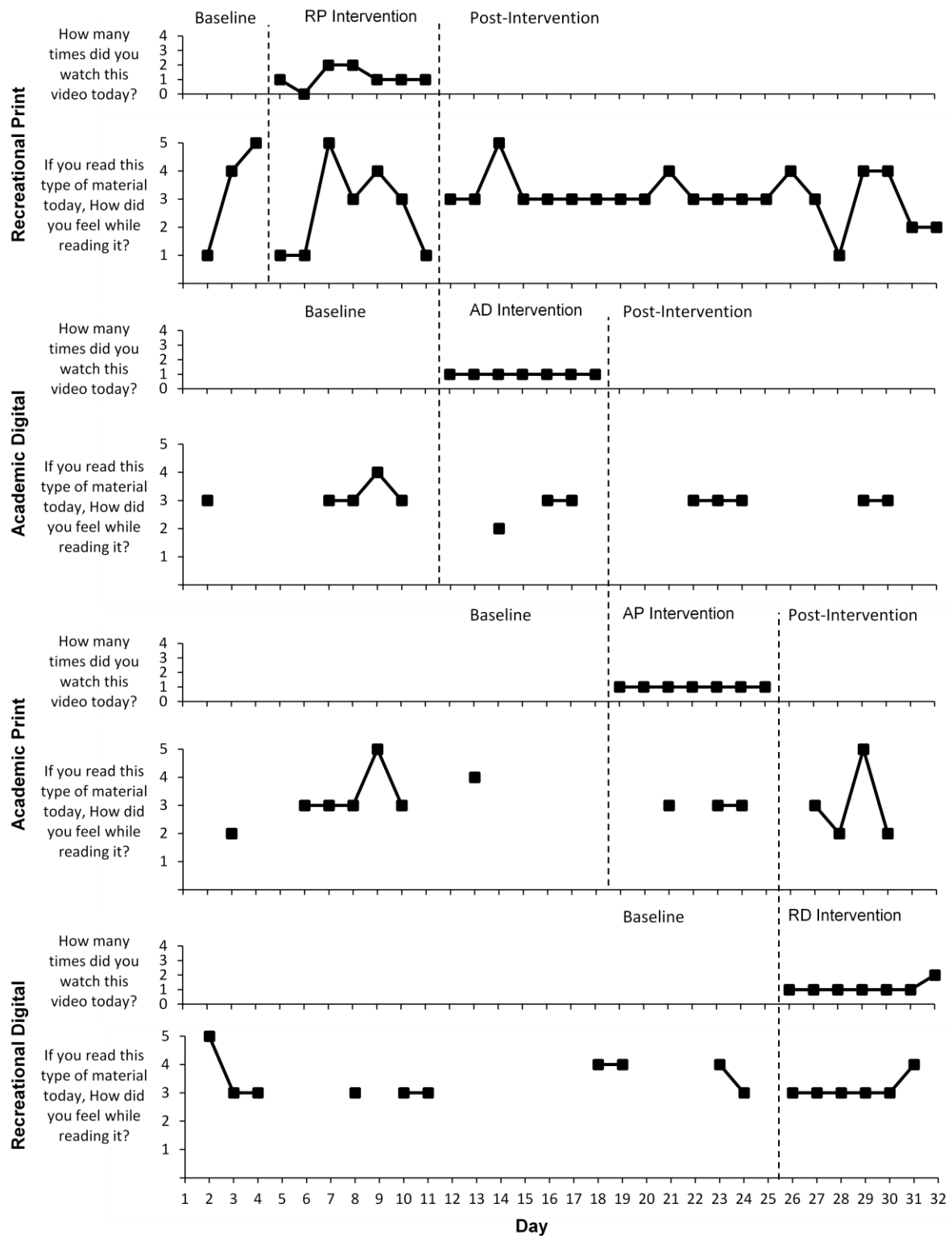


Figure 3. Tyler's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

Figure 3 shows that Tyler submitted his DRD and watched his videos every day.

Because of the number of times he indicated that he read, it is possible to conclude that his affect while reading did not change after starting to watch each video.

Affect While Reading

Table 2 provides a summary of the results from Figures in Appendix 1.

Table 2

Summary of Results from the Participants' Daily Reading Diaries

Name	Figure	Was the video viewed at least 3 times?				Change in affect towards reading each type of material after starting to watch each video			
		AD	AP	RD	RP	AD	AP	RD	RP
Adam	1	Yes	Yes	Yes	Yes	No change	No change	No change	No change
Albert	2	Yes	No	Yes	Yes	No change	Decrease	Increase	No change
Carl	3	Yes	Yes	Yes	Yes	Insufficient data	No change	Insufficient data	No change
Corey	4	Yes	Yes	Yes	Yes	Insufficient data	No change	Insufficient data	Insufficient data
Earl	5	Yes	Yes	No	Yes	Insufficient data	Insufficient data	No change	Insufficient data
Emma	6	No	No	Yes	No	Insufficient data	Decrease	Insufficient data	No change
Francis	7	Yes	Yes	Yes	Yes	No Change	Insufficient data	No change	No change
Jack	8	Yes	Yes	Yes	Yes	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Jeffrey	9	Yes	Yes	Yes	Yes	Insufficient data	Insufficient data	Insufficient data	No change
Kevan	10	No	No	No	No	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Malcolm	11	No	Yes	No	No	Insufficient data	Decrease	Insufficient data	Insufficient data
Michael	12	Yes	Yes	Yes	Yes	Insufficient data	No change	No change	Insufficient data
Rory	13	Yes	Yes	No	Yes	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Tyler	14	Yes	Yes	Yes	Yes	No change	No change	No change	No change

Note. AD = Academic Digital, AP = Academic Print, RD = Recreational Digital, RP = Recreational Print

Table 2 shows that most of the participants watched each of their videos at least three times. It also shows that the change in affect while reading data was inconclusive. Some participants showed a very slight increase or decrease in their affect after they started to watch each video; these changes were not substantial. Undeniably, many of the participants clearly showed no change in how they felt while reading. However, the vast majority of participants did not provide enough data points before or after the start of the interventions to accurately detect a change in trend. Consequently conclusions cannot be reliably drawn from this set of results.

Reading Habits

Data from the DRDs revealed whether or not the participants read something belonging to the four categories of reading material each day. These data were used to determine if the participants began to read more regularly after they started watching the relevant videos. To do this, each day they submitted their DRD was considered an opportunity to read. Each day they reported reading was coded with a 1 and each day they reported that they did not read was coded with a 0. The participants' scores were averaged in order to calculate the percentage of opportunities that were taken before and after the start of the interventions. The results are presented in Table 3 and in the Brinley Plots in Figure 4.

Brinley plots are created by plotting the pre-intervention scores as a function of the post-intervention scores. The solid line along the diagonal represents the line of no change. Points that fall on this line indicate that the participant's score did not change from the pre- to post- testing. Points that fall above the line indicate that there has been an improvement. Points that fall below the line indicate that there has been a decline.

Table 3
Percentage of Days the Participants Read Each Type of Material Before and After Starting To Watch the Relevant Video

Name	Academic Digital		Academic Print		Recreational Digital		Recreational Print	
	Before	After	Before	After	Before	After	Before	After
Adam	0%	0%	33%	39%	0%	0%	0%	0%
Albert	0%	0%	70%	46%	54%	60%	47%	67%
Carl	50%	21%	40%	31%	7%	11%	84%	100%
Corey	33%	22%	71%	71%	50%	22%	53%	25%
Earl	14%	33%	67%	43%	100%	100%	55%	33%
Emma	8%	0%	75%	48%	9%	0%	50%	31%
Francis	20%	50%	50%	32%	73%	93%	79%	75%
Jack	31%	0%	24%	33%	67%	25%	20%	29%
Jeffrey	25%	20%	71%	40%	67%	89%	100%	100%
Kevan	50%	0%	78%	0%	50%	88%	50%	17%
Malcolm	22%	5%	50%	57%	9%	0%	50%	27%
Michael	10%	10%	35%	31%	75%	100%	25%	54%
Rory	14%	13%	70%	40%	69%	50%	33%	75%
Tyler	50%	38%	41%	50%	42%	86%	100%	100%

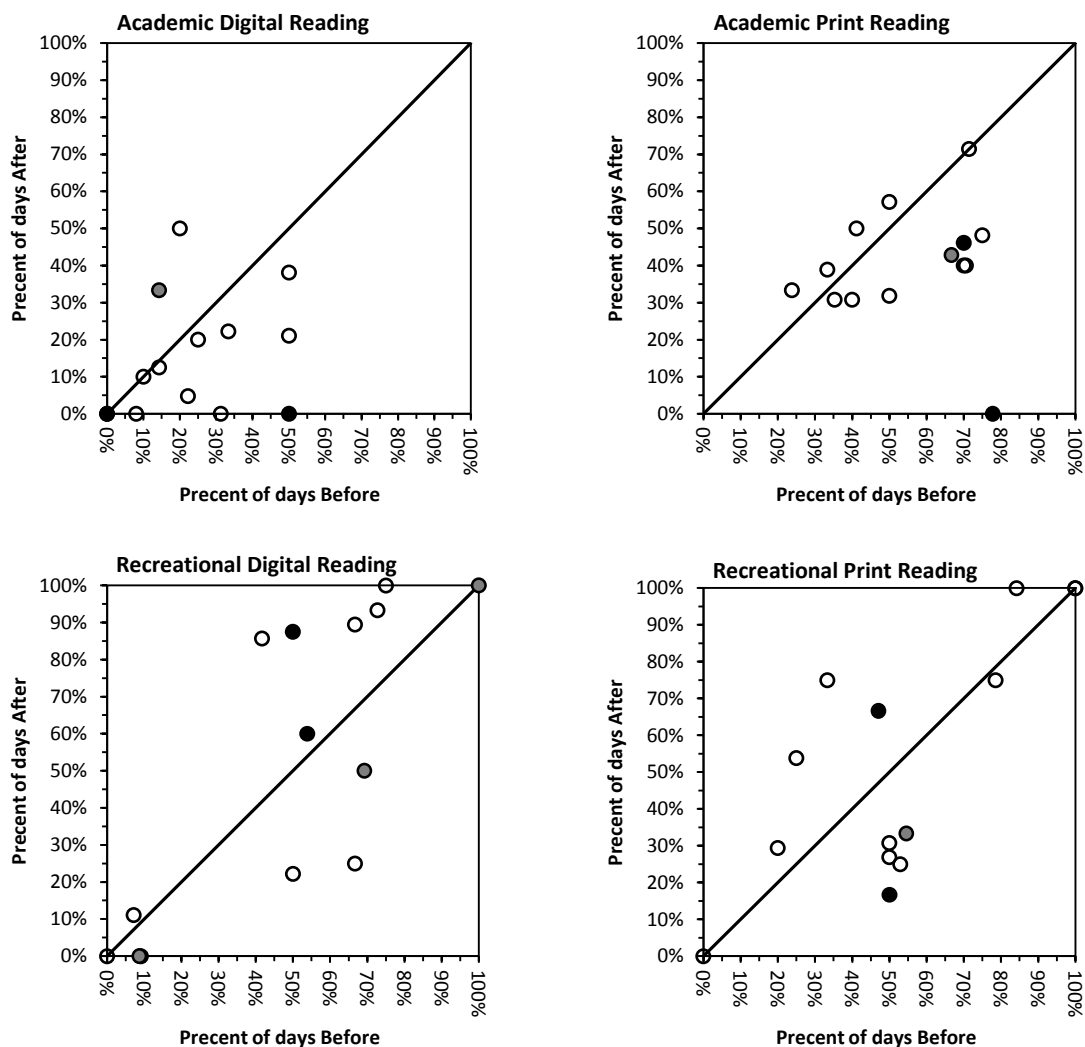


Figure 4. Percentage of opportunities taken to read each type of material before and after the respective interventions. Note. The participants with black dots did not watch 3 of their videos at least 3 times, the participants with grey dots did not watch the specific video at least three times, and the participants with white dots complied appropriately. The solid line is the line of no change.

The set of data in Figure 4 shows that the majority of the participants read less academic digital material following the intervention. On the other hand the majority read more recreational digital material following the intervention. Furthermore, for both academic print and recreational print reading, the number of participants who read more following the intervention was relatively equal to the number of participants who read less. Overall the

variable nature of the data in Figure 4 suggests that the VSM intervention did not systematically influence the participants reading habits.

Reading Attitudes

The SARA was administered during the pre-testing, immediately before the intervention began and during the post testing. The data was recorded to determine if the intervention affected the participants' attitudes towards reading. Table 4 shows each participant's score on the four subscales for each of the three times that the survey was administered. The attitudes score range from 1 (very negative) to 6 (very positive).

Table 4
SARA Subscale Scores Measuring Reading Attitudes Before and After the Intervention

Name	Pre-testing				Immediately before				Post-testing			
	AP	AD	RP	RD	AP	AD	RP	RD	AP	AD	RP	RD
Adam	1	1.4	1.4	4.33	1	1.2	1.6	4	1	1.4	1.4	3.67
Albert	3.2	4.2	4.2	3.33	2.4	3	2.8	4.33	4.8	5.2	5.2	6
Carl	4.6	2.8	5.8	1.67	3.8	4.2	5.2	2.33	4.4	4.6	5.6	2.67
Corey	1.6	2.2	2.2	3.33	1	2.4	1.4	3.33	3	3.2	2.6	3.33
Earl	4.6	5	3.6	6	3.4	5.4	2.8	6	3.2	5	2.2	6
Emma	2	3.2	3	5	1.8	3	1.8	5	3	3.8	3.4	4.33
Francis	3	4	4.2	3.67	2.2	4	4.2	3.33	1.8	2.8	3.6	4.33
Jack	2.4	3.6	3	4.33	2	3.8	2.2	5.33	2.8	3.6	3.8	3.67
Jeffrey	2.6	3.4	4.2	2	3	3.4	4	2	3.6	3.8	4.6	2.33
Kevan	3	5.6	4	5.67	2.8	5	2.6	5	3	4.2	2	5.67
Malcolm	4.8	4	5.2	4.33	4.2	4.8	4.4	5.33	5	4.8	3.8	5.67
Michael	3	3.4	5.4	6	1.8	3.6	3.6	5	2	3.8	4.6	5
Rory	4.2	5	5.6	5.33	3.6	5.2	5	4.33	4	5.8	5.6	4
Tyler	2.2	4.2	2.8	4.67	1.4	3.4	2.4	3	2.2	4	2.8	4.33
Mean	3.01	3.71	3.90	4.26	2.46	3.74	3.14	4.17	3.13	4.00	3.66	4.36

Note. Abbreviations same as Table 2

This set of data is presented in modified Brinley plots (Rucklidge & Blampied, 2011). Again, the solid line along the diagonal is the no change line. Points that fall above this line indicate that the participant's attitude improved between pre- and post-testing. However, it is possible that any apparent changes could be due to measurement error (Wise, 2004). To be confident that any improvements made between the pre-test and post-test were a result of the intervention the reliable change index (RCI) was used (Jacobson & Truax, 1991).

$$RCI = \frac{(X_2 - X_1)}{S_{diff}}$$

Where X_1 , represents a participant's pre-test score, X_2 represents that same participant's post-test score, and S_{diff} is the standard error of difference between the two test scores. S_{diff} can be computed directly from the standard error of measurement (SE) according to this formula:

$$S_{diff} = \sqrt{2(SE)^2}$$

S_{diff} describes the spread of the distribution of change scores that would be expected if no actual change had occurred. SE is given by:

$$SE = S_1 \sqrt{(1 - r_{xx})}$$

Where S_1 represents the standard deviation of control group, normal population, or pre-treatment experimental group and r_{xx} represents the test-retest reliability of this measure.¹

The RCI is used to determine whether a change reflects more than the fluctuations of an imprecise measuring instrument (Jacobson & Truax, 1991). A change is considered significant ($p < .05$) if the RCI for the difference is greater than 1.96. This indicates that the results would be unlikely to have occurred without an actual change.

¹ There seems to be debate over how values used to calculate the RCI are obtained. For example although the test-retest reliability is commonly used for r_{xx} (Dowrick et al., 2006), some people use Cronbach's alpha. However, in this study the test-retest reliability constant was used to calculate the RCI. This was because Cronbach's alpha is a measure of internal consistency (that is, how correlated different items in the measure are to the same construct). Cronbach's alpha is essentially the average split-half reliability of all the measurements (the split-half reliability is calculated by randomly splitting the items into two groups and correlating the scores). RCI is used to determine if the change is due to actual change or variability in the measurement over time. Therefore, the reliability coefficient used in the formula must reflect how likely it is that the measure will produce the same result over time with all things being equal, not how likely it is that the items in the measure are all related.

Because $RCI > 1.96$ is the index for a statistically significant difference the formula can be rearranged to calculate the reliable change criterion (RCCrit):

$$X_2 - X_1 > 1.96(S_{diff})$$

The difference between the participant's scores must be greater than the RCCrit to be considered reliable at the $p < .05$ level. A change, up or down, greater than this should be regarded as reliable. On a Brinley plot the vertical difference between a data point and the line of no change equals $X_2 - X_1$. Therefore, a line representing the RCCrit can be added to a Brinley plot to quickly show what changes are reliable.

The test-retest reliability for the SARA has not been published so it was calculated using the data obtained from the two times it was administered before the intervention began. The standard deviation was calculated from the participants' pre-test scores. Table 5 presents the information used to calculate the RCCrit. Figure 5 shows the modified Brinley plots comparing the initial pre-test data with the post-test data. Other comparisons could be made but this one was selected because these data were collected under the same conditions.

Table 5
Information Used To Calculate the RCCrit for the Change in Attitude towards Each Type of Reading

	Academic Print	Academic Digital	Recreational Print	Recreational Digital
r_{xx}	0.93	0.84	0.91	0.80
S_1	1.18	1.13	1.32	1.35
SE	0.32	0.45	0.40	0.60
S_{diff}	0.45	0.64	0.57	0.85
RCCrit	0.88	1.25	1.12	1.68

Note. r_{xx} = test-retest reliability constant, S_1 = Standard deviation of pre-testing scores, SE = the standard error of measurement, S_{diff} = the standard error of difference between the pre- and post- test scores, and RCCrit = Reliable Change Criterion.

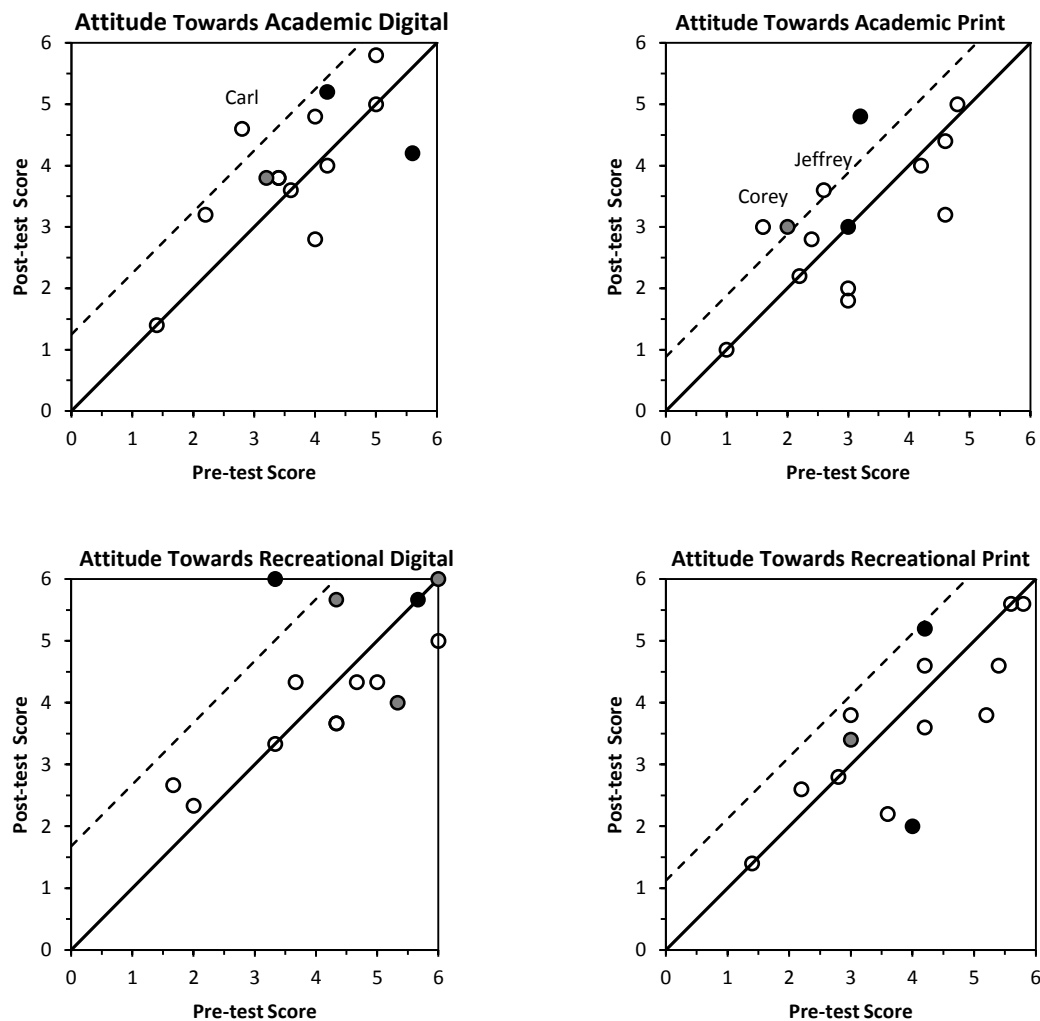


Figure 5. Modified Brinley Plots for the four subscales in the Survey of Adolescent Reading Attitudes. Note. Black dots represent fully non-compliant participants. Grey dots represent participants who did not watch the specific video enough times. White dots represent valid participants. The solid line is the line of no change. The dashed line represents the reliable change criterion.

Figure 5 shows that only a few participant's attitudes improved enough to be considered reliable. Carl was the only participant that made a reliable improvement in his attitude towards academic digital reading. However, looking at his AD score in Table 4 reveals that this improvement was made before the intervention began. Additionally, Corey and Jeffrey's attitudes towards academic print improved reliably. However Albert and Emma's attitude also improved even though they did not watch their AP video enough times.

This suggests that the change in attitude towards reading academic print material cannot be attributed to the VSM intervention. Overall, Figure 5 suggests that the VSM intervention used in this study did not improve the participants' attitudes towards reading.

Reading Ability

The WRAT-4 was administered before and after the intervention to determine if the intervention improved the participants' literacy abilities. Table 6 shows each participant's pre-intervention and post-intervention standard scores for the three subtests that were administered. The standard score for each subtest in the WRAT-4 has a mean of 100 and a SD of 15. This makes it easier to compare the participants' results with each other and the standardisation sample.

Table 6

WRAT-4 Subscale Scores Before and After the Intervention

Name	Pre-Intervention Standard Scores			Post-Intervention Standard Scores		
	Word Reading	Sentence Comp.	Spelling	Word Reading	Sentence Comp.	Spelling
Adam	66	72	68	71	78	69
Albert	79	85	71	76	85	66
Carl	110	123	91	103	138	80
Corey	84	93	89	83	95	84
Earl	88	100	82	88	99	89
Emma	82	85	87	81	85	81
Francis	98	110	92	103	101	94
Jack	77	87	72	65	77	61
Jeffrey	86	87	83	89	93	55
Kevan	103	115	106	100	110	106
Malcol	92	97	85	99	86	85
Michael	73	77	67	73	67	75
Rory	80	94	82	89	103	81
Tyler	68	66	70	67	65	72
Mean	84.71	92.21	81.79	84.79	91.57	78.43

Note. Sentence Comp. = Sentence Comprehension

As expected, Table 6 shows that most of the participants scored well below average on the literacy subtests of the WRAT-4. Some of the participants' scores were above average. However, this does not mean that they were not dyslexic because their diagnosis would have been based on a discrepancy between their literacy skills and other cognitive abilities.

These scores are also presented on modified Brinley plots in Figure 6. Again, this was done by plotting the pre-intervention scores as a function of the post-intervention scores. The solid line along the diagonal represents the line of no change. The dashed line parallel to this represents the RCCrit. Points that fall above the dashed line indicate that the participant's score on the subtest improved and that the change was significantly reliable.

The traditional test-retest reliability for the WRAT-4 has not been published because each form of the WRAT-4 is not intended to be administered twice. Instead the two alternative forms are meant to be used together to detect a change over time without a confounding practice effect. Accordingly, the RCCrit was calculated using the alternative form delayed retest reliability coefficients that were published in the WRAT-4 user manual (Wilkinson & Robertson, 2006). The standard deviations were calculated from the participants' pre-test scores.

Table 7 shows data used to calculate the RCCrit for each of the subtests of the WRAT-4.

Table 7
Values Used To Calculate the RCCrit for the Subtests in the WRAT-4

	Word Reading	Sentence Comp.	Spelling
r_{xx}	0.88	0.85	0.89
S_1	12.72	16.07	11.19
SE	4.41	6.22	3.71
S_{diff}	6.23	8.80	5.25
RCCrit	12.22	17.25	10.28

Note. Abbreviations same as Table 5

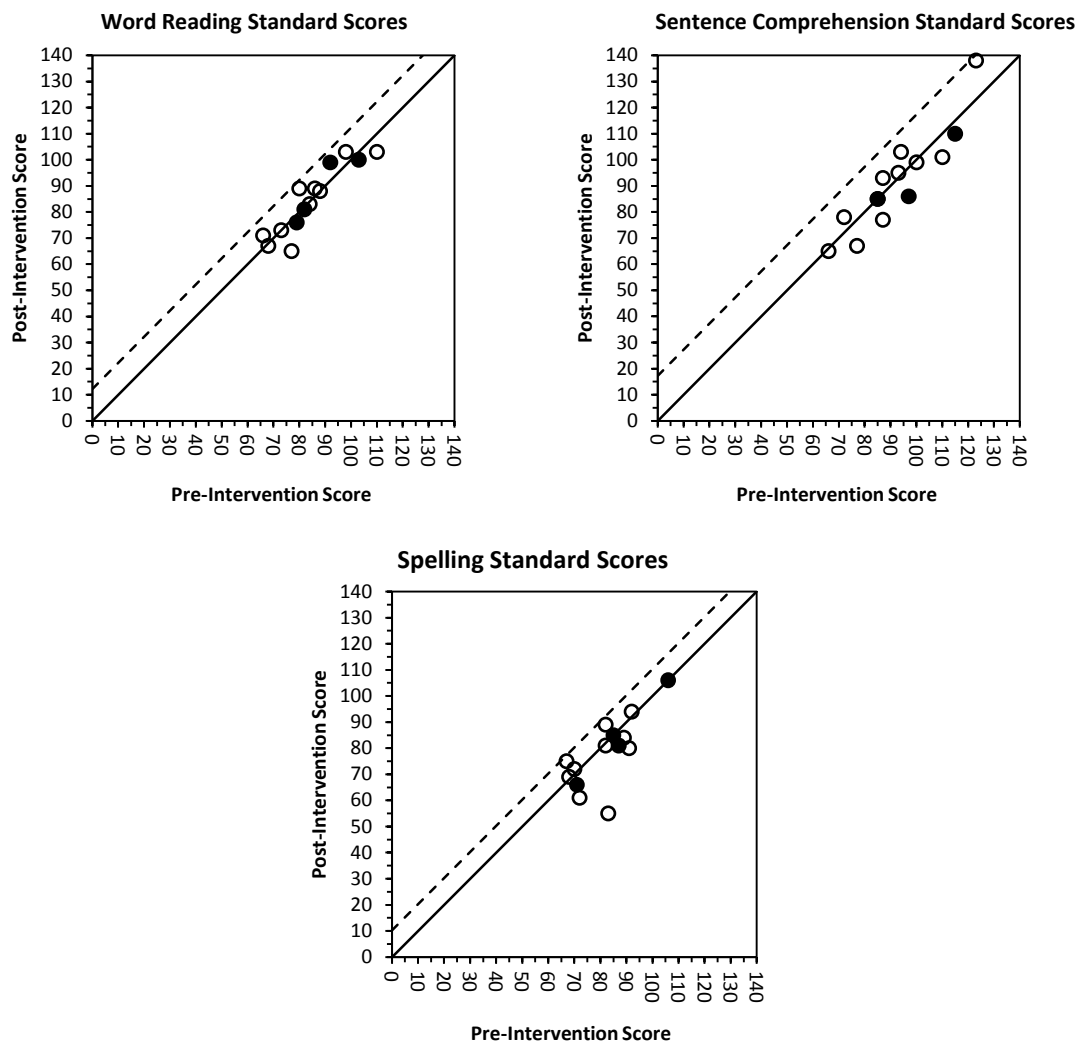


Figure 6. Modified Brinley Plots of the Wide Range Achievement Test –Fourth Edition scores before and after the intervention. Note. Presented are the three subtests that were administered. Black dots represent non-compliant participants. White dots represent compliant participants. Solid line is the line of no change. Dashed line represents the reliable change criterion

Figure 6 shows that none of the participants made a reliable improvement in their reading and spelling abilities between pre-testing and post-testing. This suggests that the VSM intervention used in this study did not lead to any immediate improvements in reading ability.

Discussion

This study used a multiple baseline design across behaviours to determine if an application of VSM could improve the reading attitudes of students with dyslexia. During the 1 month intervention, each week the participants were asked to watch a slightly different short video of themselves reading. Before and after the intervention the participants' attitudes towards reading were measured using the SARA, and their literacy abilities were measured using the WRAT-4. During the intervention their affect while reading and their reading habits were monitored using the DRD.

The results obtained from the participants' DRD did not provide enough information to determine if affect while reading increased after watching each video. Consequently, support for this hypothesis is inconclusive. Also, the results from the DRD showed that the VSM intervention did not systematically influence the participants reading habits. This does not support the hypothesis that after watching each video the portrayed material will be read more often. Although the intervention attempted to improve reading attitudes, the results from the SARA showed that almost all of the participants' apparent changes in attitudes were not great enough to be considered reliable. Furthermore, the results indicated that the changes in attitude that were reliable should not be attributed to the VSM intervention. This does not support the hypothesis that watching the VSM videos should increase the attitudes towards some if not all kinds of reading measured. Finally, the ultimate goal of a treatment for dyslexia should be to improve individual's academic performance. However, the results from the WRAT-4 did not support the hypothesis that watching the VSM videos will lead to an increase in literacy ability.

There are two broad possibilities that could account for why the intervention did not successfully improve the participants' reading attitudes and abilities. It is possible that the intervention might have worked but several issues prevented it from succeeding in this study.

Alternatively, it is possible that the intervention would have been unsuccessful even in ideal circumstances because of the underlying mechanisms of VSM and reading attitudes. While discussing how each of the main findings relates to the previous research, the limitations that may have prevented the intervention from working in this study will be considered. This will be followed by a discussion of the inherent limitations that may have prevented the intervention from ever working. Next, the implications of the findings will be discussed. Then, ideas for future research will be presented before concluding with a final summary.

Affect while Reading

Unfortunately there was an insufficient amount of data from the DRD to draw a conclusion on the effect the VSM intervention had on the participants' affect while reading. As a consequence, it is not possible to determine if the results support the idea that an increase in attitudes towards reading will coincide with an increase in affect while reading.

Affect and attitude are closely related. According to Kassin et al. (2011), an attitude is an affective, evaluative reaction. Rosenberg's tripartite view of attitude states that attitude comprises feelings, action readiness, and beliefs (Rosenberg et al., 1960). Conradi et al. (2014) define reading attitudes as a set of acquired feelings. Also, affect while reading is a part of the metacognitive state that is produced while reading, which according to the McKenna Model feeds back and influences attitudes towards reading (McKenna, 1994; McKenna et al., 1995). Thus, it was assumed that an increase in positive affect while reading would coincide with an increase in positive attitudes towards reading. Because of this an effort was made to record the participants' affect while reading each day in the hope that it could be used to support the reliability of the reading attitude measure. However, because there was an insufficient amount of data this was not possible.

There were several limitations that may account for the lack of data from the DRD. Bolger, Davis, and Rafaeli (2003) point out that because of the substantial demands of

repeated queries and responses, diary studies require a level of commitment from the participant that is rarely required in other types of research studies. Therefore, it is possible that keeping a diary every day for 1 month was too much to ask, particularly in the younger participants. However, this is unlikely as most of the participants submitted their DRD most days.

It is also possible that the questions that attempted to measure affect were not suitable. In the DRD the participants were asked to indicate on a five-point scale how they felt while reading, but it is possible that the participants were not aware of their feelings while reading, let alone accurately able to remember them when filling in their DRD at the end of the day. An alternative would be to use a four-point emoticon scale like McKenna and Kear (1990) used in their measure of reading attitudes. This would have made it easier for the participants to comprehend each option and prevent them from choosing neutral middle responses.

These limitations could be overcome by using a shorter DRD where the participants are asked to indicate how they feel on a four-point emoticon scale immediately after reading. However, the most likely reason for the lack of data on affect while reading is that the participants were only asked how they felt while reading when they had indicated that they had read the certain type of material that day. This is a problem because the opportunities to read may have been out of the participants' control. This is also a limitation for the finding on reading habits.

Reading Habits

Although some participants reported to read material more frequently after they started to watch one of their videos, other participants reported to read less frequently. Therefore, the overall results from the DRD did not systematically support the hypothesis that the participants would read more often after starting to watch the relevant videos.

The theory of planned behaviour (Ajzen, 1991) states that attitudes influence behaviour. In particular, the McKenna model of reading attitudes (McKenna, 1994) claims that attitudes towards reading influences the decision to read (or keep reading). Because of this, the participants' reading habits were also recorded in the hope that they would provide an additional measure to support the reliability of any changes in the participants' attitudes towards reading. But again, the results of this study are unable to provide this support because neither a reliable increase in the participants' attitudes nor a systematic increase in reading frequency was detected.

As mentioned, measuring changes in the participants' reading habits was limited because many opportunities to read are out of the participants' control. This means that even if the intervention had improved the participants' attitudes enough to make them want to read more, they may not have been given the opportunities to do so. This is especially true for academic reading. Although older students may choose when to study, younger students still heavily rely on their teachers to assign academic reading. One option to overcome this limitation is to solely focus on recreational reading, because individuals are more likely to choose to do this themselves. Also the utility of improving attitudes towards academic reading is jeopardised by the finding that even proficient readers may have a negative attitude towards it (McKenna et al., 2012; McKenna et al., 1995).

Another justification for finding no systematic change in the participants' reading habits is that the DRD did not use a valid measure of reading habits. It is unreasonable to expect people to read recreationally every day, or to read academic material over the weekend, let alone a young student who struggles to read. However, in the DRD the participants were simply asked to indicate if they had read anything belonging to any of the four categories of reading each day. This meant that the participants would have to start reading each material almost every day in order to detect a change in their reading habits.

Although the participants were asked to only count material they read for more than a few minutes, they were not asked how many times they read each type of material per day, how much time they spent reading or how much they read. These alternative questions would have provided a more detailed description of the participants' reading habits. However, they were not used because it was thought that it would be too difficult for the young participants to monitor and remember exactly how much reading they had done each day. This issue could be avoided by asking the participants to record how much they read and how long it took them immediately after they finished reading.

The additional measure of behaviour was necessary because self-report measures of attitudes are subject to inherent limitations, such as the social desirability bias (Tourangeau & Yan, 2007). However, the participants' reading habits were also measured using self-report. This could be overcome by having an observer monitor the participants reading or, in the case of digital reading, using a computer program to track the frequency and duration of reading on an electronic device.

Reading Attitudes

The results from the SARA did not support the hypothesis that watching the VSM videos would increase the attitudes towards some if not all kinds of reading measured. This is inconsistent with the idea from the previous literature that VSM can be used to increase attitudes towards reading. Possibly without being aware of the connotations, both Robson (2013) and Decker and Buggey (2014) mentioned that their participants' reading attitudes improved as a side effect of a VSM intervention that aimed to develop literacy skills. On one hand, it is likely that this anecdotal evidence of attitude changes following the VSM interventions was in fact due to the improvement made in the participants' reading skills and not from merely seeing themselves on video.

On the other hand, it could also be possible that the reason the current study did not find positive results could be because the videos did not actually portray a positive attitude towards reading. Although the study intended to use FFVSM to present a possible future image of the participants reading with a positive attitude, the participants may not have interpreted the finished videos this way. Robson (2013) and Decker and Buggey (2014) recorded their participants reading aloud in order to increase their reading skills, whereas this study attempted to separate attitude from ability by specifically avoiding portraying improved reading on the videos. So the participants were asked to read in their heads because it was assumed that this would show them silently reading at their current level. However, this meant it was difficult to determine if the participants were severely struggling to read or if they were reading at all, in which case the videos would not have provided a positive image. Also in order to create the illusion of positive attitudes, the participants were asked to act entertained or interested and told what to say to the camera. So it is possible that they knew the emotions were not genuine when watching the videos. Therefore rather than a positive future image, the participants might have viewed the videos as silly reviews of their current behaviour. If this occurred a change in attitude would not be expected.

Although this procedure did not produce positive results, it still might be possible to use VSM to change attitudes in the future. Peter Dowrick suggested creating videos that present the participant with both the target object and an object they already have a positive attitude towards; for example, if the participant liked motorbikes, a video could be created showing them reading a textbook while sitting on a motorbike (Peter Dowrick, personal communication, September 22, 2014). This may work because the individual will have positive associations with their preferred object and it is possible that this will induce positive associations with the target object. This would be similar to the way advertisers pair their

product with events and objects that already have positive associations. But future research is needed to test if this will work.

Reading Ability

Contrary to the hypothesis, the WRAT-4 results showed that the VSM intervention in this study did not lead to an improvement in literacy abilities. However, this does not contradict the ideas from the previous literature.

Many people claim that a student's attitude towards reading influences their academic achievement. However, the large scale survey of elementary school students' reading attitudes by McKenna et al. (1995) and the meta-analysis of the relationship between reading attitudes and achievement by Petscher (2010) only confirm that the two factors are moderately positively correlated. Although it seems obvious that reading achievement and ability influence attitudes it is still not clear whether the reverse occurs. Because this study attempted to improve attitudes towards reading without directly focusing on developing the participants' skills, it would have been possible to determine if reading attitudes influence ability and achievement. In any case, because neither factor was reliably manipulated by the intervention, the results are inconclusive.

The fact that no change was seen in the participants' literacy skills might be due to the short duration of the study. Only 2 months elapsed between the pre-testing and post-testing sessions. This may not have been enough time for a detectable improvement to take place. Also, small subtle improvements in ability may have been masked by the measurement error in the WRAT-4. Additionally, the reading habit findings have already revealed that the participants did not read more, and it is unlikely for anyone's skills to improve without additional practice. This limitation could easily be overcome by measuring changes in the participants' ability over a longer period of time.

Limitations

There are several issues that limited this study as a whole. While these may seem obvious in hindsight, it was still important to conduct the study and put the theories to the test.

First of all, videos can only record things that can be observed. Attitudes are mental concepts that cannot be directly observed. Although attitudes can influence behaviour, the theory of planned behaviour (Ajzen, 1991) states that behaviour is also influenced by other factors. Thus it may not be possible to accurately infer someone's attitude from simply observing how they behave. Therefore, it may be practically impossible to clearly portray an attitude on film. In which case, VSM cannot be used to change attitudes.

Additionally, the aim of any treatment for individuals with dyslexia should be to ultimately improve their literacy skills. However, even if the intervention had improved the participants' reading attitudes to the point that they decided to read rather than undertake other activities, such as watching TV, it is possible that this would not have had an effect on their reading ability. The McKenna model (McKenna, 1994) claims that attitude towards reading influences the decision to read. Thus, it was assumed that a positive attitude towards reading would lead to more practice, which in turn should lead to an improvement in reading ability. However, when Topping, Samuels, and Paul (2007) analysed data from 45,670 students in grades 1-12, they found a positive relationship between reading achievement and quantity of reading (measured by time spent reading), but only when the reading was high quality (measured by comprehension of what they had read). They concluded that time spent reading without guidance has only a modest influence on reading achievement. In other words, practice alone does not make perfect. In this case, this means that even if the intervention were to improve the participants' attitudes towards reading and consequently the

amount of reading they were to do, their reading ability would not improve without guidance from their teachers or an additional skills training program.

Another thing to consider is that it may not be possible to change reading attitudes without also improving reading ability. According to the McKenna model (McKenna, 1994) attitudes towards reading are influenced by beliefs about the outcome of reading and beliefs about the expectations of others as well as the outcomes of incidences of reading. However, it is unclear which factor exerts the most influence. Because an individual's ability to read has a strong influence on their reading experiences, it is possible that any intervention that aims to persuade an individual to value reading more without also attempting to improve their reading ability may be undermined by the next negative experience the individual has while reading. The conservative response is that in order for an individual's reading attitude to change, all three factors in the McKenna model should be addressed.

Fink (1995) showed that a group of successful individuals with dyslexia had positive attitudes towards reading despite their difficulties with reading. It was implied that it was their positive attitude that caused the people in his study to persistently practice reading, which in turn led to their academic success. This was used to argue that it is not necessary to develop reading skills first in order to develop a positive attitude towards reading. This application of VSM was unable to determine whether or not this is true. Although it may be impractical to create an effective VSM intervention that only targets reading attitudes, there are other ways to encourage children to read more. As already mentioned, Thames and Reeves (1994) and J. Fletcher et al. (2012) both showed that students attitudes towards reading could be improved with good teaching and using interesting books.

Implications

Due to the lack of positive changes in the participants' reading attitudes and abilities, this study has not provided the treatment programme it set out to develop. There are several

changes that could be made to the procedure to try to get the intervention to produce positive results in the future. However, this study implies that asking participants to watch videos of themselves silently reading with positive expressions on their faces followed by them looking directly at the camera and affirming their reading behaviour does not improve the reading attitudes of students with dyslexia. This does not undermine or discredit the current understanding of VSM (Dowrick, 2012), it merely reveals a potential limitation to its possible applications. Namely, VSM is most effective as a behavioural intervention. This is consistent with the current literature that has presented successful applications of VSM (Buggey, 2005; Buggey & Ogle, 2012; Dowrick, 1999; Hitchcock et al., 2003; Prater et al., 2012).

Also, the analysis of the limitations of this study implies that only focusing on improving reading attitudes is an ineffective way to improve reading achievement. This is supported by the finding that some proficient readers have poor attitudes towards reading (McKenna et al., 1995). However, if people who can read well still choose not to read when given the opportunity, this undermines the assumption that children with dyslexia must read as well as their non-disabled peers to provide them with equal educational opportunities.

Reading is a highly valued skill in society because it is a lucrative source of information and entertainment. Therefore, individuals with dyslexia are required to have at least a basic ability to read, but it may not be necessary for them to be able to read everything a non-disabled person can. With appropriate support and accommodations an individual with dyslexia may still be able to succeed academically despite their unexpected difficulty learning to read. Shaywitz et al. (2008) point out that there are three general types of accommodations: those that by-pass the reading difficulty by providing information through an auditory mode (for example, audiobooks), those that provide compensatory assistive technologies (for example, text-to-speech computer software), and those that provide additional time so that the struggling reader can adequately demonstrate their knowledge (for example, extra time in

exams). Because individuals with dyslexia generally have a discrepancy between their reading and intellectual abilities, accommodations are critical to assure fairness and equity. With the provision of such accommodations, individuals with dyslexia may be able to overcome their difficulties (Shaywitz, 2003).

Future Research

Rather than focusing on reading attitudes future research could use VSM to develop the phonological skills of individuals with dyslexia. VSM has been used to improve academic performance (Hitchcock et al., 2003; Prater et al., 2012). However, the VSM studies that aimed to improve reading performance have only focused on improving reading fluency (Decker & Buggey, 2014; Dowrick et al., 2006; Robson, 2013) or reading comprehension (Hitchcock et al., 2004). A lot of research has shown that individuals with dyslexia particularly benefit from phonological awareness training (Duff & Clarke, 2011; J. M. Fletcher, 2007; Shaywitz et al., 2008; Snowling & Hulme, 2011). Therefore, future research could attempt to use VSM to improve phonological awareness.

Hitchcock et al. (2004) and Dowrick et al. (2006) used VSM to supplement the ACE reading program. VSM could be used in a similar way to supplement a phonological awareness intervention, such as the Gillon Phonological Awareness Training programme. This programme includes several activities that aim to teach the participants different phonological skills, such as an odd-one-out game used to identify phonemes in words, and a sound-symbol bingo game to reinforce knowledge of phoneme-grapheme relationships. Gillon (2000) tested this intervention against a more traditional speech-language intervention control program and a minimal intervention control program. She found that children who received the phonological awareness intervention made significantly more gains in their phonological awareness ability and reading development than the children who received the other types of speech and language intervention. Interestingly, in the study participants were

given a video of the researcher demonstrating each intervention activity. Although Gillon (2000) showed that the intervention is already effective, it would be interesting to test if videos of the participants themselves accurately demonstrating each activity could make the programme even more effective.

Conclusion

Dyslexia is a common SLD that is characterised by an unexpected difficulty learning to read (American Psychiatric Association, 2013). Reading is a highly valued and necessary skill, therefore individuals with dyslexia require support. Previous dyslexia interventions have directly focused on improving specific components of reading (Shaywitz et al., 2008; Snowling, 2013). However, this study aimed to develop an intervention that targeted reading attitudes. Reading attitudes are a set of acquired feelings about reading that consistently predispose an individual to engage in or avoid reading (Conradi et al., 2014). There is a moderate relationship between reading attitudes and achievement (Petscher, 2010), therefore targeting reading attitudes in dyslexic children is an appealing way to improve their academic performance. Also, it has been shown that successful individuals with dyslexia have positive attitudes towards reading (Fink, 1995). Based on the previous literature, this study aimed to improve the reading attitudes of individuals with dyslexia using VSM. VSM is a behavioural intervention that uses carefully created videos to increase the performance of desired behaviours (Dowrick, 1999). VSM has already been used to improve reading ability (Decker & Buggey, 2014; Dowrick et al., 2006; Hitchcock et al., 2004; Robson, 2013), so this study made an effort to create videos that only portrayed positive attitudes towards reading. This was done by filming the participants silently reading different material with positive expressions on their faces before looking directly at the camera and affirming their reading behaviour.

Fourteen students aged 9-14 who had a formal diagnosis of dyslexia took part in this multiple-baseline study. Each week during the intervention, the participants were asked to watch a video of themselves reading from one of four types of reading material: academic digital, academic print, recreational digital and recreational print (McKenna et al., 2012). Their reading habits and affect while reading were monitored each day. Their attitudes towards reading and their reading ability were measured before and after the intervention. This study did not detect any systematic or reliable changes in the factors following the intervention. This may have been due to several limitations in the procedure; otherwise it could have been that it may not be possible to change attitudes using VSM or without also simultaneously developing reading ability. Furthermore, it may not be beneficial to only try to improve reading attitudes because even if this does lead to more frequent reading, practice alone does not make perfect (Topping et al., 2007). VSM is an effective behavioural intervention (Buggey & Ogle, 2012), therefore, rather than focusing on reading attitudes, future research could use VSM to support the development of reading skills, such as phonological awareness.

Reading is a valuable skill because it allows us to explore the ideas and experiences of other people as well as succeed academically. Individuals with dyslexia are disadvantaged because they have an unexpected difficulty learning to read. With appropriate accommodations and support people with dyslexia can overcome their obstacles. They may struggle, but with the right attitude they can still reach their full potential.

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Appendix 1

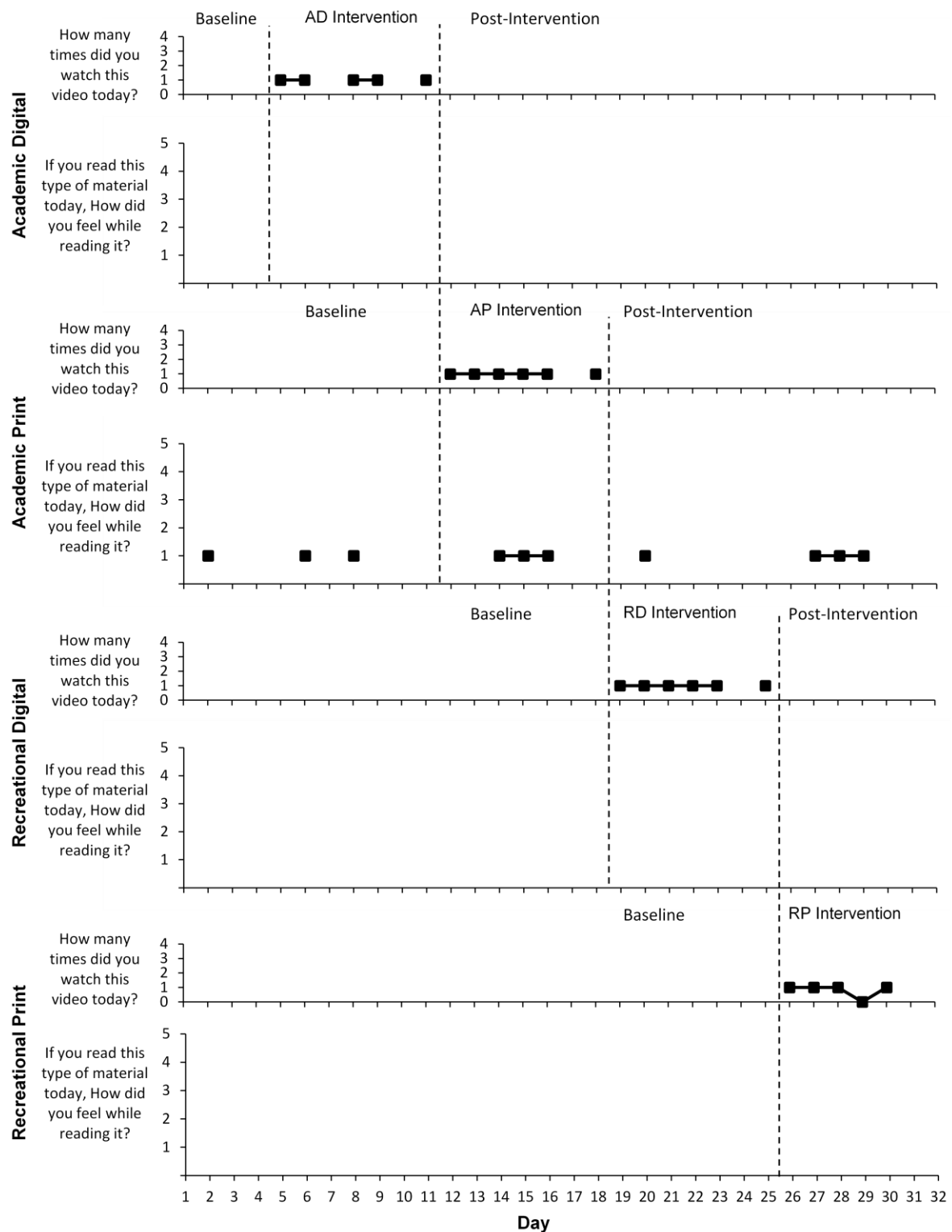


Figure 7. Adam's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

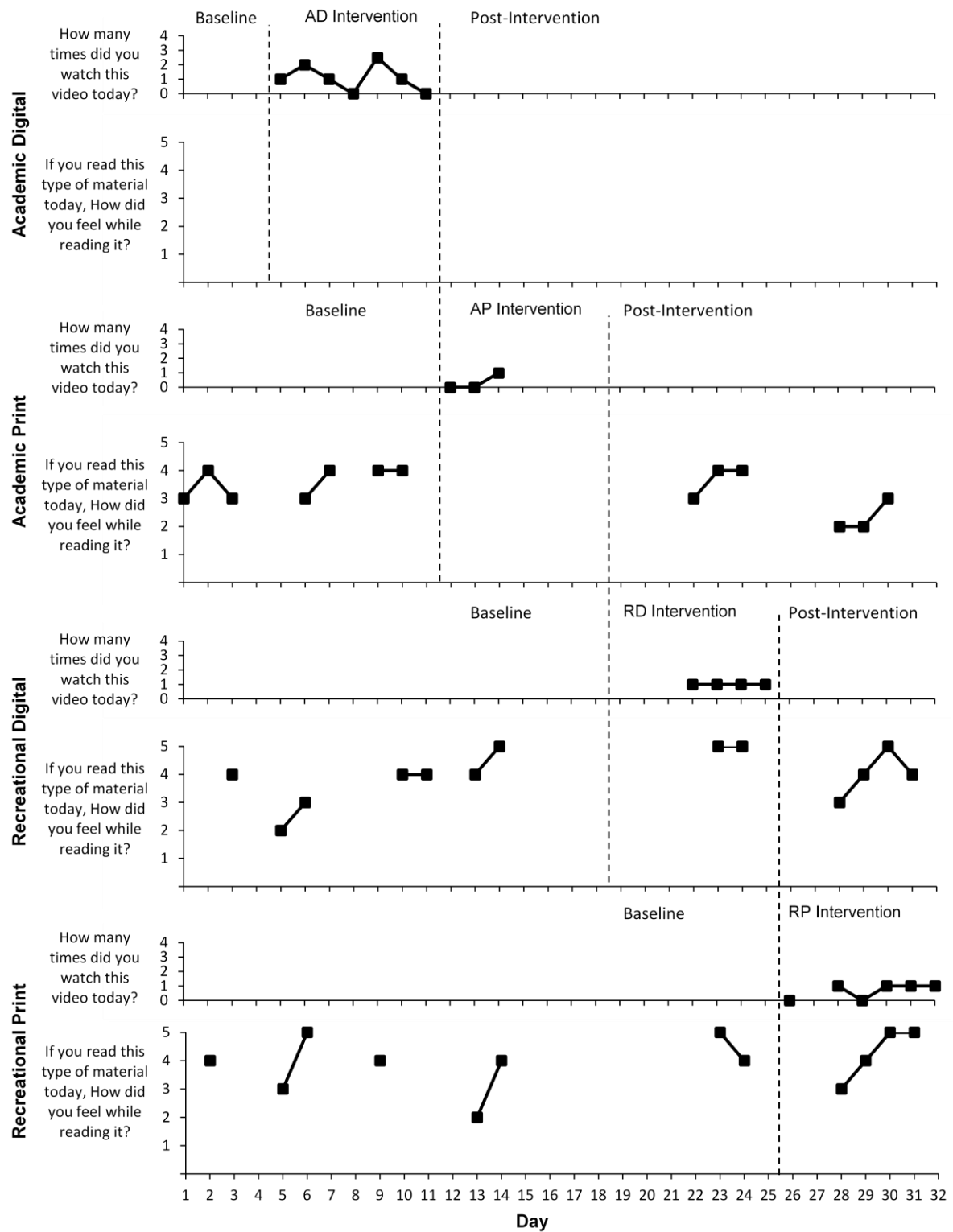


Figure 8. Albert's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

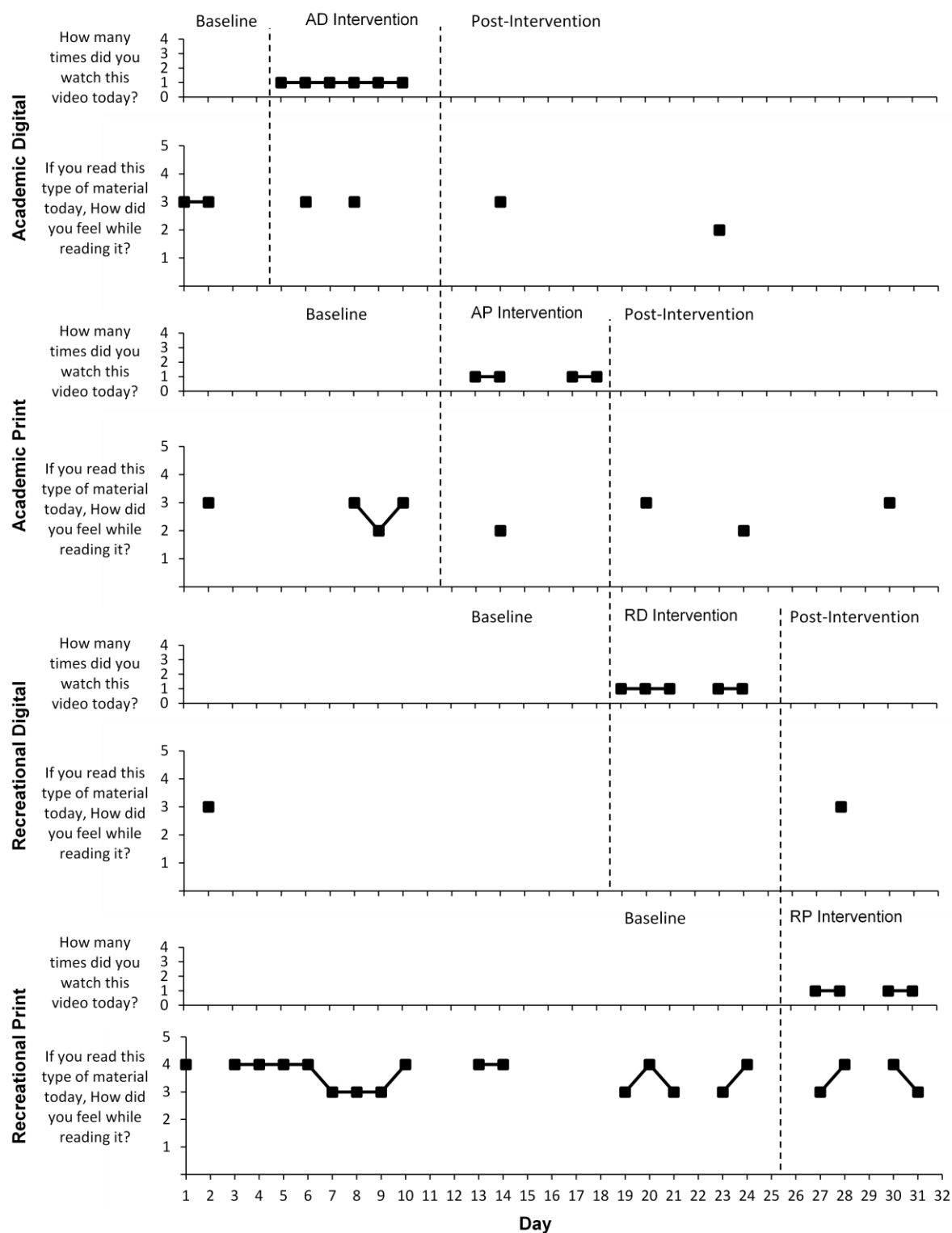


Figure 9. Carl's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

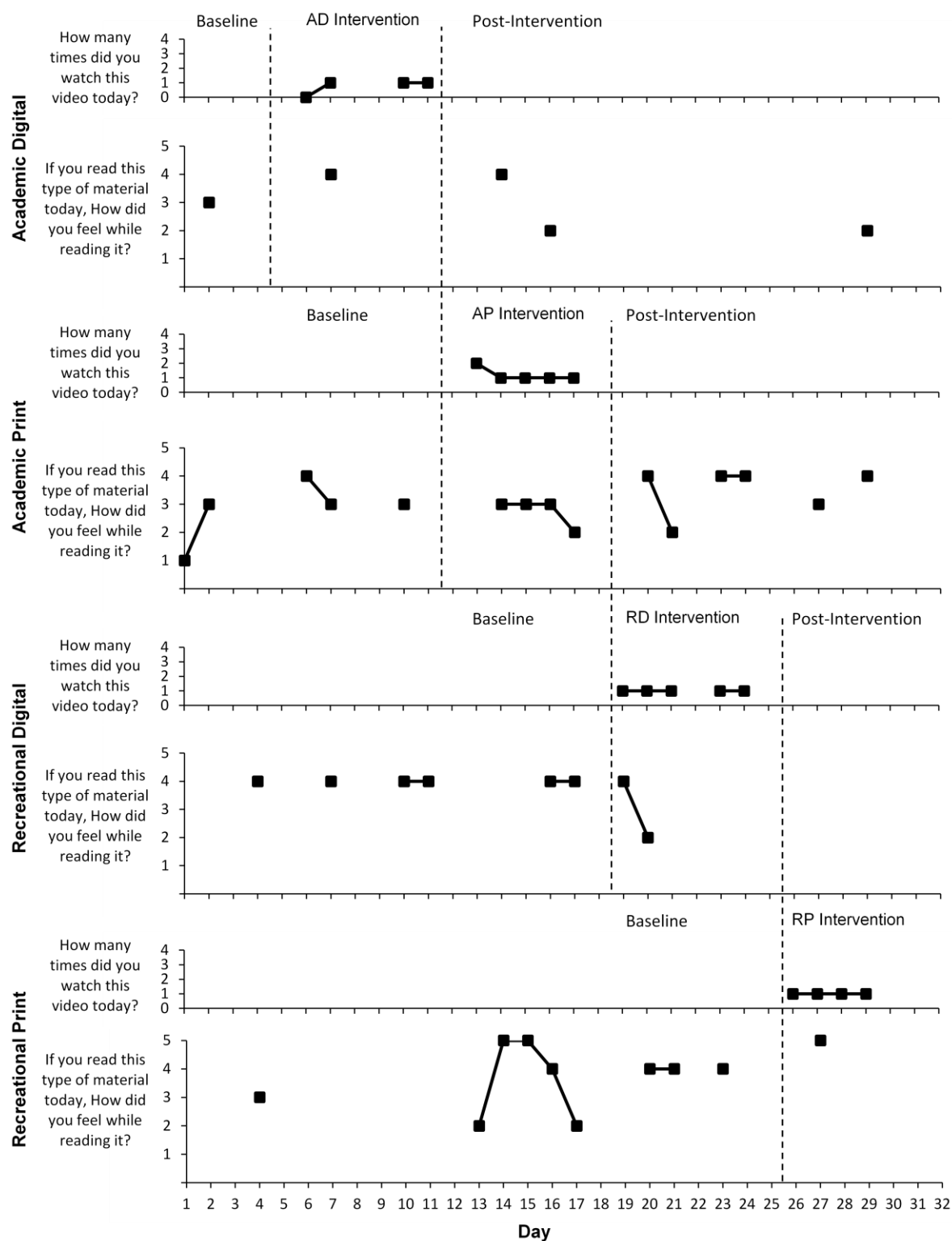
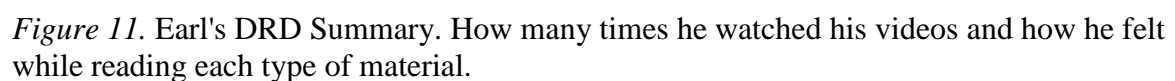


Figure 10. Corey's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.



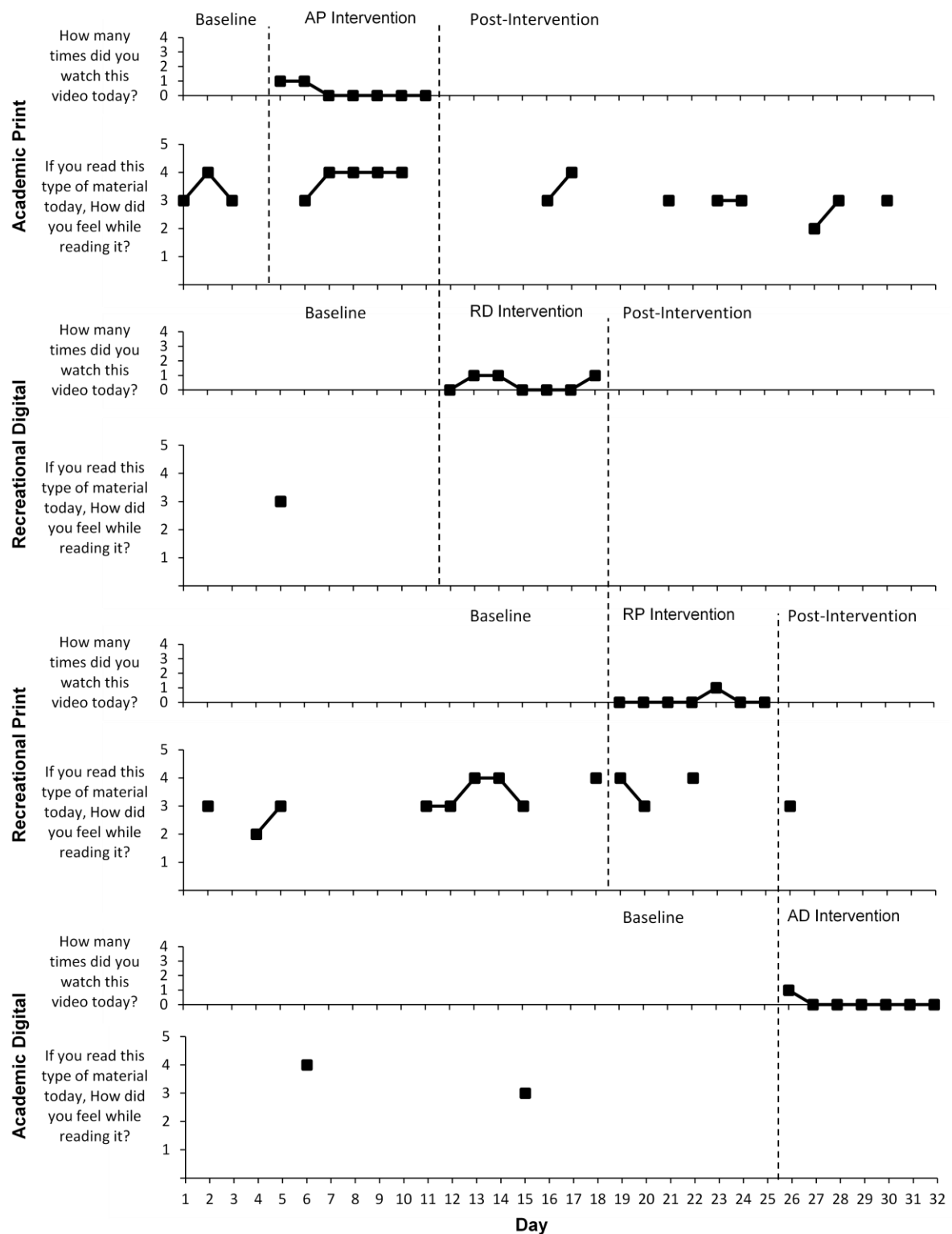


Figure 12. Emma's DRD Summary. How many times she watched his videos and how she felt while reading each type of material.

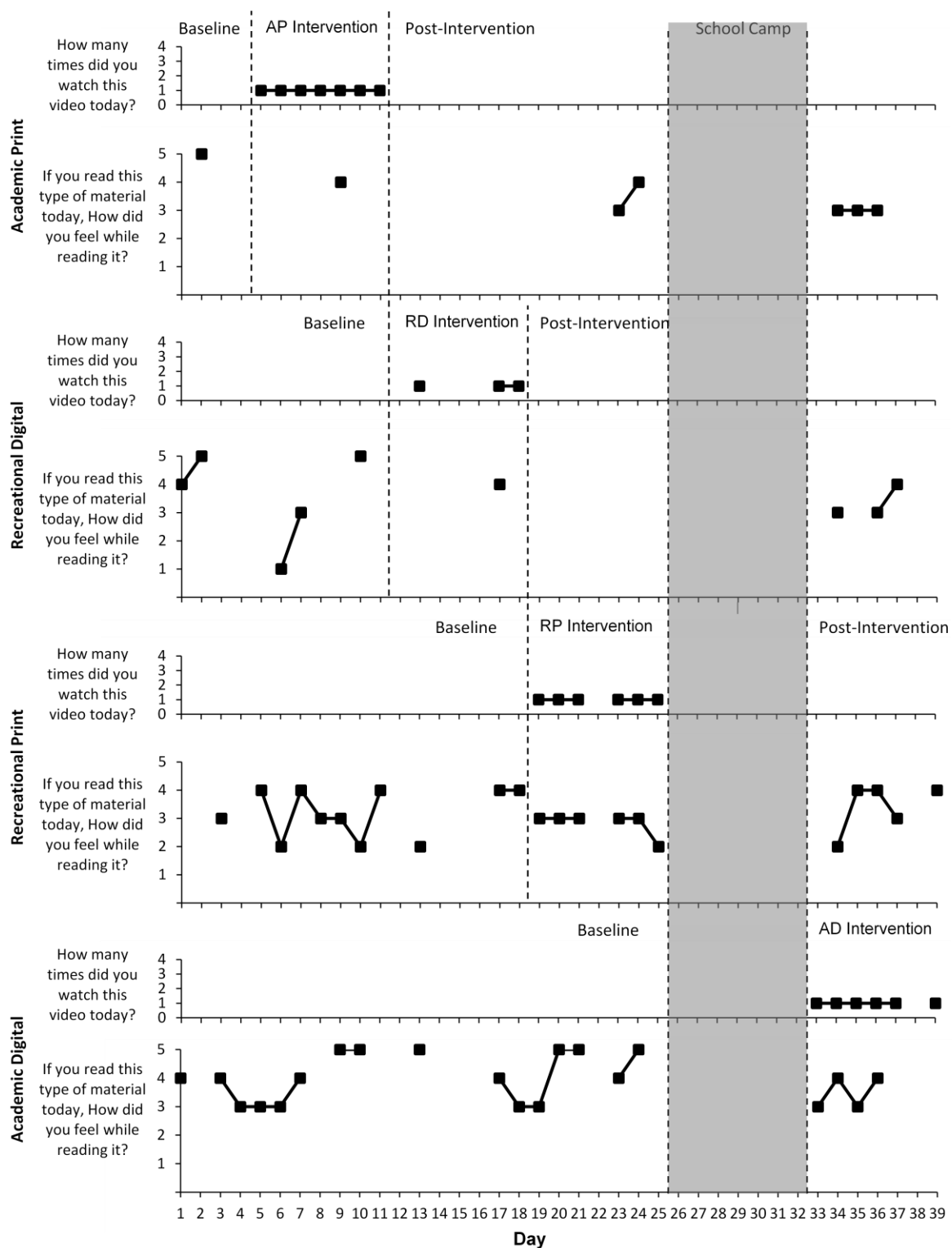


Figure 13. Francis' DRD Summary. How many times he watched his videos and how he felt while reading each type of material. Grey band shows when he was away on a school camp.

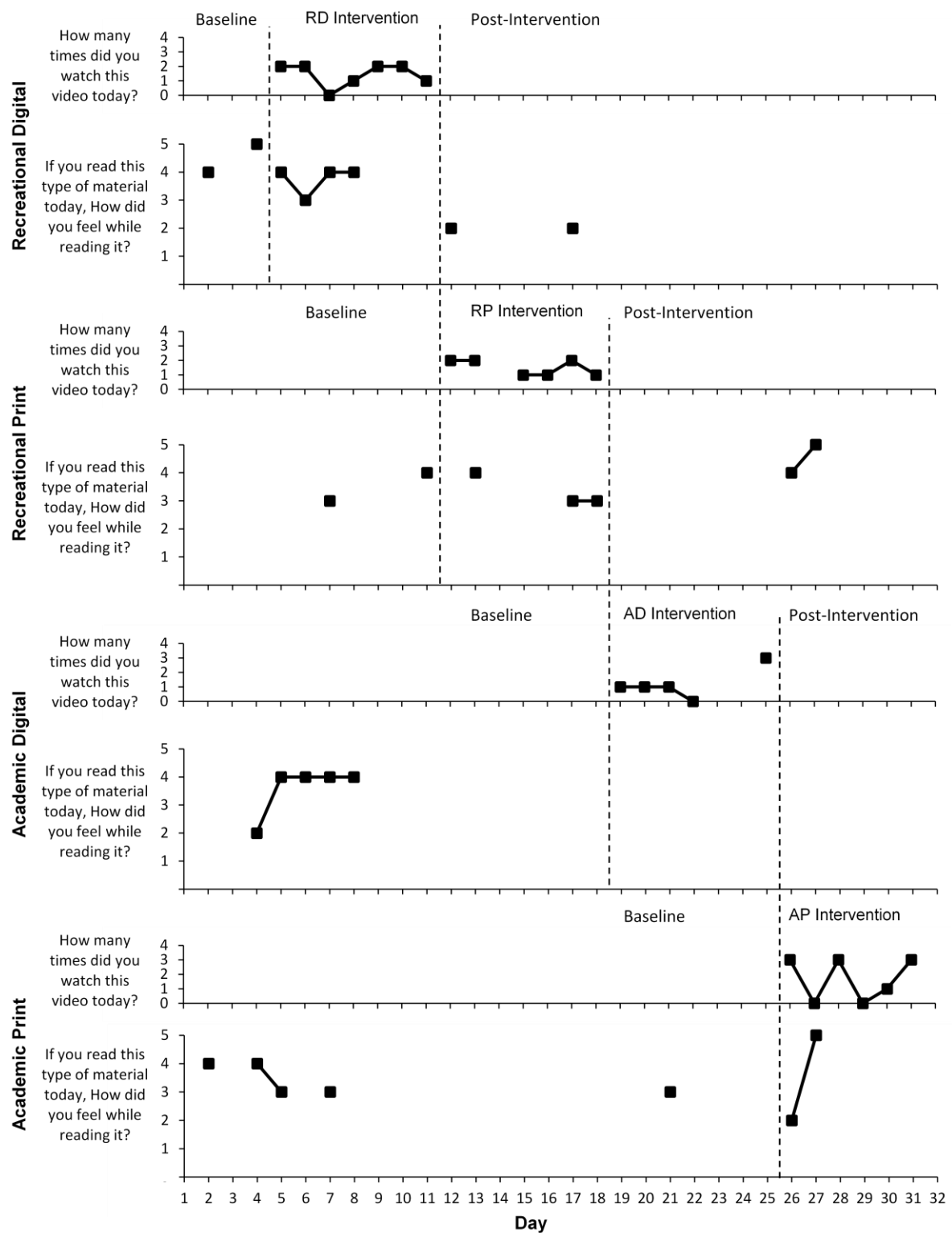


Figure 14. Jack's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

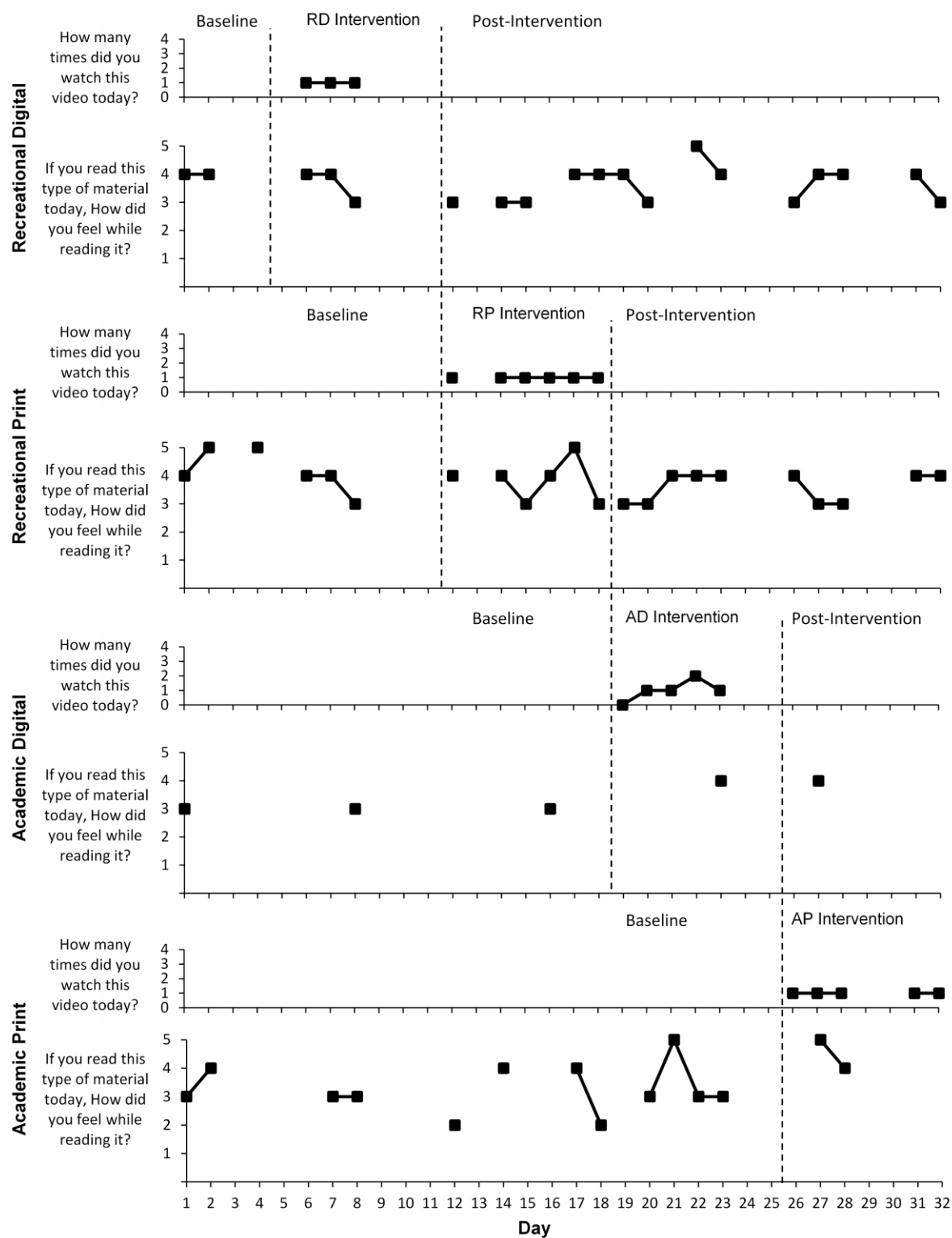


Figure 15. Jeffrey's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

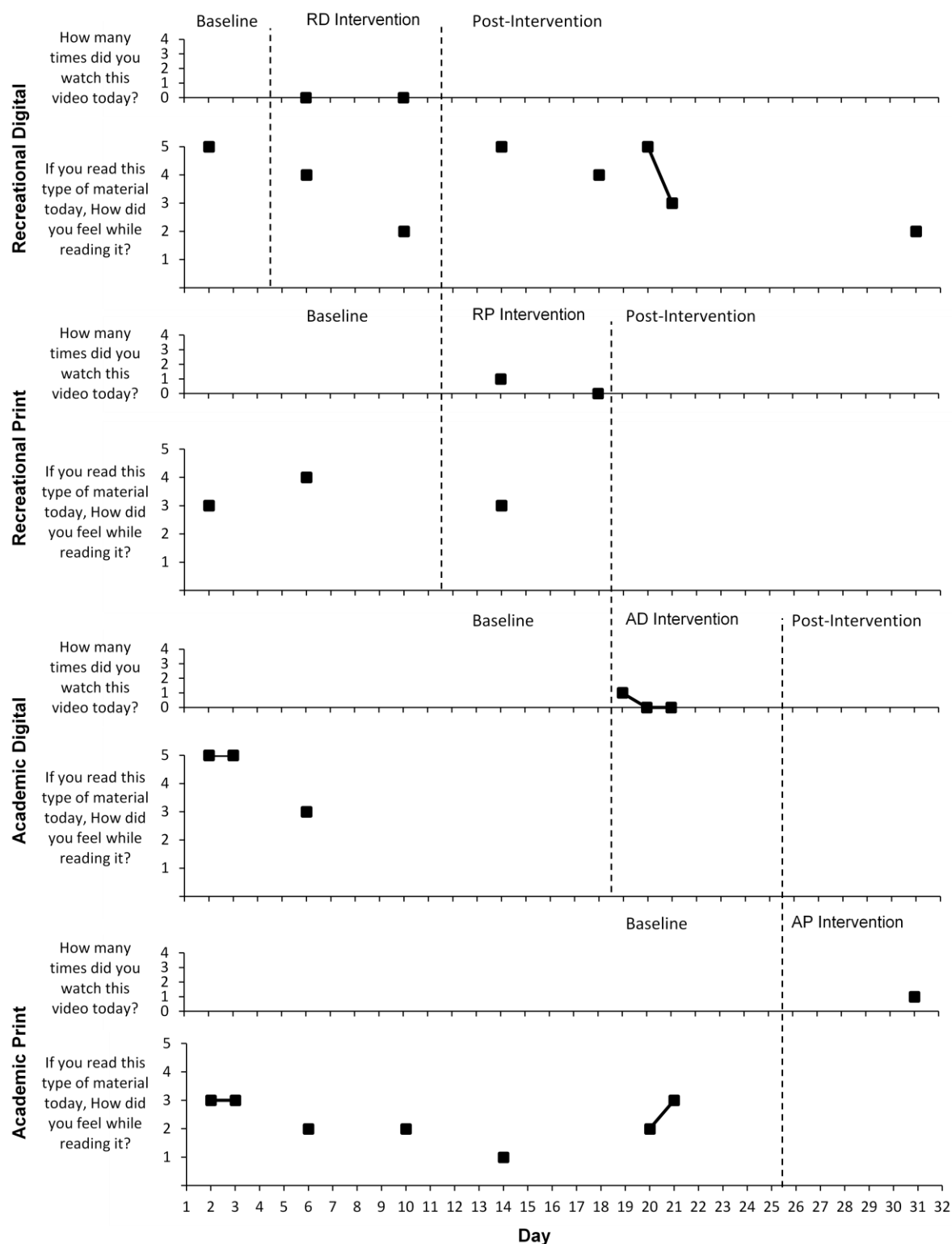


Figure 16. Kevan's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

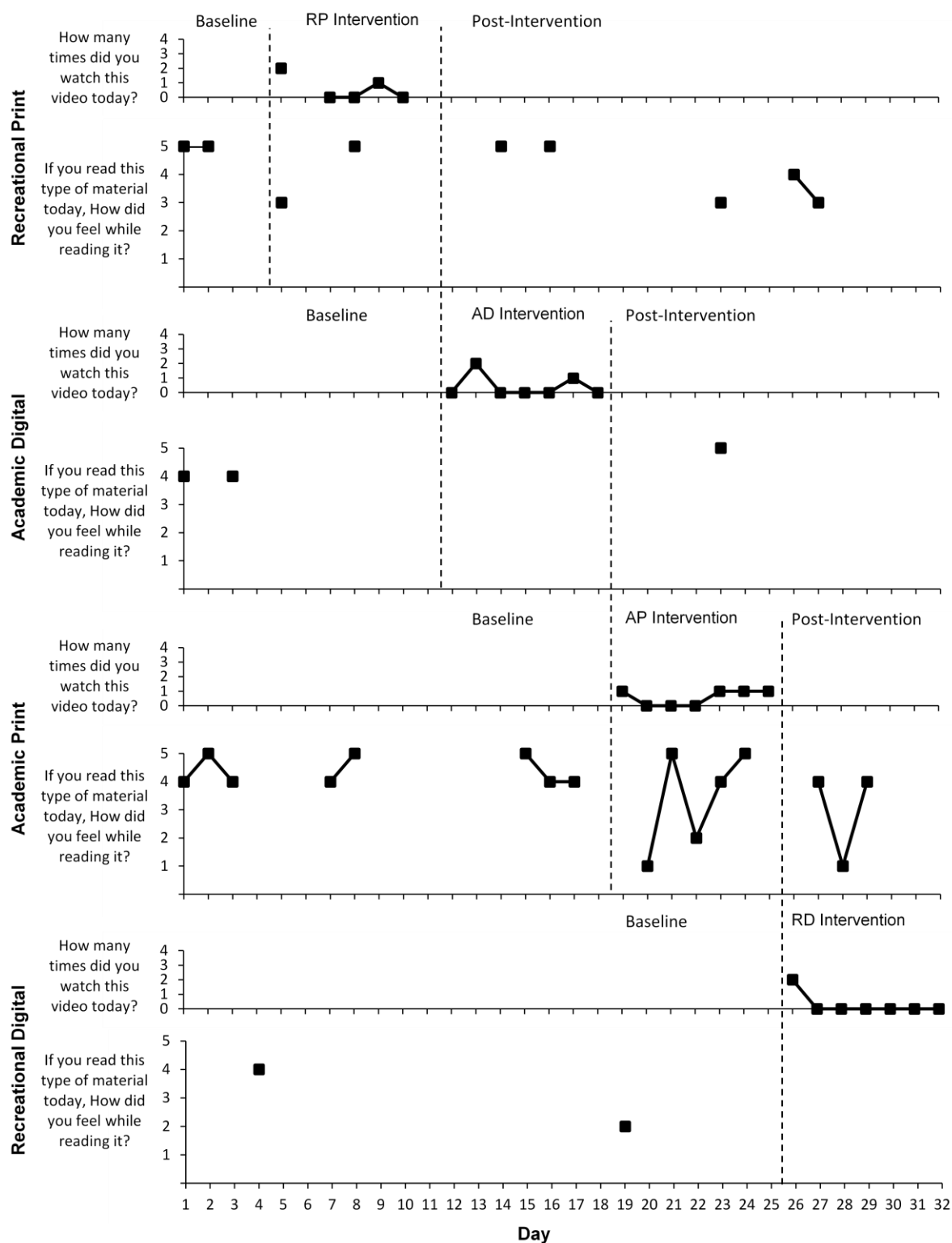


Figure 17. Malcolm's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

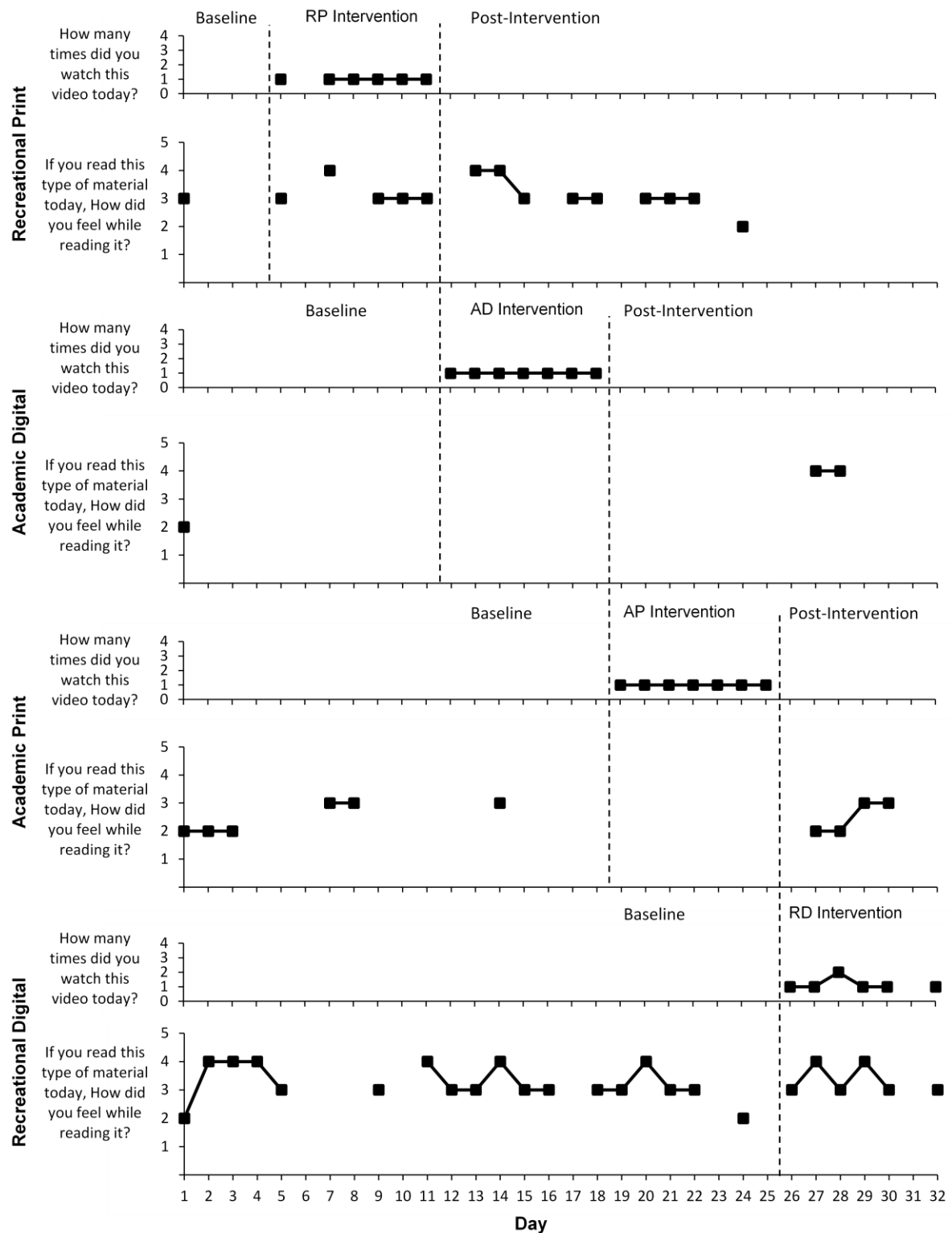


Figure 18. Michael's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

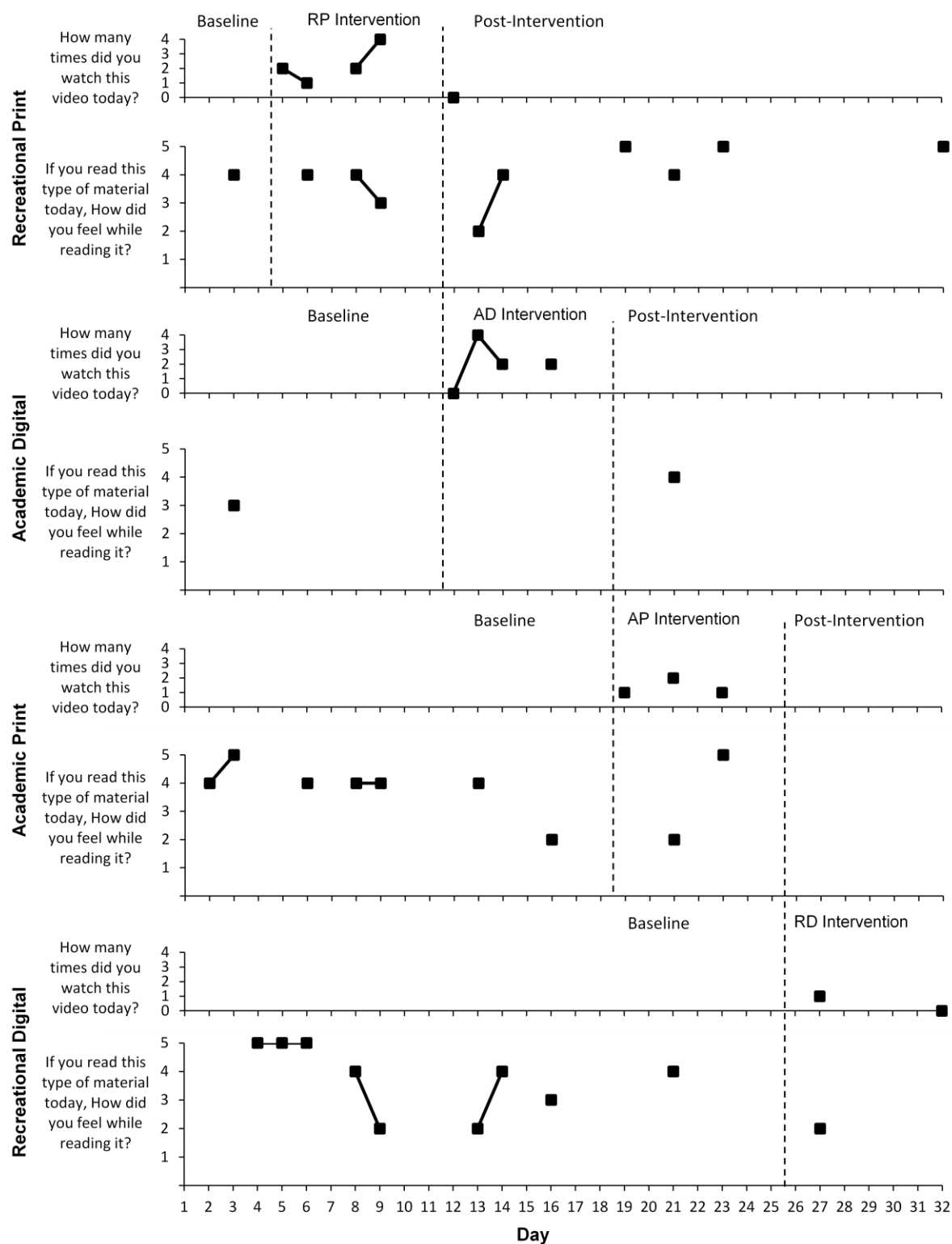


Figure 19. Rory's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

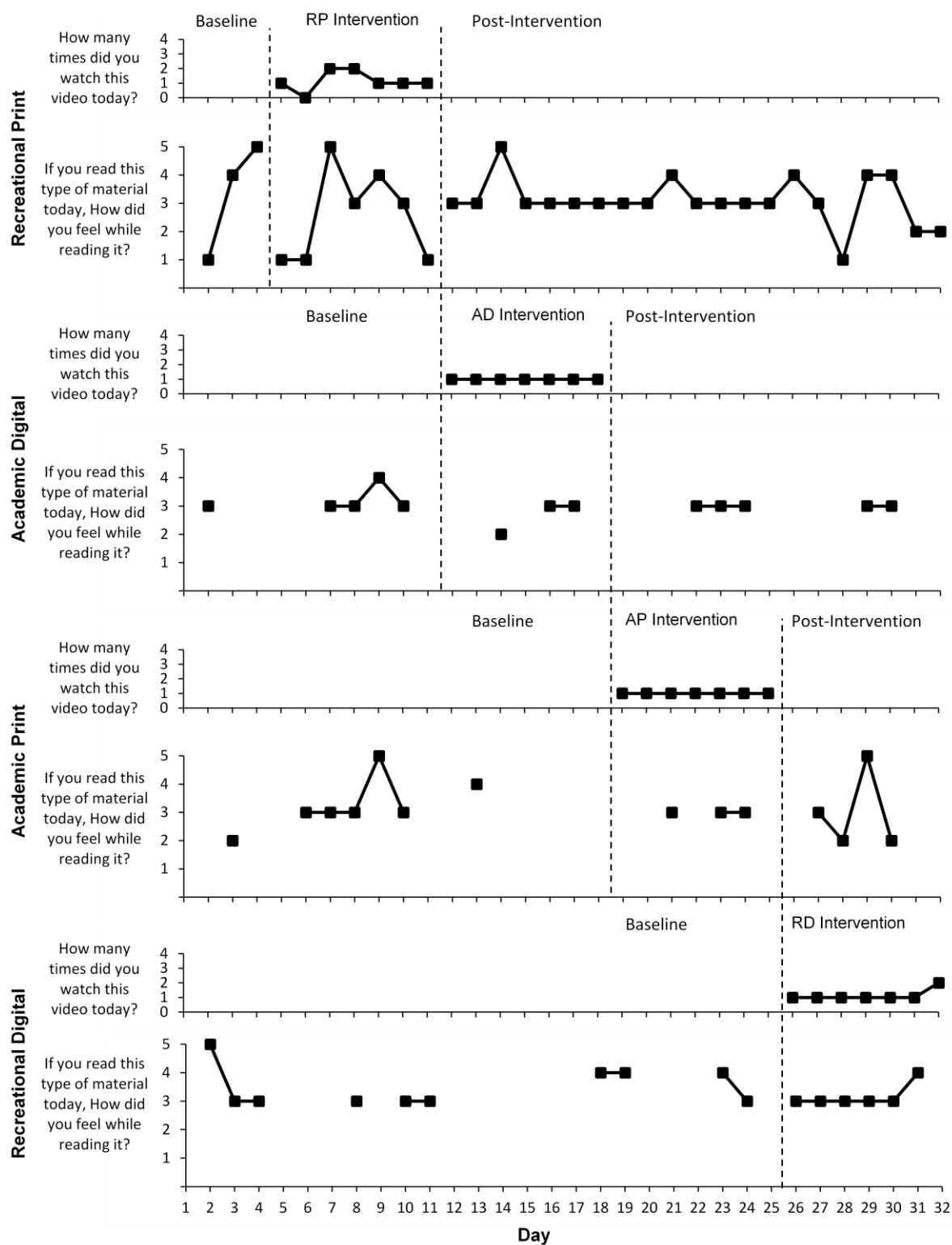


Figure 20. Tyler's DRD Summary. How many times he watched his videos and how he felt while reading each type of material.

Appendix 2



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: 2014/27/ERHEC

30 June 2014

James Maguire
Department of Psychology
UNIVERSITY OF CANTERBURY

Dear James

Thank you for providing the revised documents in support of your application to the Educational Research Human Ethics Committee. I am very pleased to inform you that your research proposal "Using video self-modelling to improve the reading attitudes of students with dyslexia" has been granted ethical approval.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 10 June 2014.

Should circumstances relevant to this current application change you are required to reapply for ethical approval.

If you have any questions regarding this approval, please let me know.

We wish you well for your research.

Yours sincerely

A handwritten signature in black ink, appearing to read 'N Surtees'.

Nicola Surtees
Chair
Educational Research Human Ethics Committee

"Please note that Ethical Approval and/or Clearance relates only to the ethical elements of the relationship between the researcher, research participants and other stakeholders. The granting of approval or clearance by the Ethical Clearance Committee should not be interpreted as comment on the methodology, legality, value or any other matters relating to this research."

Appendix 3

Supplementary information on Dyslexia

Theoretical Cause. There are several theories regarding the cause of dyslexia. The cerebellar theory suggests individuals with dyslexia have a mildly dysfunctional cerebellum, which causes problems with balance, motor skills, phonological skills and rapid processing (Fawcett, Nicolson, & Dean, 1996). The magnocellular theory suggests that the problems a dyslexic individual may display are a result of visual and auditory deficits (Stein & Walsh, 1997). The transactional theory postulates that reading ability is not a property of the reader but varies depending on the complex social contexts and events in which it occurs (McEneaney, Lose, & Schwartz, 2006). However, the most accepted theory is the Phonological Theory (Ramus et al., 2003).

Reading is a complex skill which includes a number of identifiable component skills. Towards the end of the 1990s the U.S. government requested the formation of The National Reading Panel, which aimed to assess the effectiveness of different approaches used to teach children to read. The panel found that in order to read with comprehension, the learner must have previously acquired knowledge of the meanings of most of the words in the text and the ability to read that text at a functional level of fluency. In order to read with a functional level of fluency, the learner must have previously acquired the ability to instantly recognise a majority of the words in the text and the ability to decode the remaining words with a functional level of decoding fluency. In order to acquire a functional level of decoding fluency, the learner must have learned the most commonly occurring of the grapheme-phoneme equivalence relations (letter-sound relations) which occur in written English. In order to acquire grapheme-phoneme equivalence relations in a timely fashion the child must be able to distinguish between each of the 52 printed letters and distinguish between each of

the 43 English language phonemes (National Institute of Child Health and Human Development, 2000).

According to Shaywitz et al. (2008), phonological awareness (PA) refers to the ability to recognize, identify, and manipulate syllables and phonemes within spoken language. Shaywitz et al. (2008) go on to list several studies that have shown that PA is; at the core of reading and reading difficulties, predicts reading acquisition, differentiates good and poor readers, and that improving PA improves reading. Accordingly, the phonological theory postulates that difficulties individuals with dyslexia have in reading are caused by difficulties using letter-sound relationships to quickly decode and identify written words.

This has been supported by neuroimaging studies that have shown that individuals with dyslexia have dysfunctions and abnormalities in the parts of the brain that are usually associated with reading processes (Shaywitz et al., 2008). On a similar point, several genes have been linked to dyslexia (Francks et al., 2002). This implies that dyslexia is heritable. Consequently, the disability is present in children and is not the result of a life-time of poor reading.

Diagnosis. The DSM-V recommends that a diagnosis should be based on the clinical synthesis of the individual's history (developmental, medical, family, educational), school reports, and psycho-educational assessments (American Psychiatric Association, 2013). The clinician tries to detect a weakness in phonologically based skills in the context of often stronger cognitive and academic skills in non-reading-related areas (Shaywitz et al., 2008).

However, there are two issues that result from trying to detect discrepancies. Firstly in order to detect a discrepancy between a child's IQ and their achievement the child may have to *wait-to-fail*. This is a problem because it prevents early identification which may prevent early intervention. Secondly, it is now recognised that poor phonological awareness and

dyslexia occur across the IQ spectrum (Snowling, 2013). Therefore, poor readers with a low IQ will not be diagnosed as dyslexic because there is no discrepancy.

The importance of early intervention has led to the development of alternative ways to detect at-risk readers. These all involve frequent testing of reading skills from an early age with comparisons to expected norms. For example, SRIM, the School wide Reading Improvement Model (Kame'enui, Simmons, & Coyne, 2000) and RTI, Response To Intervention (Fuchs & Fuchs, 2005) where children not making progress receive additional support. These alternatives may be cheaper than formal evaluations. However, they also have their own limitations, which may explain why they have not been universally adopted yet. For now a formal assessment by a trained clinician remains the most widely used method for diagnosing dyslexia.