



Reading Enjoyment, Behaviour and Attitudes in Pupils who use Accelerated Reader

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Words for life

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Table of contents

Content of figures and tables.....	4
Executive summary	6
This report	8
AR in 2014	8
Exploring AR longitudinally using a dataset of 1,500 children in KS2 whom we have followed since 2011.....	13
Reading enjoyment.....	13
Reading frequency.....	14
Reading confidence	14
Reading length.....	15
Reading attitudes.....	15
A closer look at AR children – length of AR.....	17
Modelling relationships over time	20
Differences between boys and girls	24
Discussion.....	29
Appendix 1	31
Appendix 2	33
Reading enjoyment also including gender	33
Reading frequency also including gender.....	33
Reading length also including gender.....	34
Reading attitudes also including gender	35

Content of figures and tables

Figure 1: Levels of reading enjoyment for AR and non-AR pupils in 2014	9
Figure 2: Percentage of AR and non-AR pupils who enjoy reading either very much or quite a lot in 2012 to 2014	9
Figure 3: Frequency of reading outside class for AR and non-AR pupils in 2014.....	10
Figure 4: Percentage of AR and non-AR pupils reading outside class at least once week in 2012 to 2014	10
Figure 5: Frequency of reading for fun outside class for AR and non-AR pupils in 2014.....	11
Figure 6: Number of books read in the past month for AR and non-AR pupils in 2014	11
Figure 7: Percentage agreement with attitudinal statements for AR and non-AR pupils in 2014	12
Figure 8: Percentage of AR and non-AR pupils who enjoy reading either very much or quite a lot in 2011 to 2014	13
Figure 9: Reading outside class at least a few times a week for AR and non-AR pupils in 2011 to 2014	14
Figure 10: Median reading confidence for AR and non-AR pupils in 2011 to 2014	14
Figure 11: Reading for 30 minutes or more for AR and non-AR pupils in 2011 to 2014	15
Figure 12: Percentage agreement with attitudinal statements for AR and non-AR pupils in 2011 to 2014	16
Figure 13: Standardised reading assessment scores in 2014 by length of AR.....	17
Figure 14: Percentage enjoying reading either very much or quite a lot in 2014 by length of AR	18
Figure 15: Percentage reading at least once a week in 2014 by length of AR	18
Figure 16: Percentage perceiving themselves to be very good readers in 2014 by length of AR	19
Figure 17: Percentage reading for one hour or more in 2014 by length of AR	19
Figure 18: Percentage agreement with attitudinal statements in 2014 by length of AR.....	20
Figure 19: Predictive relationships between survey variables and reading attainment over time for AR children, beginning with survey variables in 2011	22
Figure 20: Predictive relationships between survey variables and reading attainment over time for AR children, beginning with attainment in 2011	22
Figure 21: Predictive relationships between survey variables and reading attainment over time for non-AR children, beginning with survey variables in 2011	23
Figure 22: Predictive relationships between survey variables and reading attainment over time for non-AR children, beginning with attainment in 2011	24
Figure 23: Predictive relationships between survey variables and reading attainment over time for AR girls, beginning with survey variables in 2011	25
Figure 24: Predictive relationships between survey variables and reading attainment over time for AR boys, beginning survey variables in 2011	25
Figure 25: Predictive relationships between survey variables and reading attainment over time in non-AR girls, beginning with survey variables in 2011	26
Figure 26: Predictive relationships between survey variables and reading attainment over time in non-AR boys, beginning with survey variables in 2011	27
Figure 27: Predictive relationships between survey variables and reading attainment over time for AR girls, beginning with attainment in 2011	27
Figure 28: Predictive relationships between survey variables and reading attainment over time for AR boys, beginning with attainment in 2011	28
Figure 29: Predictive relationships between survey variables and reading attainment over time for non-AR girls, beginning with attainment in 2011	28
Figure 30: Predictive relationships between survey variables and reading attainment over time for non-AR boys, beginning with attainment in 2011	29
Figure A1: Reading enjoyment by gender and AR in 2011 to 2014	33
Figure A2: Reading outside class at least a few times a week by gender and AR in 2011 to 2014	34
Figure A3: Reading 30 minutes or more by gender and AR in 2011 to 2014	34
Figure A4: Percentage agreement with attitudinal statements by gender and AR in 2011 to 2014	35

Table 1: Correlations in 2014.....21
Table A1: Correlations in 2011 to 2014 31

Executive summary

Do pupils who use Accelerated Reader (AR) think differently about reading, do they enjoy reading more and do they do it more often than pupils who do not use AR? We explore this question using two sources of data. The first utilises data from our 2014 annual literacy survey in which more than 32,000 children and young people aged 8 to 18 participated. 3 in 10 (29.9%; N = 9,551) of participating pupils said that they use AR. The 2014 findings are contextualised by recourse to findings we made in 2012 and 2013.

These data confirm previous findings and show that:

- Significantly more pupils who use AR enjoy reading either very much or quite a lot than pupils who do not use AR (58.8% vs. 51.9%).
 - The reading enjoyment gap between AR and non-AR pupils has narrowed between 2012 and 2014.
- Significantly more AR pupils read frequently outside class than their non-AR peers. For example, 83.6% of AR pupils read outside class at least once a week compared with 76.3% of non-AR pupils
 - The gap in reading frequency between AR and non-AR pupils has decreased between 2012 and 2014.
- AR pupils are significantly more likely to think positively about reading than their non-AR peers. For example, while 48.5% of AR pupils think that reading is cool, only 37.5% of non-AR pupils think the same.

The second source uses data from a longitudinal study we set up in 2011. We followed 1,500 pupils who were aged seven to eight (Year 3) in 2011 until they were aged 10 to 11 (Year 6) in 2014. 37% of these pupils said that they used AR in 2011. All pupils completed our attitudinal survey each year, and each year schools also sent us their attainment data. These data allow us to compare AR pupils with non-AR children over time on their reading enjoyment, reading behaviour and reading attitudes. In particular, they allow us to tease out the relative importance of reading enjoyment, behaviours and attitudes in predicting reading skills over time. We will also explore whether different patterns of relationships exist depending on whether or not children and young people use AR.

These data generally corroborate findings from the cohort analyses outlined above and show that:

- Y3 pupils who used AR in 2011 were significantly more likely to enjoy reading than their non-AR peers. These differences remained true when these pupils were in Y4 and Y5, with differences becoming more pronounced when pupils were in Y6 in 2014.
- Y3 pupils who used AR in 2011 did not read any more frequently than their non-AR peers. This remained true in 2012 and 2013, when these pupils were in Y4 and Y5 respectively. However, when pupils were in Y6 in 2014, AR pupils were significantly more likely to read outside class than their non-AR peers.
- AR pupils who were in Y3 in 2011 were significantly more likely to think positively about reading than their non-AR peers. This difference in reading attitudes continued throughout the next three years when pupils were in Y4, Y5 and Y6.

There is some indication that pupils who do AR for four years have better outcomes in terms of reading enjoyment, reading frequency and reading attitudes than children who do AR for less than four years. For example, when participating children were in Y6 in 2014, pupils who had done AR for four years (N = 82) enjoyed reading more, were more confident readers, read for longer and had more positive attitudes towards reading than pupils who had done AR for three (N = 109), two (N = 264) or one (N = 126) year. Pupils who had done AR for two years had the lowest reading enjoyment, reading confidence and reading length scores.

Longitudinal data allowed us to explore the relationships between reading enjoyment, reading behaviour, reading attitudes and reading attainment over time. Using path analyses, we found

that reading enjoyment, reading frequency and reading attitudes in 2011, when pupils were in Y3, positively predicted attainment in 2012, when pupils were in Y4. Interestingly, there was an inverse relationship between reading length in 2011 and reading attainment in 2012, which indicates that pupils who read for shorter periods of time did better in their reading skills. In turn, reading attainment in 2012 positively predicted reading enjoyment, reading confidence, reading frequency, reading length and reading attitudes in 2013, when pupils were in Y5. Finally, only reading enjoyment and reading confidence in 2013 predicted reading attainment in 2014, when pupils were in Y6. These analyses suggest that only reading enjoyment has a strong bi-directional link with reading attainment, indicating that reading enjoyment both predicts and is predicted by reading attainment.

Our analyses also highlight some interesting differences between boys and girls who use AR and those who do not. In particular, reading frequency is initially more important for AR girls in predicting reading attainment, while attitudes towards reading are initially more important for AR boys. For both AR girls and AR boys, reading enjoyment and reading confidence are important later in predicting reading attainment in 2014. Reading confidence is a stronger predictor of attainment for AR boys than AR girls, while reading enjoyment is a slightly stronger predictor of attainment for AR girls than AR boys.

We also notice some interesting findings regarding differences between girls and boys who use AR and those who do not. While reading enjoyment and reading frequency are significant positive predictors of reading attainment in 2012 for AR girls, reading frequency is a much weaker predictor and reading enjoyment a stronger predictor of reading attainment in 2012 for non-AR girls. While reading attitudes significantly predict reading attainment in 2012 for AR boys, no such relationship exists for non-AR boys. However, reading frequency positively predicts reading attainment in 2012 for non-AR boys. Also, in addition to reading enjoyment and reading confidence, reading frequency and reading attitudes positively predict reading attainment in 2014 for non-AR boys, while reading duration negatively predicts attainment in 2014.

The finding that reading enjoyment is the only variable in this complex interplay of variables that has a strong bi-directional influence, regardless of gender and whether children use AR or not, not only highlights the importance of reading enjoyment as a variable that matters, but also underlines the need to develop effective methods to encourage children and young people to read for enjoyment.

Another important finding was that the relationship between 'soft' reading outcomes and reading attainment is largely similar regardless of whether children do AR or not, and regardless of their gender. This is the case despite significant differences in the absolute levels of their soft outcomes (how much they enjoy reading, how much they think positively about reading etc.). Consequently, interventions that work for one group of children in terms of improving outcomes should work equally in other groups as well.

We are hopeful that an increased understanding of the relationships between reading enjoyment, attitudes, behaviour and skills will not only help us to strengthen the work carried out across the National Literacy Trust and the sector, but it will also help us to influence education policy and practice to promote the importance of reading for pleasure.

This report

Accelerated Reader (AR) is a tool for monitoring and managing independent reading practice. Although a wealth of data is routinely collected about children's reading skills as part of the AR tool, no information is collected on the 'softer' reading outcomes, such as reading enjoyment and attitudes towards reading. We were therefore commissioned by Renaissance Learning in 2012 and 2013¹ to help plug that gap using data from our annual literacy survey. Both times we found that children and young people who use AR tend to enjoy reading more, read more often, read a greater variety of materials and think more positively about reading than their peers who do not use AR.

The purpose of this report is two-fold. Firstly, we will explore the relationship between AR and reading enjoyment, reading frequency and reading attitudes using data from our 2014 annual literacy survey in which 32,000 children and young people aged 8 to 18 participated. This will help us contextualise the findings from previous reports published on our 2012 and 2013 data², and outline any change in the relationships that might have happened over time.

The second part of this report will explore the relationship between AR and reading outcomes using data from 1,500 KS2 children for whom we have collected attitudinal and attainment data since 2011. The analyses using the longitudinal data uniquely allow us to compare AR pupils with non-AR children over time on their reading enjoyment, reading behaviour and reading attitudes. In particular, we will be able to tease out the relative importance of reading enjoyment, behaviours and attitudes in predicting reading skills over time. We will also be able to explore whether different influences are important depending on whether or not children and young people use AR.

AR in 2014

29.9% (N = 9,551) of children and young people who participated in our annual survey in 2014 said that they use AR; 47.9% (N = 15,312) said they do not use AR³. Children and young people who use AR were very similar to children and young people who do not use this reading tool, with one exception. The KS4 cohort (aged 14 to 16) was significantly bigger for those pupils who do not use AR. Although this reflects the fact that AR is mainly used by KS2 and KS3 pupils, the proportion of KS4 pupils who do not use AR was adjusted to mirror the proportion of KS4 pupils who use AR for comparative purposes (matching KS4 pupils in terms of the other background variables).

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There was a significant<sup>4</sup> difference between AR and non-AR pupils in 2014 in the degree to which they **enjoy reading**<sup>5</sup>. **Figure 1** outlines the difference in percentages and shows that AR pupils are more likely to enjoy reading either very much or quite a lot than non-AR pupils (58.8% vs. 51.9%).

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<sup>1</sup> [http://www.literacytrust.org.uk/assets/0001/9353/AR\\_and\\_young\\_people\\_s\\_reading.pdf](http://www.literacytrust.org.uk/assets/0001/9353/AR_and_young_people_s_reading.pdf) and [http://www.literacytrust.org.uk/assets/0002/4012/AR\\_and\\_young\\_people\\_s\\_reading\\_2013.pdf](http://www.literacytrust.org.uk/assets/0002/4012/AR_and_young_people_s_reading_2013.pdf)

<sup>2</sup> 32.4% (N = 11,191) of young people who participated in 2012 said that they use AR; 43.8% said they do not use AR, while 23.8% were not sure whether they do or not. 28.1% (N = 8,031) of children and young people who participated in our annual survey in 2013 said that they use AR; 47.7% (N = 13,641) said they do not use AR.

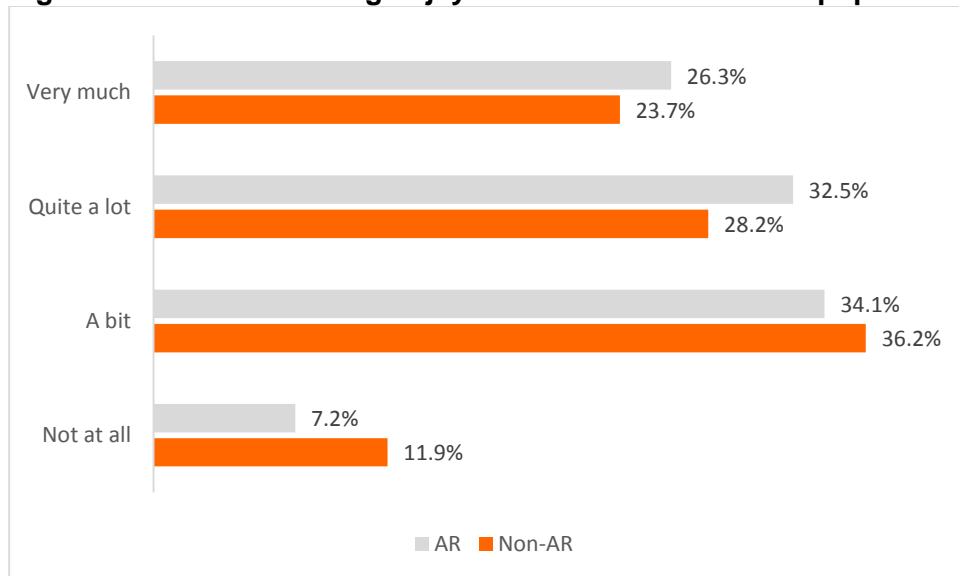
<sup>3</sup> 22.2% (N = 7,098) were not sure whether they do AR or not. These were excluded from the analyses in this report.

<sup>4</sup> We use a significance value of 0.001 for the following analyses. If a difference or relationship is statistically significant at this level then the likelihood is not more than 1 in 1000 (0.1%, using the 0.001 p-value) that it would happen by chance. We can therefore be relatively confident that it is meaningful.

<sup>5</sup> Mann Whitney U (24,769) = 66700014.50, Z = -11.241, p = .000, r = -.071

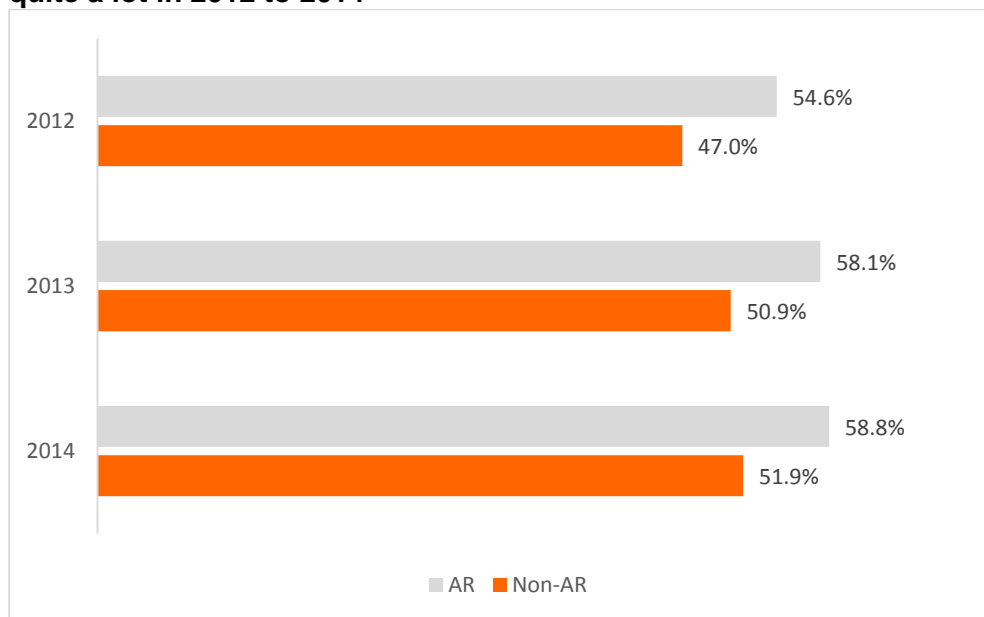


**Figure 1: Levels of reading enjoyment for AR and non-AR pupils in 2014**



**Figure 2** shows that levels of enjoyment have increased for all pupils between 2013 and 2014. While AR pupils continue to enjoy reading more than non-AR pupils, the gap in reading enjoyment between the two has narrowed slightly over the past three years, decreasing from a 7.6 percentage point difference in 2012 to a 7.2 percentage point difference in 2013 and a 6.9 percentage point difference in 2014.

**Figure 2: Percentage of AR and non-AR pupils who enjoy reading either very much or quite a lot in 2012 to 2014**



AR pupils in 2014 are also significantly more likely than non-AR pupils to **see themselves as readers** (67.8% vs. 60.3%) and to have a **favourite book or story** (66.0% vs. 57.5%)<sup>6</sup>.

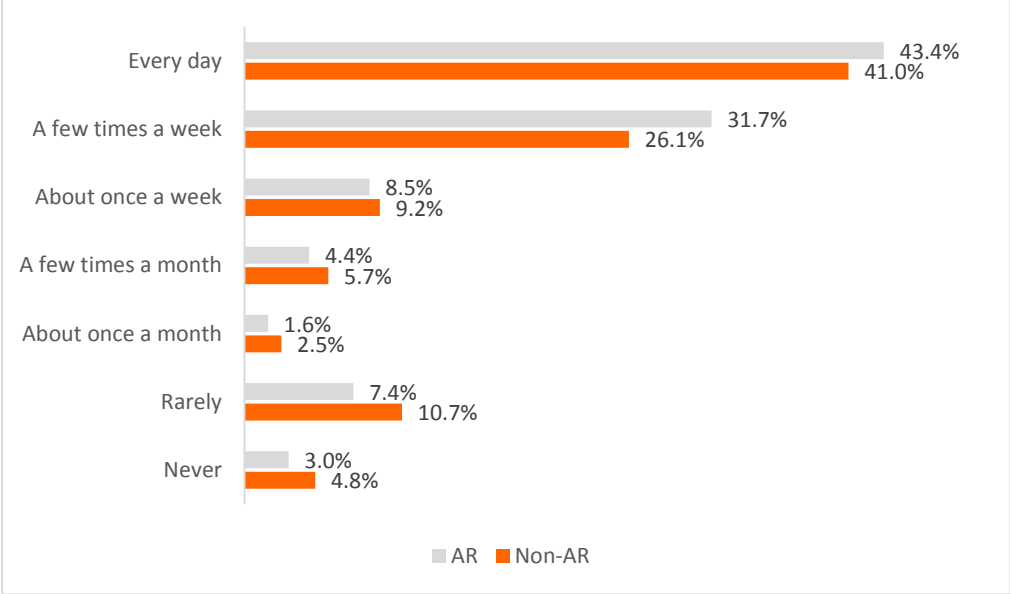
In 2014, there was no significant difference between AR and non-AR pupils in **how good a reader** they rate themselves to be on a scale of 1 to 10, where 1 equals not a very good reader and 10 equals a very good reader<sup>7</sup>.

<sup>6</sup> Being a reader:  $\chi^2(2, N = 24,504) = 397.744, p = .000, \text{Cramer's } V = .127$ ; Favourite book:  $\chi^2(2, N = 23,831) = 229.155, p = .000, \text{Cramer's } V = .098$

<sup>7</sup> AR:  $\text{Mdn} = 7$ ; non-AR:  $\text{Mdn} = 7$ ; Mann-Whitney  $U(24,704) = 70512865.00, Z = -3.018, p = .003, r = -.019$

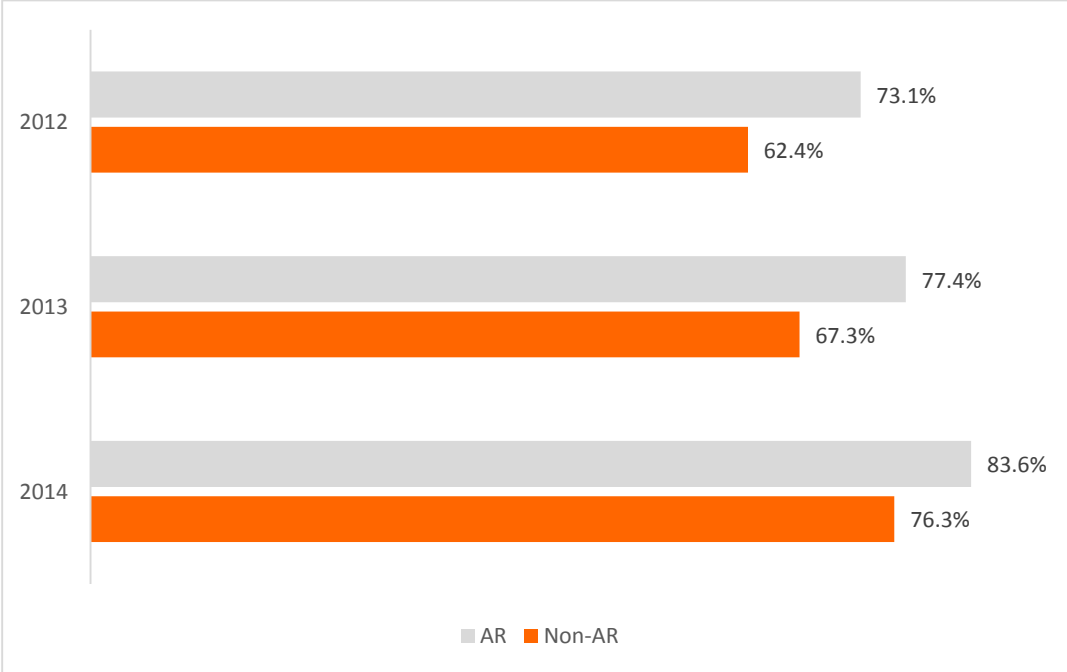
AR pupils also read more frequently outside class than non-AR pupils<sup>8</sup>. **Figure 3** outlines the difference in percentages and shows AR pupils and young people who use AR are slightly more likely to say that they read outside class on a daily basis than non-AR pupils. Overall, 83.6% of AR pupils say that they read outside class at least once a week, compared with 76.3% of non-AR pupils.

**Figure 3: Frequency of reading outside class for AR and non-AR pupils in 2014**



**Figure 4** compares the percentage of AR and non-AR pupils who read outside class at least once a week between 2012 and 2014. While more AR than non-AR pupils read outside class at least once a week in 2014, the gap between the two groups has reduced slowly over those three years, decreasing from a 10.7 percentage point difference in 2012 to a 10.1 percentage point difference in 2013 and a 7.3 percentage point gap in 2014.

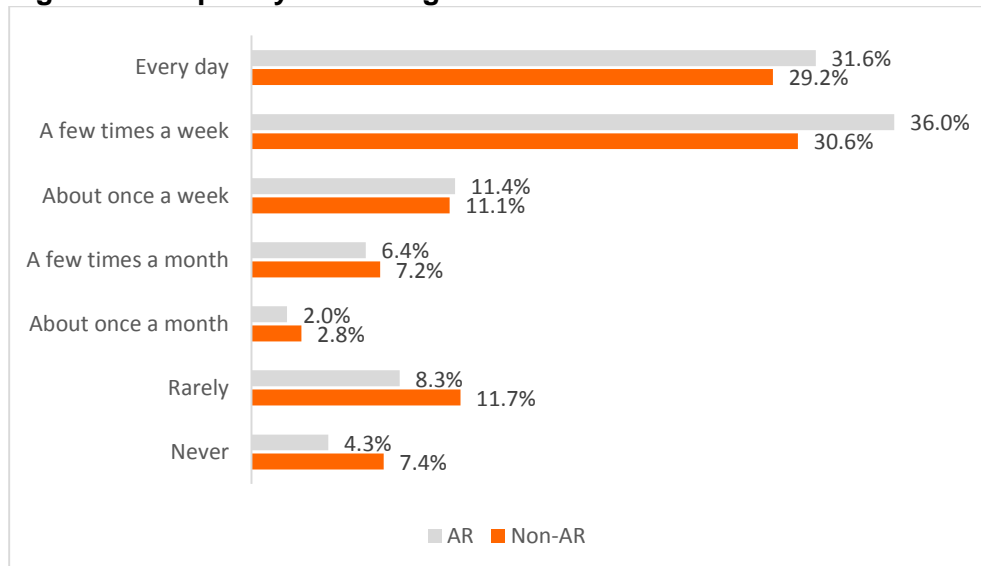
**Figure 4: Percentage of AR and non-AR pupils reading outside class at least once week in 2012 to 2014**



<sup>8</sup> Mann Whitney U (24,673) = 67034831.00, Z = -.9.636, p = .000, r = -.061

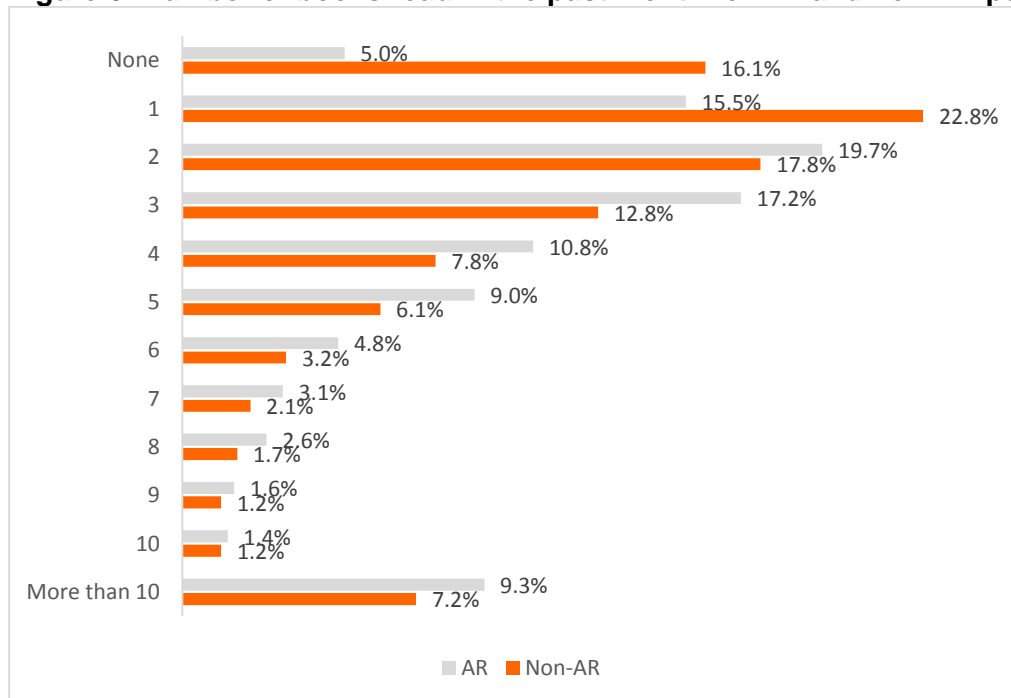
In 2014, we also asked children and young people how often they **read outside class for fun** or **for information**. AR pupils read significantly more frequently for fun outside class than non-AR pupils but the difference for reading for information was not significant<sup>9</sup>. **Figure 5** shows that more AR than non-AR pupils read for fun daily or a few times a week. Conversely, one and a half times as many non-AR as AR pupils say that they rarely or never read for fun outside class (19.1% vs. 12.6%).

**Figure 5: Frequency of reading for fun outside class for AR and non-AR pupils in 2014**



Not only do AR pupils read for fun outside class more often than non-AR pupils, but they also read significantly more **books in the past month**<sup>10</sup>. **Figure 6** explores this difference in percentages.

**Figure 6: Number of books read in the past month for AR and non-AR pupils in 2014**

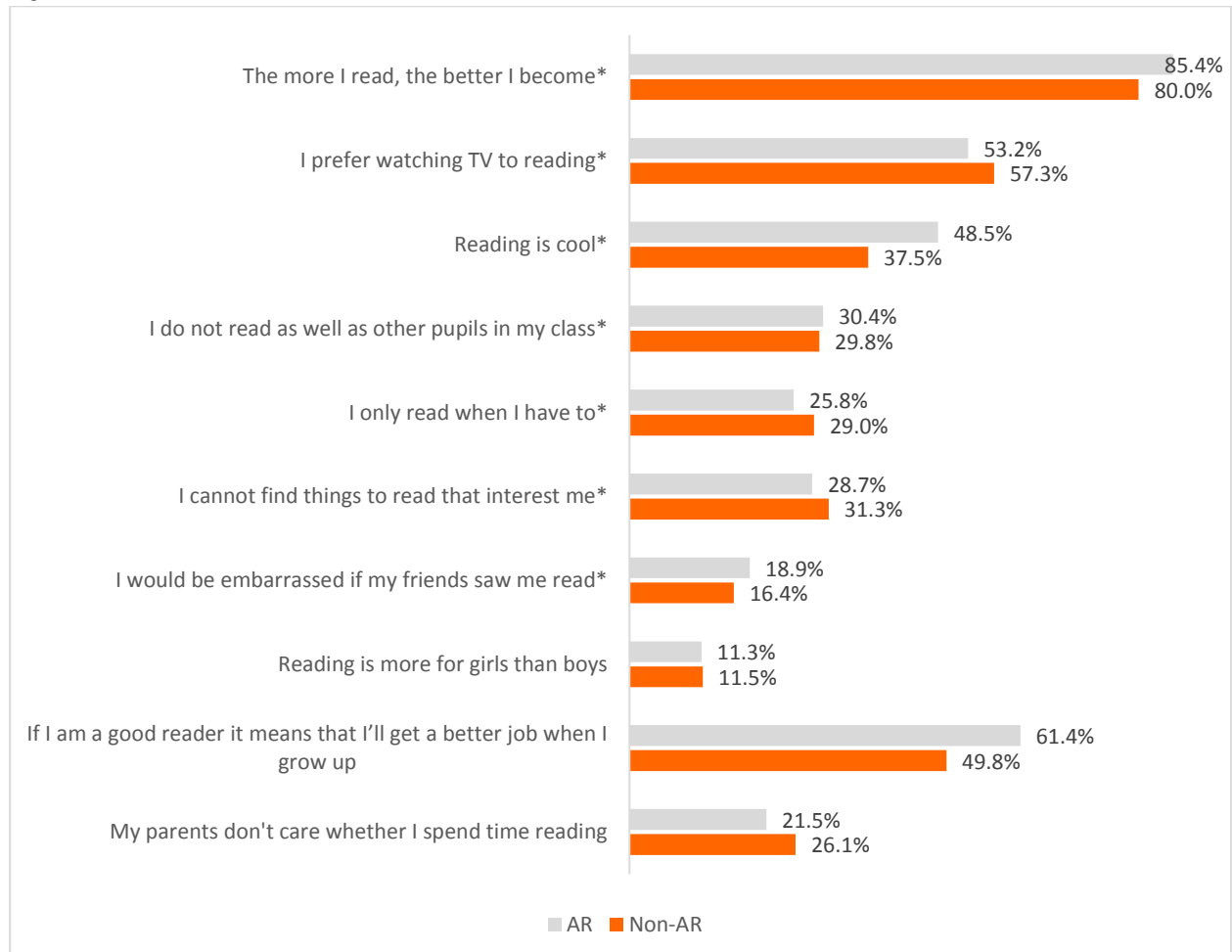


<sup>9</sup> Reading for fun: Mann Whitney U (24,067) = 62710735.50, Z = -.11.467, p = .000, r = -.074; Reading for information: p = .024

<sup>10</sup> AR: Mdn = 4; non-AR: Mdn = 3; Mann Whitney U (24,258) = 54459708.00, Z = -.28.899, p = .000, r = -.186

AR pupils also had more **positive attitudes towards reading**<sup>11</sup> than non-AR pupils in 2014<sup>12</sup>. **Figure 7** outlines the difference between AR and non-AR pupils for the attitudinal items and shows that more AR than non-AR pupils agree that reading is cool. They are also more likely to see a link between their reading skill and a chance to get a better job when they are older.

**Figure 7: Percentage agreement with attitudinal statements for AR and non-AR pupils in 2014**



(\*Indicates items in the reading attitude scale)

**In sum**, more children and young people who use AR enjoy reading, read frequently and think more positively about reading than their peers who do not use AR. Children and young people who use AR are also more likely to see themselves as readers, are more likely to have a favourite book or story and are more likely to read more books outside class than their peers not using AR.

<sup>11</sup> Principal component analysis indicated that seven of our 10 items loaded on one factor that explained 41.659% of the variance. These seven items were combined into a scale (the more I read the better I become, reading is cool, I don't read as well as other pupils in my class – reverse coded, I only read when I have to – reverse coded, I cannot find things to read that interest me – reverse coded, I prefer watching TV to reading – reverse coded, I would be embarrassed if friends saw me read – reverse coded). Cronbach's alpha = .835

<sup>12</sup> AR: M = 2.558, SD = .795; Non-AR: M = 2.607, SD = .819;  $t(19959,205) = -4.563$ ,  $p = .000$ ,  $d = .061$ ,  $Mdif = -.049$  CI 95%(-.070, -.028); adjusted for non-equal variances.

## Exploring AR longitudinally using a dataset of 1,500 children in KS2 whom we have followed since 2011

In 2011 we set up a sample of nearly 3,000 Y3 and Y7 pupils whom we followed in terms of their attitudes towards reading and their reading attainment for the next four years. Attrition over the years was particularly pronounced for secondary pupils, so we decided to focus the following analyses on 1,568 pupils whom we followed since they were in Y3 (aged 7 to 8) and for whom we had data spanning four years. 581 of these pupils had used AR (37.1%) in 2011 when they were in Y3. There were no significant differences between non-AR and AR pupils in terms of their background<sup>13</sup>.

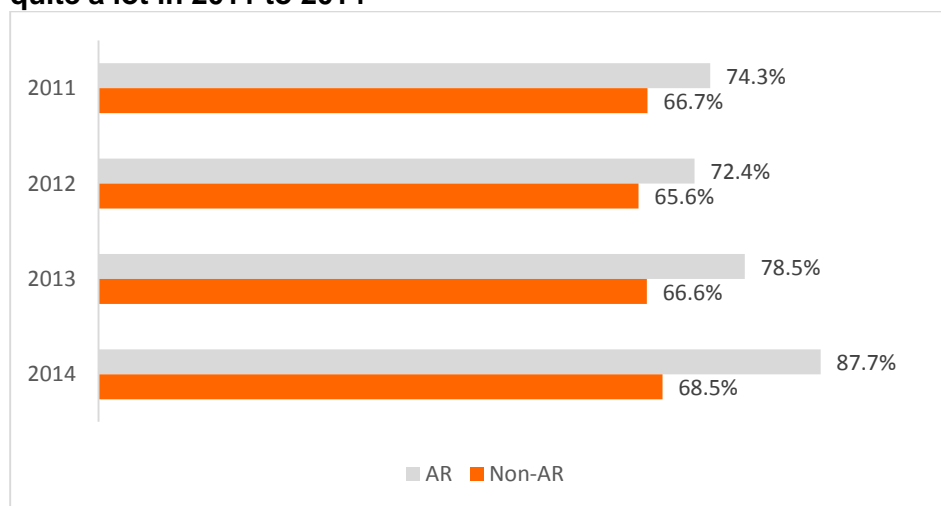
The analyses of differences in reading enjoyment, behaviour and attitudes outlined earlier have focused on changes in a particular year or have explored changes over time using cross-sectional cohorts. The analyses using the longitudinal data, on the other hand, allow us to compare the same AR pupils with non-AR children over time in terms of their reading enjoyment, reading behaviour and reading attitudes. The longitudinal data also give us the opportunity to explore the relative importance of reading enjoyment, behaviours and attitudes in predicting reading skills over time, and allow us to assess whether different influences are important depending on whether or not children and young people use AR.

Before we outline the findings from the path analyses that model influences over time, we thought it would be interesting to have a look at the data from our longitudinal sample for each year separately first.

### Reading enjoyment

Y3 pupils who used AR in 2011 were significantly<sup>14</sup> more likely to enjoy reading than their peers who didn't use AR. This difference between the two groups remained significant<sup>15</sup> over the next three years but the difference between the two groups also became more pronounced when pupils were in Y6 in 2014. **Figure 8** outlines the difference over time in percentages.

**Figure 8: Percentage of AR and non-AR pupils who enjoy reading either very much or quite a lot in 2011 to 2014**



<sup>13</sup> Gender = AR pupils – boys: 49.9%, girls: 51.4%; non-AR pupils – boys: 49.5%, girls: 50.6%,  $p = .917$ ; FSM = AR pupils – FSM: 18.6; non-AR pupils: 19.4%,  $p = .714$ .

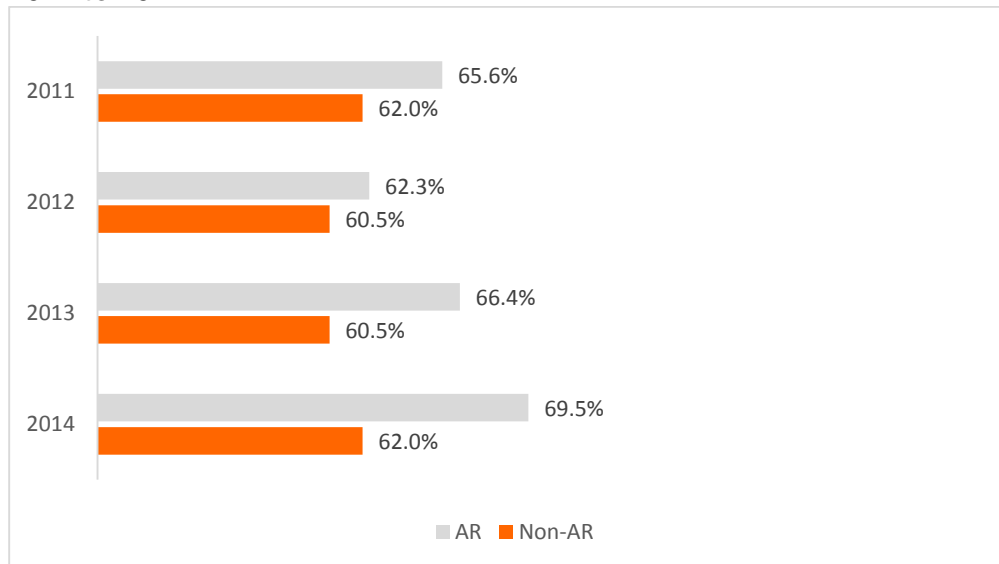
<sup>14</sup> For the following analyses we set our significance level to  $p < .01$

<sup>15</sup> Mann-Whitney U: 2011:  $U(1,568) = 258850.000$ ,  $Z = -3.413$ ,  $p = .001$ ,  $r = -.086$ ; 2012:  $261439.500$ ,  $Z = -3.077$ ,  $p = .002$ ,  $r = -.078$ ; 2013:  $260151.500$ ,  $Z = -3.288$ ,  $p = .001$ ,  $r = -.083$ , 2014:  $U(1566) 237149.500$ ,  $Z = -6.011$ ,  $p = .000$ ,  $r = -.052$

### Reading frequency

Y3 pupils who used AR in 2011 didn't differ significantly from their peers who didn't use AR in the frequency with which they read outside class<sup>16</sup>. This insignificant difference between the two continued through 2012 and 2013<sup>17</sup>. However, this relationship changed in 2014, where Y6 pupils who use AR were significantly more likely to read outside class than their non-AR peers<sup>18</sup>. **Figure 9** illustrates these changes over time for those who read at least a few times a week outside class.

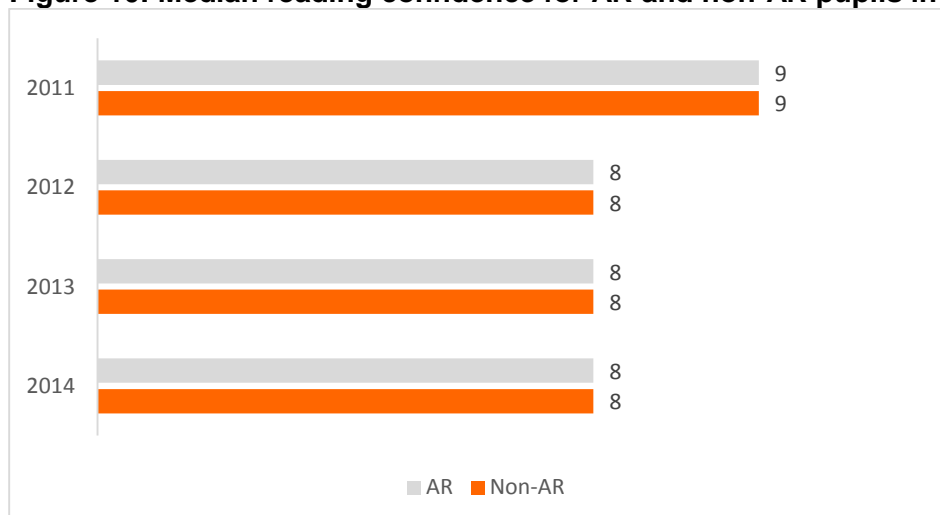
**Figure 9: Reading outside class at least a few times a week for AR and non-AR pupils in 2011 to 2014**



### Reading confidence

There was no significant difference between AR and non-AR pupils in 2011 in how good a reader they rate themselves to be on a scale of 1 to 10, where 1 equals not a very good reader and 10 equals a very good reader<sup>19</sup>. This remained true throughout the following three years<sup>20</sup> (see **Figure 10**).

**Figure 10: Median reading confidence for AR and non-AR pupils in 2011 to 2014**



<sup>16</sup>  $p = .090$

<sup>17</sup> 2012:  $p = .047$ ; 2013:  $p = .31$

<sup>18</sup> Mann Whitney U (1,568) = 263668.500,  $Z = -2.783$ ,  $p = .005$ ,  $r = -.070$

<sup>19</sup> 2011:  $p = .867$ ; 2012: 2013: 2014:

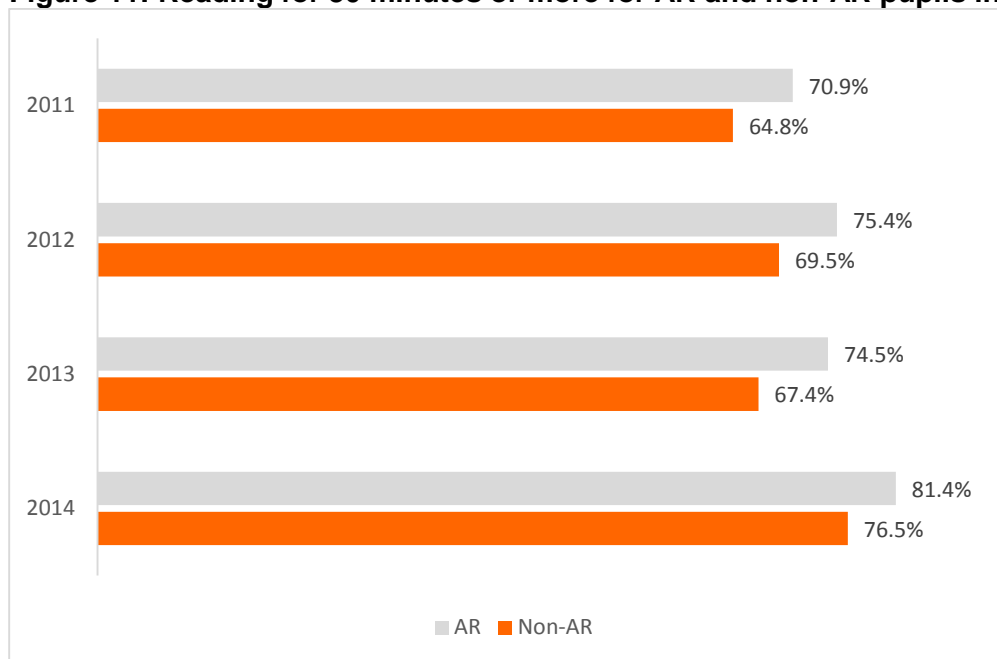
<sup>20</sup> 2012:  $p = .322$ ; 2013:  $p = .887$ ; 2014:  $p = .850$

## Reading length

There was no significant difference between AR and non-AR pupils in 2011 in how much time they spend reading outside class<sup>21</sup>. This remained true through the following three years<sup>22</sup>.

**Figure 11** outlines the percentage of pupils who read for 30 minutes or more on each occasion and shows that across the years more AR than non-AR pupils said that they read for that length of time.

**Figure 11: Reading for 30 minutes or more for AR and non-AR pupils in 2011 to 2014**



## Reading attitudes

To explore attitudinal changes over time, we combined six attitudinal statements into one scale<sup>23</sup>. AR pupils in 2011 were significantly more likely to think positively about reading than their peers who do not use AR<sup>24</sup>. This difference continued to be present throughout the following three years<sup>25</sup> (see **Figure 12**).

<sup>21</sup>  $p = .038$

<sup>22</sup> 2012:  $p = .025$ ; 2013:  $p = .022$ ; 2014:  $p = .046$

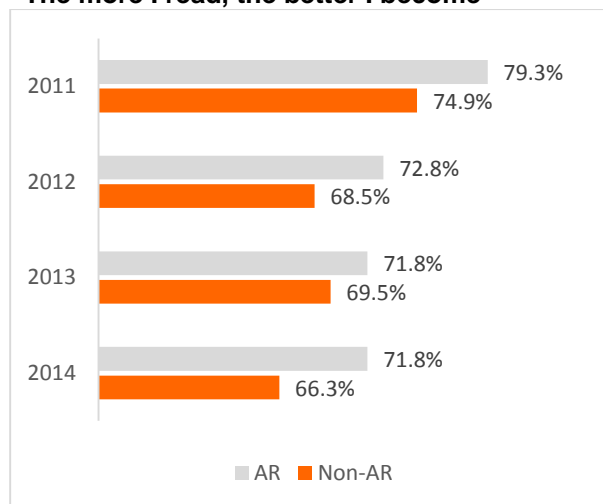
<sup>23</sup> Principal component analysis with Direct Oblimin rotation using data for 2011 suggested the presence of only one factor, explaining a total of 67.846% of the variance. The Cronbach's alpha for this scale was high = .902. Principal component analyses were also conducted on 2012, 2013 and 2014 data, which also revealed the presence of only one factor in those years.

<sup>24</sup> AR:  $M = 3.835$ ,  $SD = .878$ ; Non-AR:  $M = 3.669$ ,  $SD = (1.045)$ ;  $t(1384.699) = 3.351$ ,  $p = .001$ ,  $d = .172$ ;  $M \text{ diff} = .165$  CI 95%(.069, .236); adjusted for non-equal variances

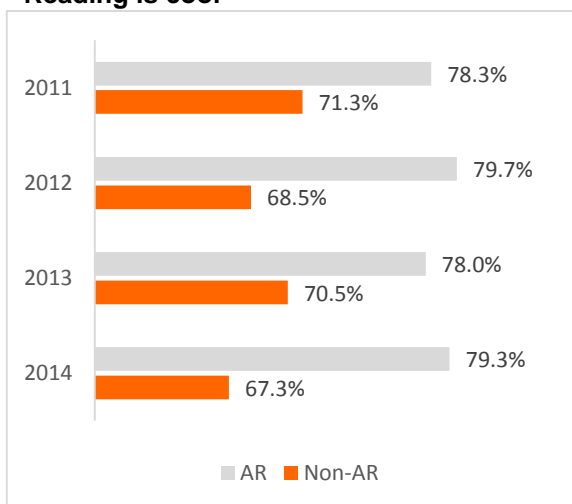
<sup>25</sup> 2012 AR:  $M = 3.795$ ,  $SD = .823$ ; Non-AR:  $M = 3.641$ ,  $SD = (.985)$ ;  $t(1358.961) = 3.272$ ,  $p = .001$ ,  $d = .170$ ;  $M \text{ diff} = .154$  CI 95%(.062, .246); 2013 AR:  $M = 3.774$ ,  $SD = .827$ ; Non-AR:  $M = 3.629$ ,  $SD = (.978)$ ;  $t(1377.477) = 3.122$ ,  $p = .002$ ,  $d = .160$ ;  $M \text{ diff} = .145$  CI 95%(.054, .237); 2014 AR:  $M = 3.809$ ,  $SD = .816$ ; Non-AR:  $M = 3.686$ ,  $SD = (.943)$ ;  $t(1339.170) = 3.351$ ,  $p = .008$ ,  $d = .139$ ;  $M \text{ diff} = .123$  CI 95%(.033, .213); all adjusted for non-equal variances

**Figure 12: Percentage agreement with attitudinal statements for AR and non-AR pupils in 2011 to 2014**

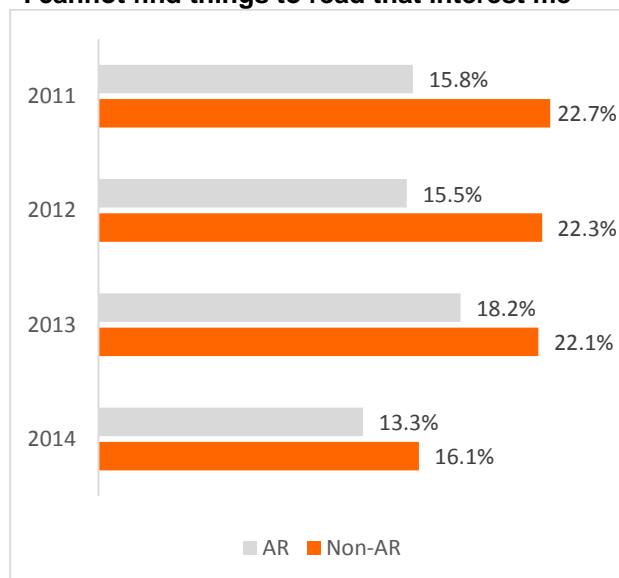
**“The more I read, the better I become”**



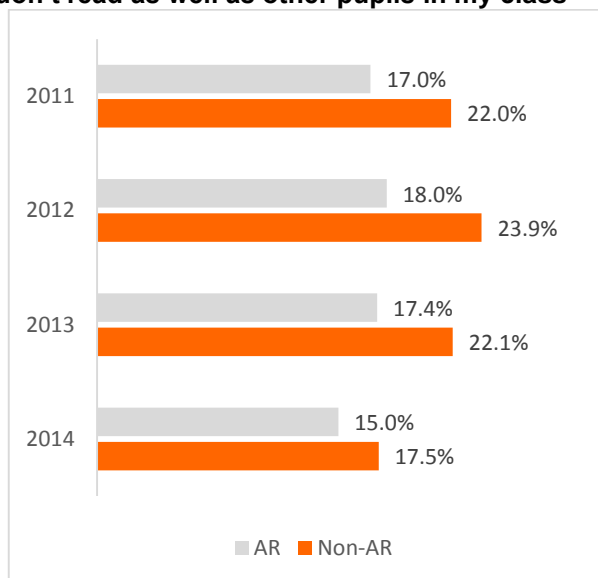
**“Reading is cool”**



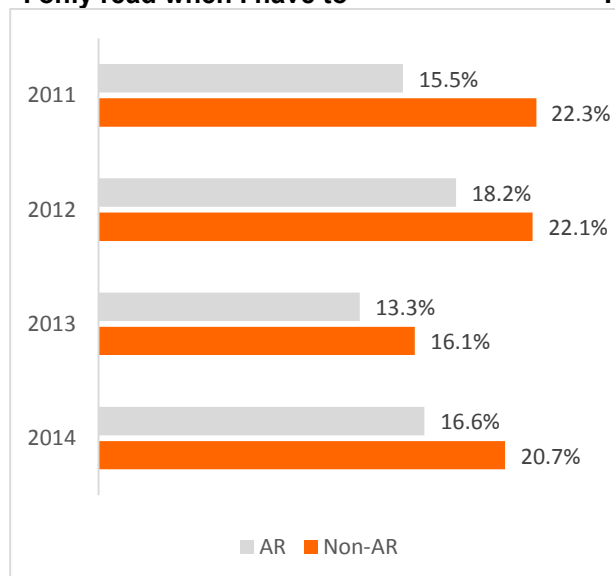
**“I cannot find things to read that interest me”**



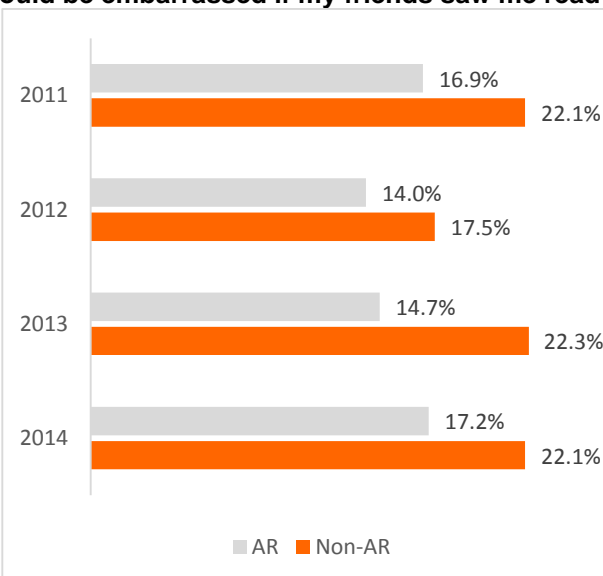
**“I don’t read as well as other pupils in my class”**



**“I only read when I have to”**



**“I would be embarrassed if my friends saw me read”**





**In sum**, the longitudinal data generally corroborate findings from the earlier cohort analyses, showing that Y3 pupils who used AR in 2011 were significantly more likely to enjoy reading than their non-AR peers. These differences remained true when these pupils were in Y4 and Y5, with differences becoming more pronounced when pupils were in Y6 in 2014. AR pupils who were in Y3 in 2011 were significantly more likely to think positively about reading than their non-AR peers. This difference in reading attitudes continued throughout the next three years when pupils were in Y4, Y5 and Y6. Finally, although initially AR pupils did not read any more frequently than their non-AR peers when pupils were in Y3, Y4 or Y5, when pupils were in Y6 in 2014, AR pupils were significantly more likely to read outside class than their non-AR peers.

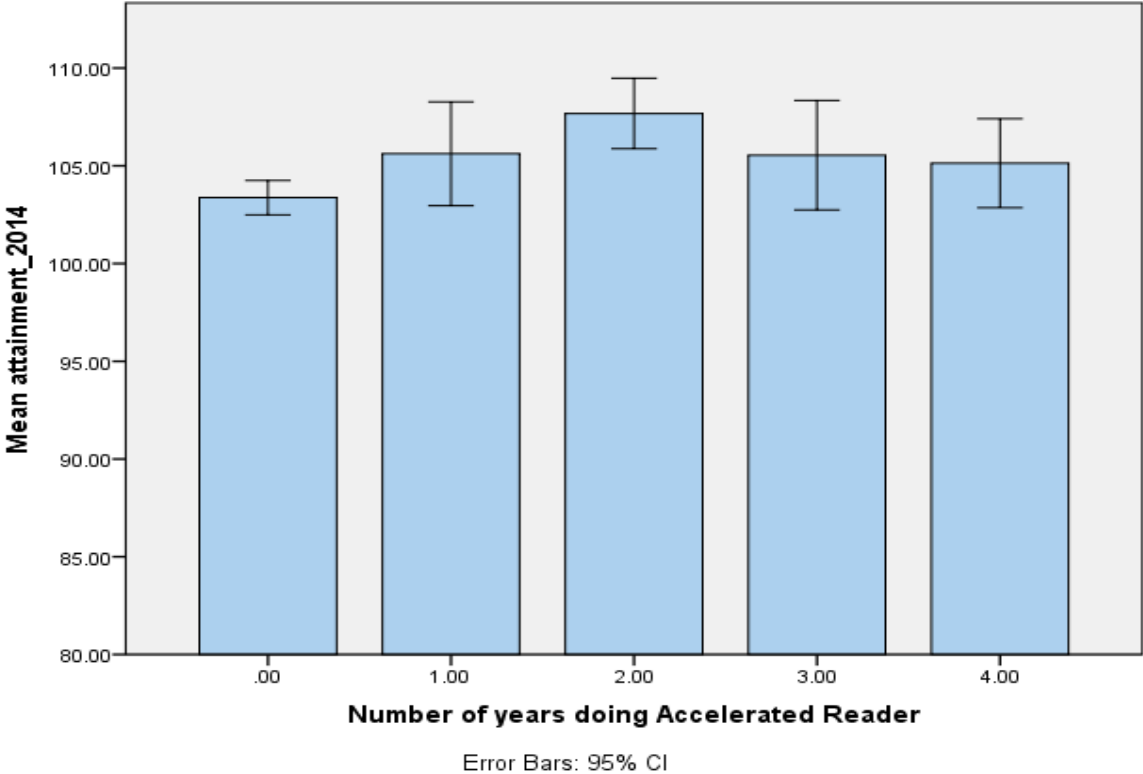
**A closer look at AR children – length of AR**

Of the 581 AR pupils, 21.7% (N = 126) did AR for one year, 45.4% (N = 264) did AR for two years, 18.8% (N = 109) did AR for three years and 14.1% (N = 82) did AR for the four years of our study. This section explores the impact of length of doing AR on reading enjoyment, reading frequency, reading attitudes and reading attainment using data from 2014.

~~~

There was a significant overall effect of length of AR on standardised reading attainment scores²⁶. Comparisons between individual groups showed that non-AR children scored significantly lower in their attainment than children who had done two years of AR^{27/28}.

Figure 13: Standardised reading assessment scores in 2014 by length of AR



In 2014, when participating children were in Y6, there were significant²⁹ differences between AR pupils depending on how long they did AR for in terms of their reading enjoyment, their reading

²⁶ ANOVA; F(4) = 5.321, p<.001

²⁷ Post hoc comparison with Bonferroni correction, p<.01

²⁸ These results should be treated with caution as the standardised tests varied between schools and we do not have data on which tests each school did.

²⁹ p = <.05

confidence, their reading length and their reading frequency³⁰. Overall, **Figures 14 to 17** illustrate these differences in percentages and show that pupils who had done AR for four years enjoyed reading more, were more confident readers, more read at least once a week and more read for one hour or longer than pupils who had done AR for three, two, or even just one year. It is worth noting that pupils who did AR for two years had the lowest scores in terms of reading enjoyment, reading confidence and reading length.

Figure 14: Percentage enjoying reading either very much or quite a lot in 2014 by length of AR

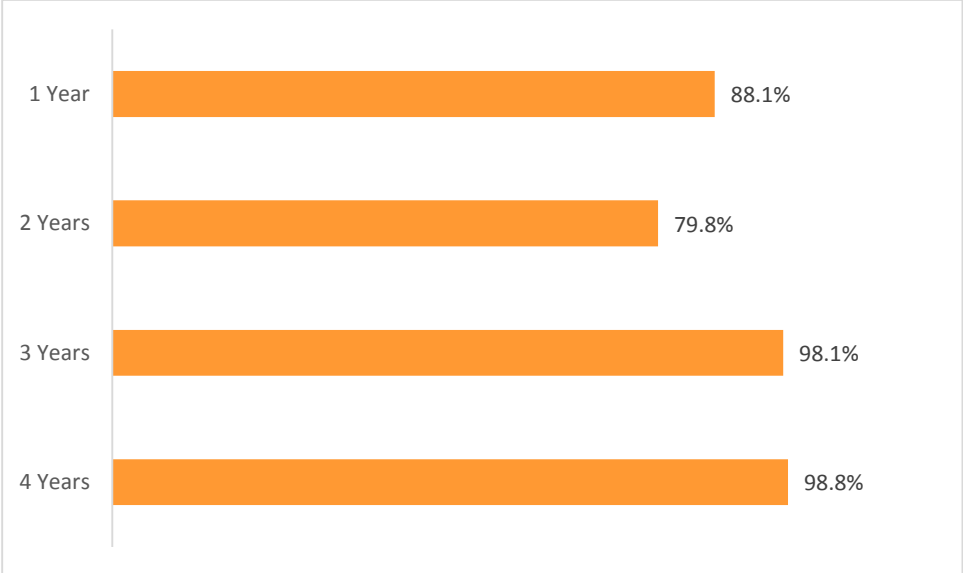
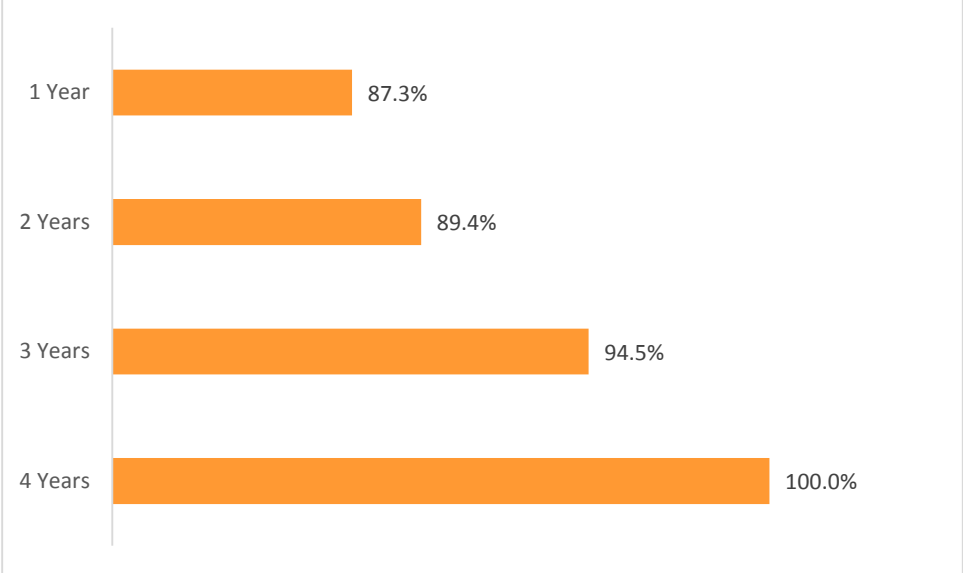


Figure 15: Percentage reading at least once a week in 2014 by length of AR



³⁰ Kruskal Wallis: reading enjoyment 2014 $\chi^2(3, N = 579) = 25.957, p = .000$; reading confidence 2014 $\chi^2(3, N = 581) = 22.823, p = .000$; reading length 2014 $\chi^2(3, N = 581) = 21.029, p = .000$; Reading frequency 2014 $\chi^2(3, N = 581) = 11.037, p = .012$;

Figure 16: Percentage perceiving themselves to be very good readers in 2014 by length of AR

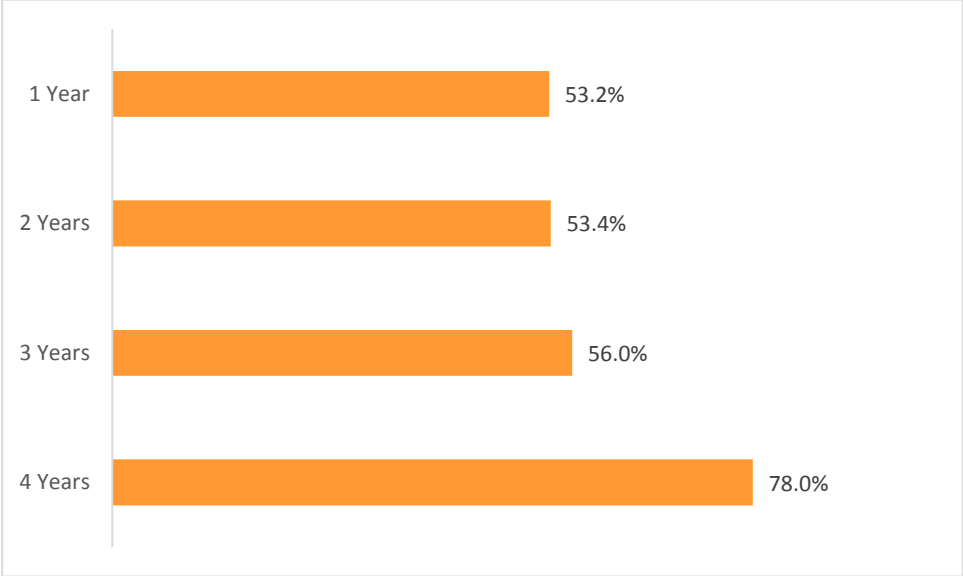
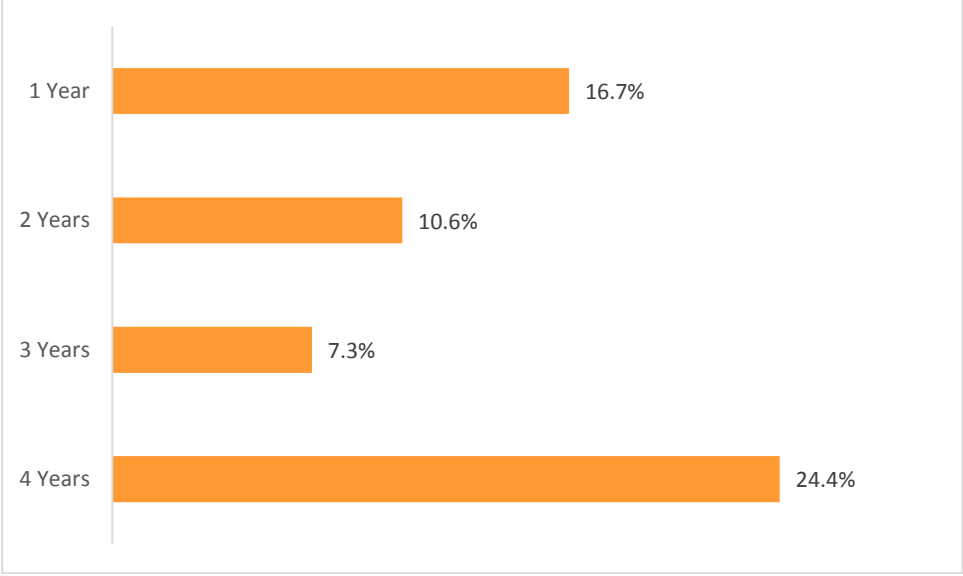


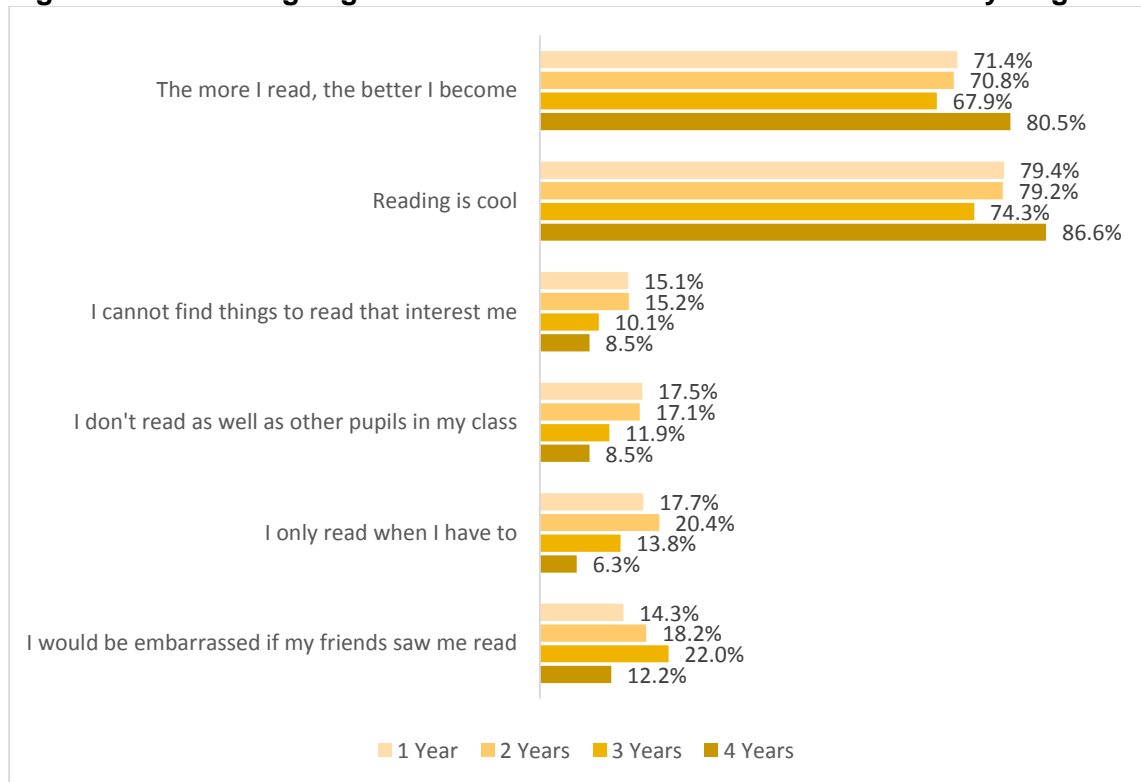
Figure 17: Percentage reading for one hour or more in 2014 by length of AR



The degree to which pupils think positively about reading also differed significantly³¹ by the number of AR years done. Pupils who had done AR for four years thought more positively about reading than pupils who had done AR for two or three years. **Figure 18** outlines these differences in percentages and shows that pupils who had done AR for four years are more likely to agree that the more they read, the better they become and that reading is cool, while fewer agree that they cannot find things to read that interest them, that they don't read as well as other pupils in their class, that they read only when they have to, and that they would be embarrassed if their friends saw them read compared with pupils who did AR for fewer years.

³¹ $F(3, 568) = 4.599, p = .003$; 1 year: $M = 3.821, SD = .921$; 2 years: $M = 3.74, SD = .822$; 3 years: $M = 3.74, SD = .712$; 4 years: $M = 3.81, SD = .816$

Figure 18: Percentage agreement with attitudinal statements in 2014 by length of AR



In sum, there is some indication that pupils who do AR for four years have better outcomes in terms of reading enjoyment, reading frequency and reading attitudes than children who do AR for less than four years. Pupils who had done AR for two years had the lowest reading enjoyment, reading confidence and reading length scores.

Modelling relationships over time

So far we have explored the relationship between AR and reading separately for each year. We are now going to explore how the relationship between reading attitudes, behaviour, confidence and enjoyment relate to attainment over time. Specifically, do our survey variables predict attainment, and does attainment predict our survey variables? This will show whether potential causal links are uni-directional or bi-directional.

To this end, we built path models using multiple regression techniques to describe how these relationships develop over time³². All paths were modelled, but only the significant ones are shown in the diagrams below (at $p < .01$)³³. Values next to each path (arrow) denote standardized beta weights. These are numbers between 0 and 1, with a value surrounding 0.1 representing a small effect size, 0.3 a medium effect size, and 0.5 a large effect size. This is a measure of how strongly the variable at the start of the path predicts the variable at the end.

³² Multiple regression requires the data to meet certain assumptions. In the present case, the data met 6 out of 8 assumptions. They did not meet the following assumptions; a) that the data are interval data (our data is ordinal), and b) that the errors are independent. For this reason, these results should be treated with caution.

³³ The numbers next to the paths represent standardised beta weights. This is the number of standard deviation increases in the outcome variable caused by one standard deviation increase in the predictor variable. The numbers directly on top of the outcome variables denote the r^2 , which is the percentage variance accounted for by the predictor variable/s. The error terms (e) above the outcome variables represent the variance that cannot be accounted for by the predictor variable/s.

Table 1 provides the correlations between the variables used in the present study for 2014 (for a table outlining all of the variables across time, see **Table A1 in Appendix 1**) and shows that reading attainment was correlated highly with reading enjoyment, reading confidence, reading frequency and reading attitudes. It was least highly correlated with reading length.

Reading enjoyment, in turn, correlates highly with reading confidence, reading frequency and reading attitudes. Again, it was least highly correlated with reading length. Reading confidence correlates highly with reading frequency, reading length and reading attitudes.

The highest correlations were between reading frequency and reading attitudes, and between reading length and reading attitudes, indicating that those who read more frequently and for longer periods of time also think more positively about reading.

Table 1: Correlations in 2014

| | Reading attainment | Reading enjoyment | Reading confidence | Reading frequency | Reading length |
|--------------------|--------------------|-------------------|--------------------|-------------------|----------------|
| Reading enjoyment | .505* | | | | |
| Reading confidence | .433* | .615* | | | |
| Reading frequency | .465* | .580* | .633* | | |
| Reading length | .230* | .310* | .349* | .554* | |
| Reading attitudes | .435* | .476* | .489* | .774* | .753* |

*p= <.01

Figure 19 outlines the relationships in the path analyses and shows that reading enjoyment, reading frequency and reading attitudes in 2011, when pupils were in Y3, positively predicted attainment in 2012, when pupils were in Y4. Interestingly there was an inverse relationship between reading length in 2011 and reading attainment in 2012, which indicates that pupils who read for shorter periods of time did better in their reading skills the following year. In turn, reading attainment in 2012 positively predicted reading enjoyment, reading confidence, reading frequency, reading length and reading attitudes in 2013, when pupils were in Y5. Finally, only reading enjoyment and reading confidence in 2013 predicted reading attainment in 2014, when pupils were in Y6.

Figure 20 approaches the inter-relationships from another direction and shows that attainment in 2011, when pupils were in Y3, positively predicted reading enjoyment, reading confidence, reading frequency, reading duration and reading attitudes in 2012, when pupils were in Y4. In turn, reading enjoyment, reading attitudes and reading confidence in 2012 positively predicted attainment in 2013, when pupils were in Y5. Reading length in 2012 was negatively related with attainment in 2013. Finally, reading attainment in 2013 positively predicted reading enjoyment, reading confidence, reading frequency, reading length and reading attitudes in 2014, when pupils were in Y6.

Figure 19: Predictive relationships between survey variables and reading attainment over time for AR children, beginning with survey variables in 2011

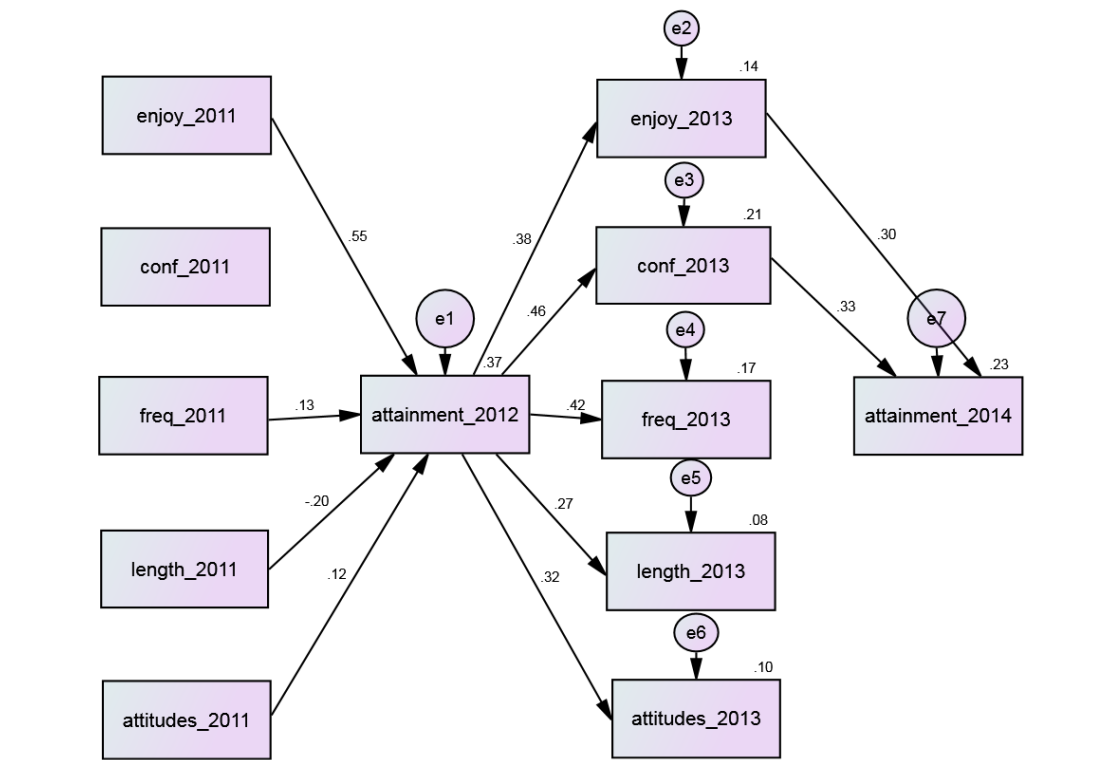
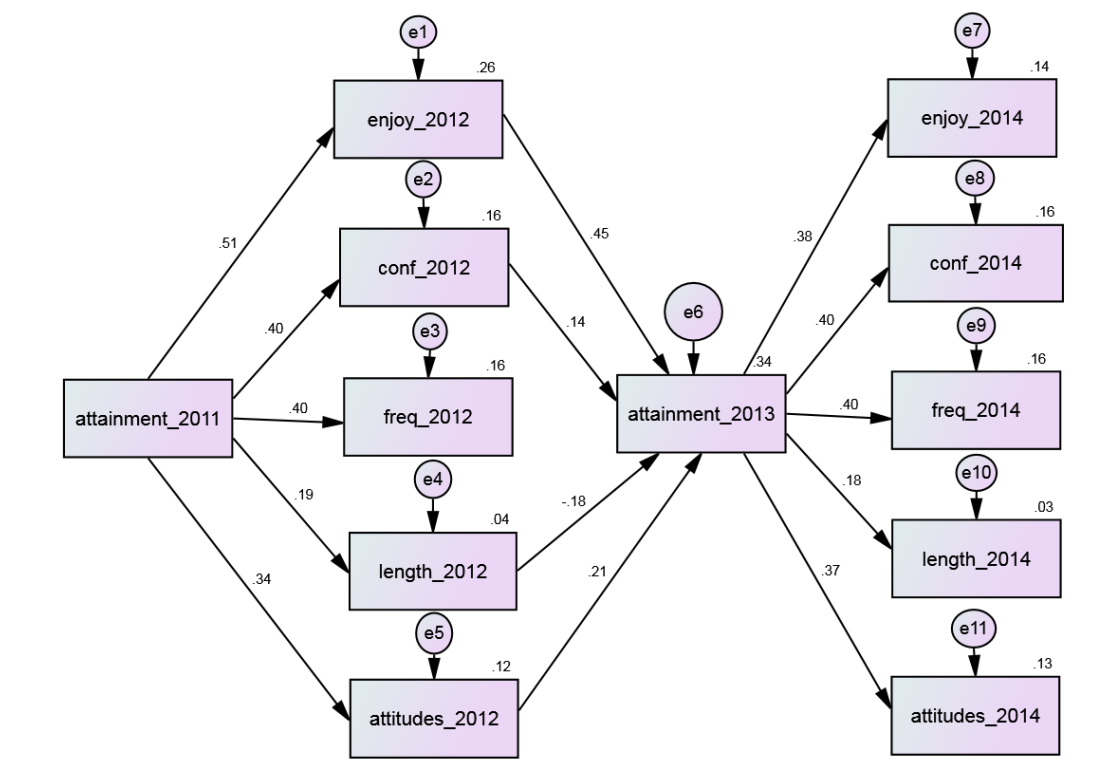


Figure 20: Predictive relationships between survey variables and reading attainment over time for AR children, beginning with attainment in 2011



These path analyses suggest that only reading enjoyment has a strong bi-directional link with reading attainment, which means that AR pupils who enjoy reading are more likely to attain better, and then in turn are more likely to enjoy reading. With regard to confidence, the relationship is more uni-directional. Children who attain well in reading are more likely to develop high confidence, but confidence in itself does not necessarily lead to better attainment. Similarly with frequency, attainment predicts frequent reading, but frequent reading only weakly predicts better attainment (uni-directional). As already mentioned above, with reading length, the results are particularly striking. Attainment predicts increased reading lengths, but shorter reading lengths predict higher attainment (hence the negative beta weights). This may be because reading for longer helps to improve attainment initially, but after a certain level of attainment is reached, reading length is less able to reflect faster reading speed. Finally, with regard to attitudes, attainment strongly predicts later attitudes to reading, and attitudes weakly predict later reading attainment (strong uni-directional, weak bi-directional relationship).

Interestingly, a substantial amount of variance in attainment is predicted by our survey variables (23-37%), which given that they were measured using completely different methods, and represent different constructs, is very good. It shows that our survey questions tapped attitudes, behaviours and beliefs that were highly related to reading test scores. Attainment was also good at predicting our survey variables (12-26%) apart from length (3-8%), with enjoyment being particularly well predicted (14-26%).

Figures 21 and 22 outline the inter-relationships for non-AR children and show that they largely follow the same dynamic as that already described for AR children – with one exception: in addition to reading enjoyment and reading confidence in 2013, reading frequency and reading attitudes also positively predict attainment in 2014 for non-AR pupils.

Figure 21: Predictive relationships between survey variables and reading attainment over time for non-AR children, beginning with survey variables in 2011

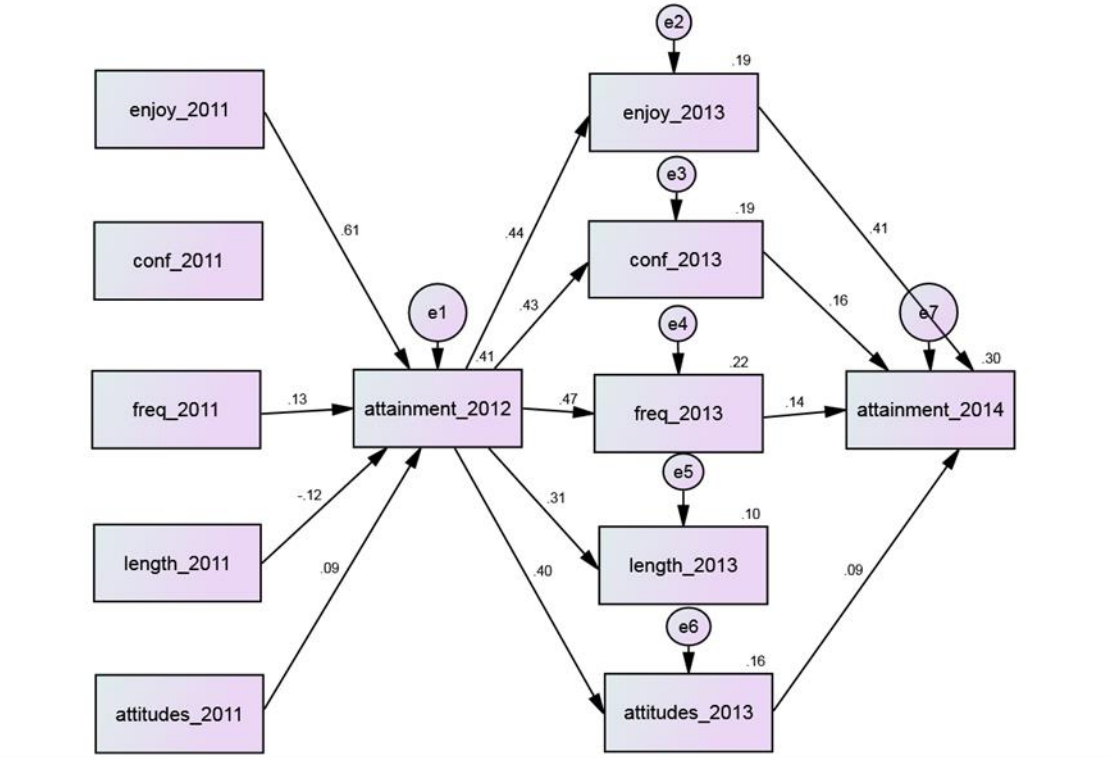
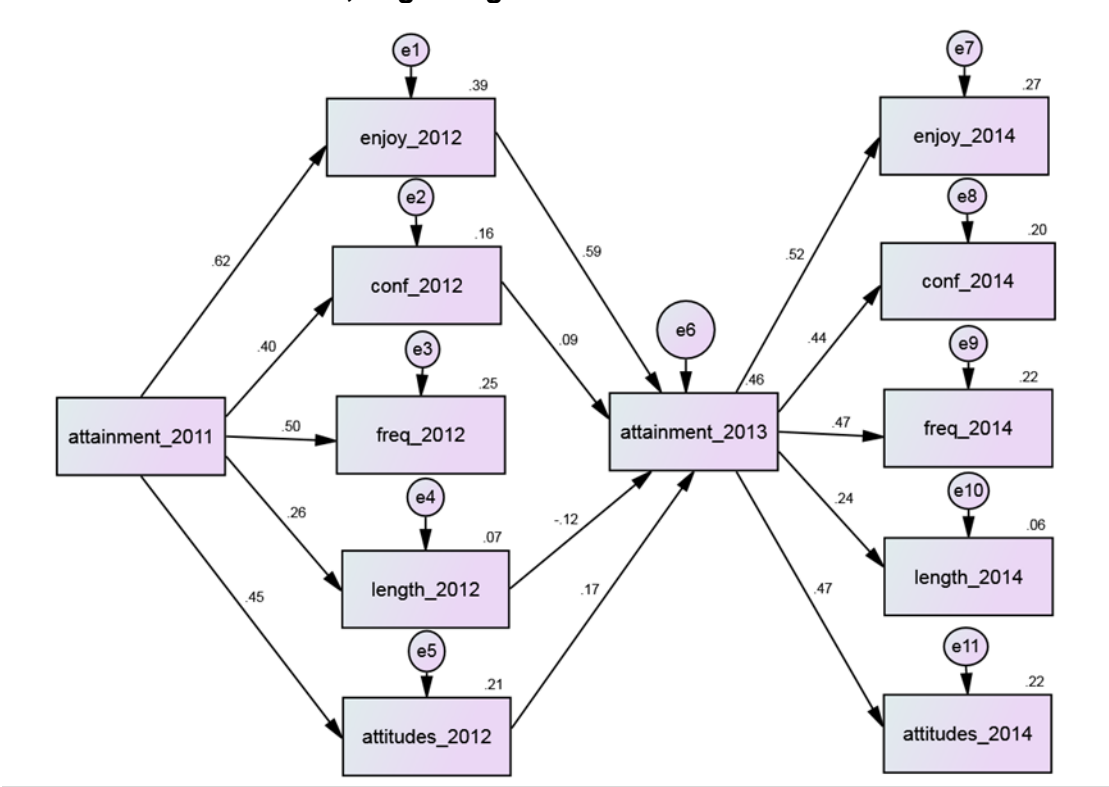


Figure 22: Predictive relationships between survey variables and reading attainment over time for non-AR children, beginning with attainment in 2011



In sum, the above path analyses highlight the importance of certain ‘softer’ reading outcomes in promoting reading skills. Reading enjoyment in particular emerged as a significant bi-directional influence for both AR children and those who do not use the reading tool.

Differences between boys and girls

While there were some differences between boys and girls on how much they enjoy reading and how they think about reading, there was no significant interaction between any of our study variables and whether they were also doing AR or not (see **Appendix 2**). However, the following path analyses indicate a few interesting differences between boys and girls and whether they use AR or not.

Although the patterns of relationships are largely the same for boys and girls who use AR (see **Figures 23** and **24**), reading frequency in 2011 positively predicts reading attainment in 2012 for AR girls but not for AR boys. Conversely, reading attitudes in 2011 positively predict reading attainment in 2012 for AR boys but not for AR girls. These suggest that reading frequency is initially more important for girls who use AR, while attitudes towards reading are initially more important for boys who use AR. For both AR girls and AR boys, reading enjoyment and reading confidence are important in predicting reading attainment in 2014. Reading confidence is a more significant predictor of attainment for AR boys than AR girls, while enjoyment is a slightly more significant predictor of attainment for AR girls than AR boys.

Figure 23: Predictive relationships between survey variables and reading attainment over time for AR girls, beginning with survey variables in 2011

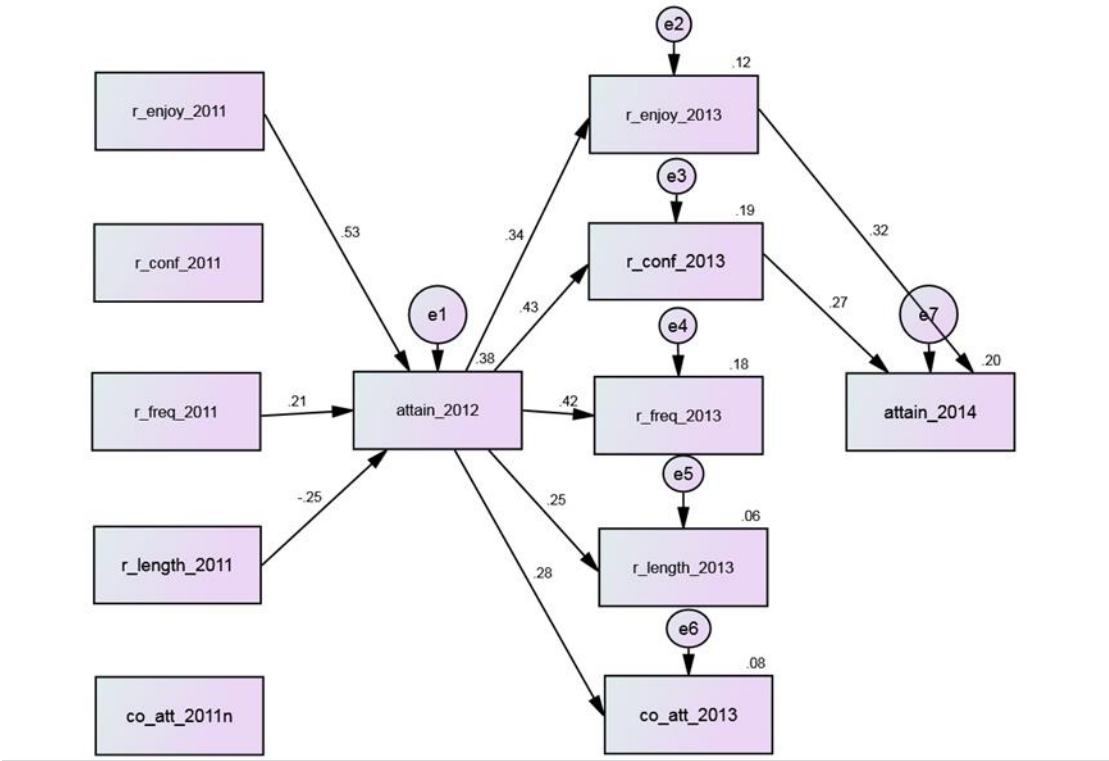
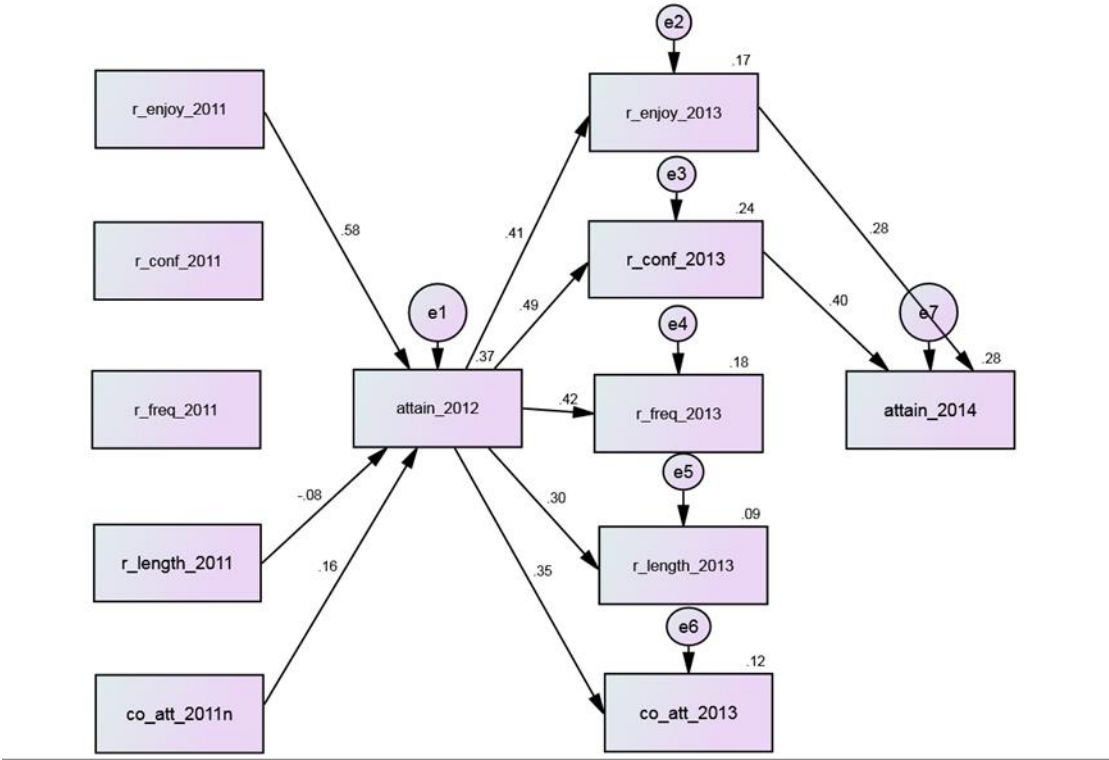


Figure 24: Predictive relationships between survey variables and reading attainment over time for AR boys, beginning survey variables in 2011



Figures 25 and 26 illustrate the pattern of relationships for non-AR boys and girls. These figures also highlight interesting differences between boys and girls who use AR and those who do not. While reading enjoyment and reading frequency are significant positive predictors of reading attainment in 2012 for AR girls, reading frequency is a much less significant predictor and reading enjoyment a more significant predictor of reading attainment in 2012 for non-AR girls. While reading attitudes significantly predict reading attainment in 2012 for AR boys, no such relationship exists for non-AR boys. However, reading frequency positively predicts reading attainment in 2012 for non-AR boys. Also, in addition to reading enjoyment and reading confidence, reading frequency and reading attitudes positively predict reading attainment in 2014 for non-AR boys, while reading duration negatively predicts attainment in 2014.

Figure 25: Predictive relationships between survey variables and reading attainment over time in non-AR girls, beginning with survey variables in 2011

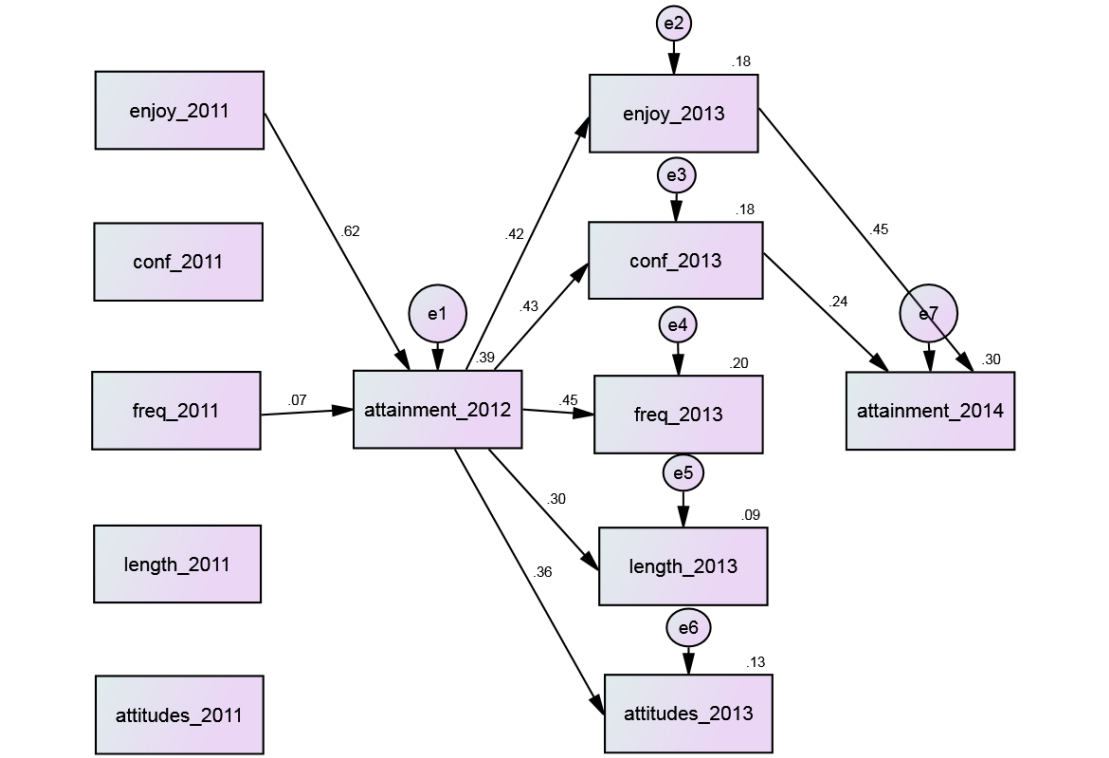
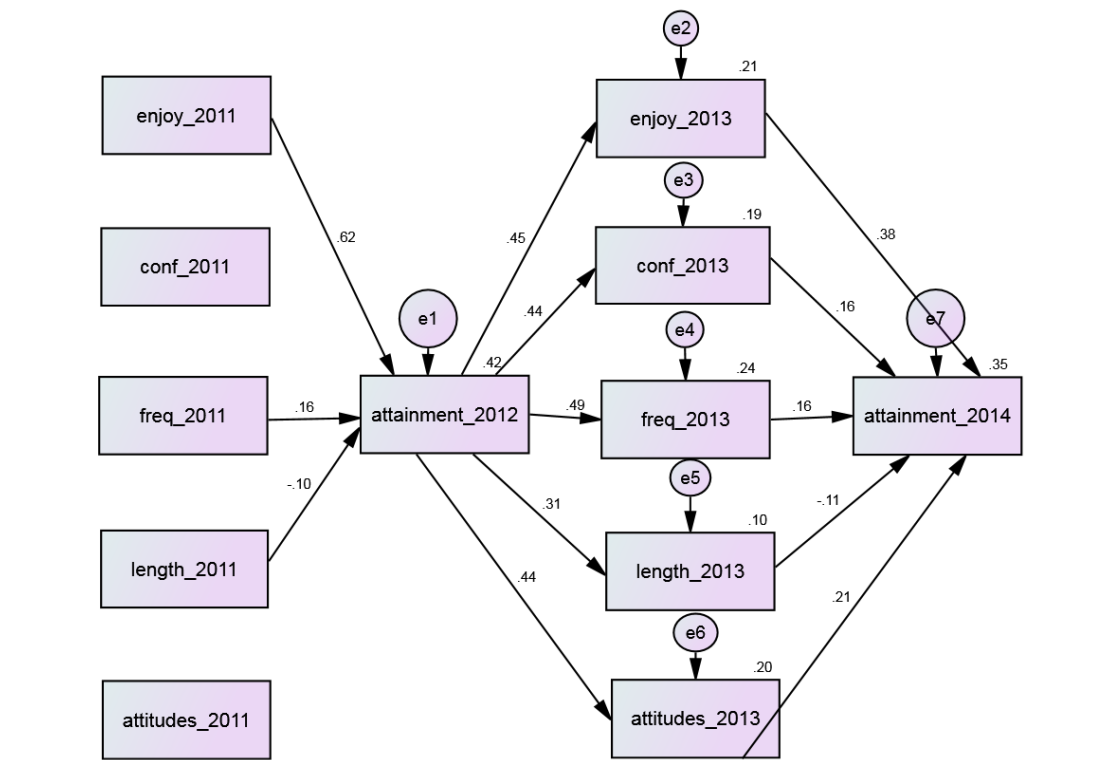


Figure 26: Predictive relationships between survey variables and reading attainment over time in non-AR boys, beginning with survey variables in 2011



Figures 27 to 30 explore the inter-relationships (starting with reading attainment in 2011) and show that patterns of relationships were similar between AR girls and boys except for a significant link from confidence in 2012 to attainment in 2013 for AR boys and non-AR girls.

Figure 27: Predictive relationships between survey variables and reading attainment over time for AR girls, beginning with attainment in 2011

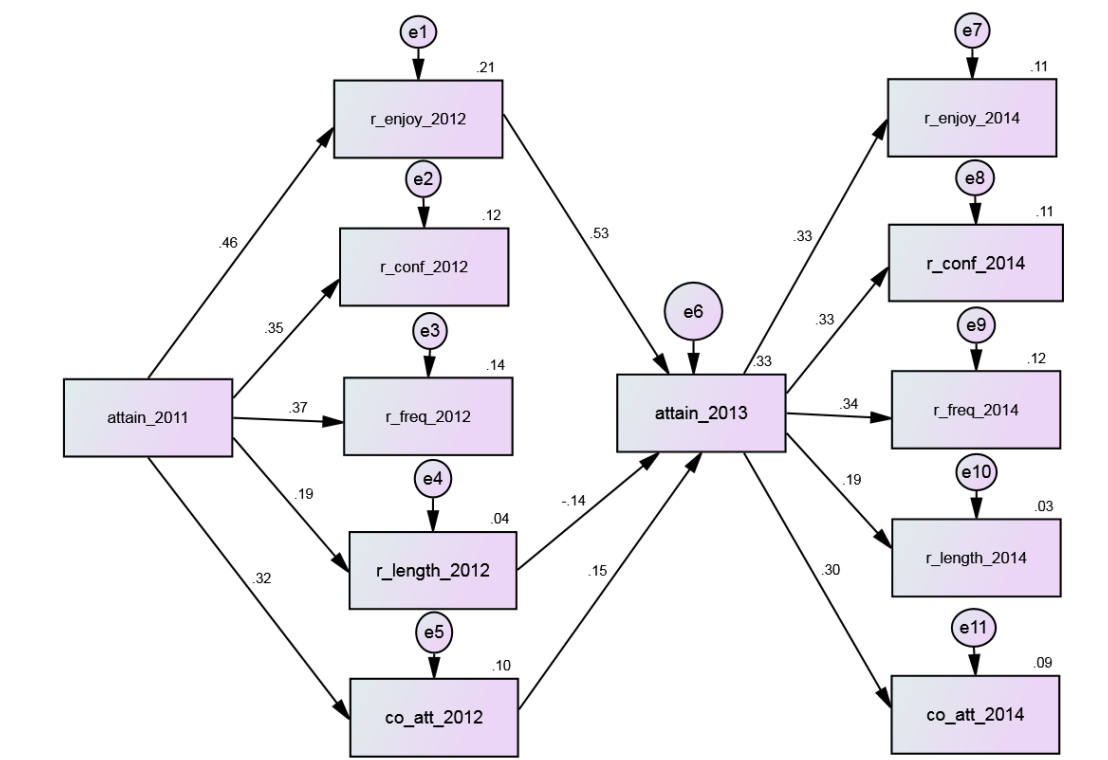


Figure 28: Predictive relationships between survey variables and reading attainment over time for AR boys, beginning with attainment in 2011

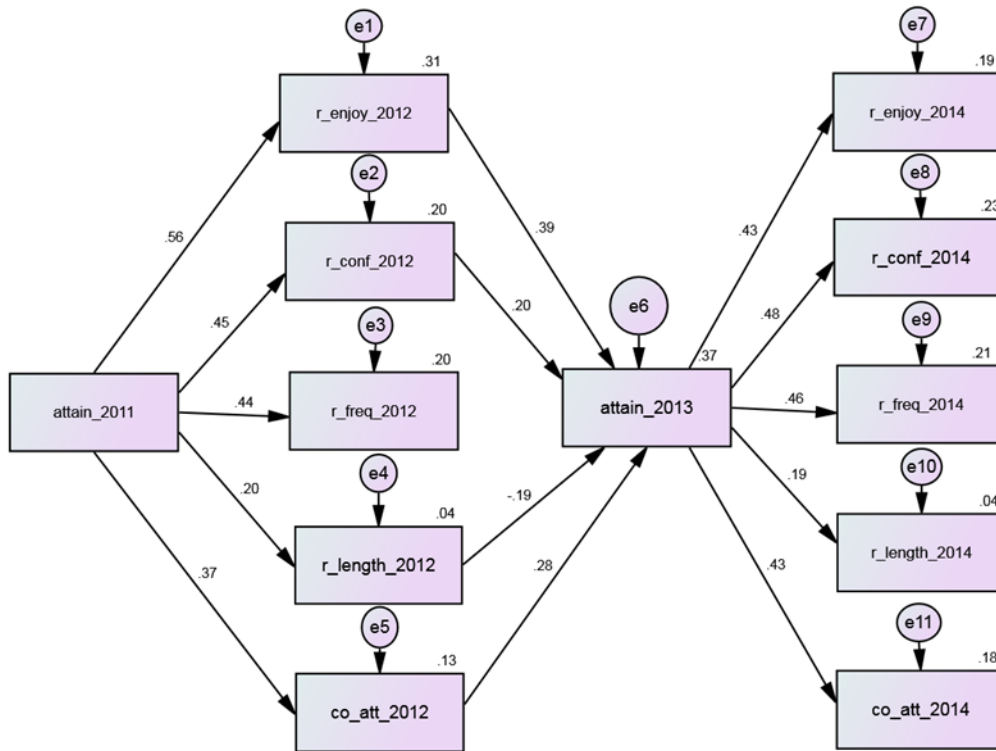


Figure 29: Predictive relationships between survey variables and reading attainment over time for non-AR girls, beginning with attainment in 2011

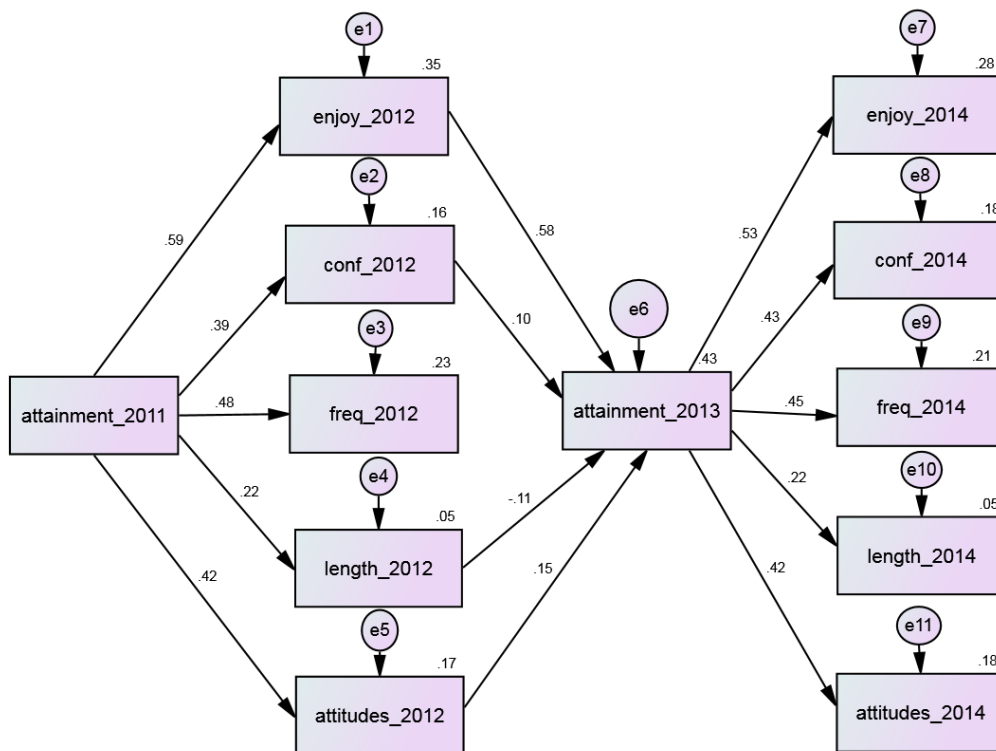
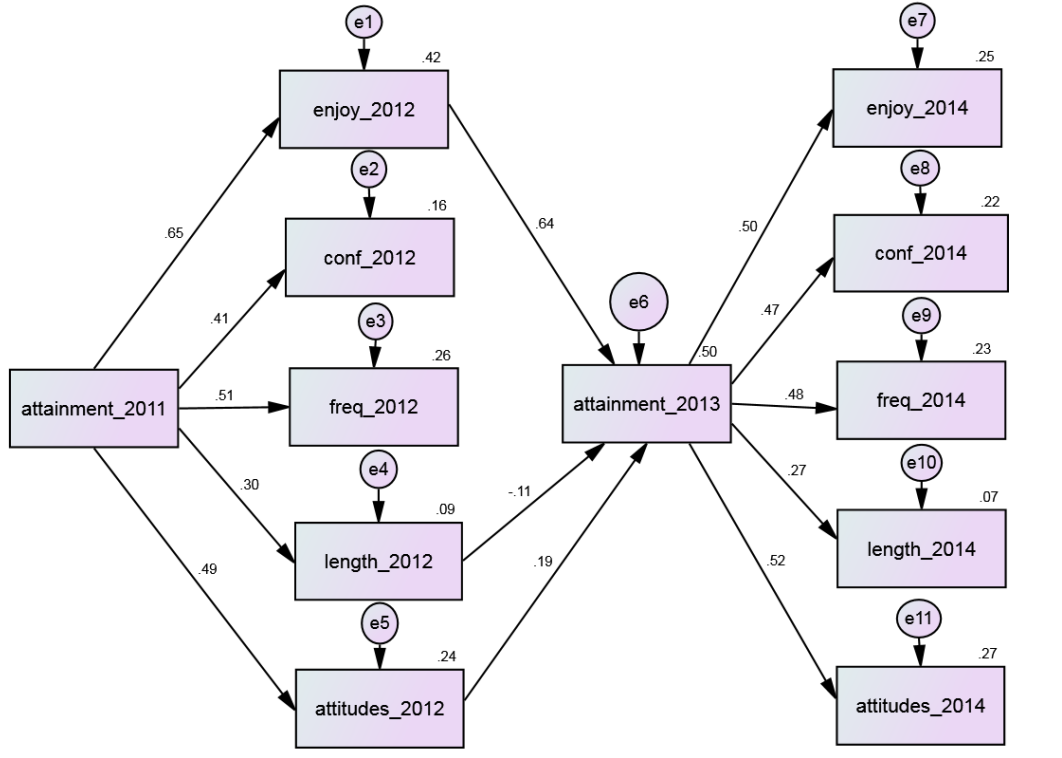


Figure 30: Predictive relationships between survey variables and reading attainment over time for non-AR boys, beginning with attainment in 2011



In sum, strong bi-directional influences exist with respect to reading enjoyment in both boys and girls regardless of whether they use AR. However, reading confidence is a more important (uni-directional) predictor for reading attainment in AR boys than AR girls or non-AR boys and girls. For AR boys, initial attitudes towards reading play a role in predicting later reading attainment

Discussion

Both cross-sectional and longitudinal data sets unanimously show that more pupils who use AR enjoy reading, read frequently and think more positively about reading than their peers who do not use AR. Children and young people who use AR are also more likely to see themselves as readers, are more likely to have a favourite book or story and are more likely to read more books outside class than their peers not using AR.

This report has also been a first step in exploring the complex relationships that underpin the interplay between reading enjoyment, attitudes, behaviour and attainment in KS2 children who use or do not use AR. To our knowledge, this is the first time that the inter-relationships between the variables often studied in other research have been examined longitudinally (over time).

The finding that reading enjoyment is the only variable in this complex interplay of variables that has a strong bi-directional influence, regardless of gender and whether children use AR or not, not only highlights the importance of reading enjoyment as a variable that matters, but also underlines the need to develop effective methods to encourage children and young people to read for enjoyment.

Another important finding was that the relationship between 'soft' reading outcomes and reading attainment is largely similar regardless of whether children do AR or not (regardless of gender). This is the case despite significant differences in the absolute levels of their soft outcomes (how much they enjoy reading, how much they think positively about reading etc.). Consequently, interventions that work for one group of children in terms of improving outcomes should work equally in other groups.

We are hopeful that an increased understanding of the relationships between reading enjoyment, attitudes, behaviour and skills will not only help us to strengthen the work carried out across the National Literacy Trust and the sector, but it will also help us to influence education policy and practice to promote the importance of reading for pleasure.

Appendix 1

Table A1: Correlations in 2011 to 2014

| | Attain 2012 | Attain 2013 | Attain 2014 | Enjoy 2011 | Enjoy 2012 | Enjoy 2013 | Enjoy 2014 | Conf 2011 | Conf 2012 | Conf 2013 | Conf 2014 | Freq 2011 | Freq 2012 | Freq 2013 | Freq 2014 | Length 2011 | Length 2012 | Length 2013 | Length 2013 | Length 2014 | Att 2011 | Att 2012 | Att 2013 |
|-------------|-------------|-------------|-------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-------------|-------------|----------|----------|----------|
| Attain 2011 | .915 | .885 | .832 | .614 | .586 | .434 | .404 | .370 | .399 | .427 | .348 | .374 | .465 | .474 | .425 | .313 | .241 | .310 | .202 | .393 | .422 | .408 | .409 |
| Attain 2012 | | .937 | .899 | .621 | .595 | .425 | .393 | .365 | .400 | .443 | .359 | .352 | .470 | .459 | .417 | .276 | .227 | .302 | .189 | .357 | .392 | .380 | .395 |
| Attain 2013 | | | .962 | .647 | .642 | .523 | .479 | .404 | .455 | .491 | .428 | .331 | .445 | .477 | .451 | .314 | .274 | .328 | .226 | .382 | .417 | .403 | .435 |
| Attain 2014 | | | | .639 | .637 | .543 | .505 | .385 | .456 | .484 | .433 | .339 | .438 | .488 | .465 | .327 | .272 | .335 | .230 | .388 | .421 | .403 | .435 |
| Enjoy 2011 | | | | | .891 | .730 | .660 | .542 | .568 | .557 | .547 | .438 | .607 | .651 | .595 | .479 | .423 | .451 | .388 | .524 | .540 | .515 | .573 |
| Enjoy 2012 | | | | | | .752 | .725 | .544 | .633 | .557 | .547 | .438 | .607 | .651 | .595 | .479 | .423 | .451 | .557 | .388 | .524 | .540 | .515 |
| Enjoy 2013 | | | | | | | .827 | .507 | .576 | .565 | .592 | .319 | .402 | .587 | .546 | .447 | .410 | .393 | .325 | .469 | .489 | .464 | .511 |
| Enjoy 2014 | | | | | | | | .455 | .548 | .545 | .615 | .314 | .413 | .516 | .580 | .454 | .375 | .362 | .310 | .442 | .448 | .432 | .476 |
| Conf 2011 | | | | | | | | | .874 | .860 | .799 | .391 | .511 | .570 | .557 | .378 | .423 | .405 | .366 | .361 | .408 | .424 | .465 |
| Conf 2012 | | | | | | | | | | .878 | .804 | .398 | .507 | .627 | .660 | .467 | .473 | .451 | .405 | .429 | .452 | .487 | .528 |
| Conf 2013 | | | | | | | | | | | .903 | .430 | .517 | .647 | .643 | .424 | .441 | .411 | .368 | .433 | .429 | .467 | .509 |
| Conf 2014 | | | | | | | | | | | | .380 | .475 | .577 | .633 | .436 | .443 | .372 | .349 | .419 | .396 | .433 | .489 |
| Freq 2011 | | | | | | | | | | | | | .905 | .745 | .635 | .707 | .644 | .619 | .581 | .687 | .727 | .703 | .667 |
| Freq 2012 | | | | | | | | | | | | | | .814 | .716 | .665 | .636 | .609 | .547 | .699 | .753 | .727 | .716 |
| Freq 2013 | | | | | | | | | | | | | | | .799 | .613 | .605 | .597 | .535 | .713 | .751 | .770 | .763 |
| Freq 2014 | | | | | | | | | | | | | | | | .635 | .580 | .595 | .554 | .671 | .699 | .716 | .774 |
| Length 2011 | | | | | | | | | | | | | | | | | .834 | .763 | .719 | .690 | .711 | .703 | .698 |
| Length 2012 | | | | | | | | | | | | | | | | | | .834 | .737 | .770 | .778 | .763 | .728 |
| Length 2013 | | | | | | | | | | | | | | | | | | | .853** | .747** | .799** | .814** | .795** |
| Length 2014 | | | | | | | | | | | | | | | | | | | | .633 | .687 | .705 | .753 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|------|------|------|
| Attitudes
2011 | | | | | | | | | | | | | | | | | | | | | .952 | .924 | .912 | |
| Attitudes
2012 | | | | | | | | | | | | | | | | | | | | | | | .969 | .940 |
| Attitudes
2013 | | | | | | | | | | | | | | | | | | | | | | | | .956 |

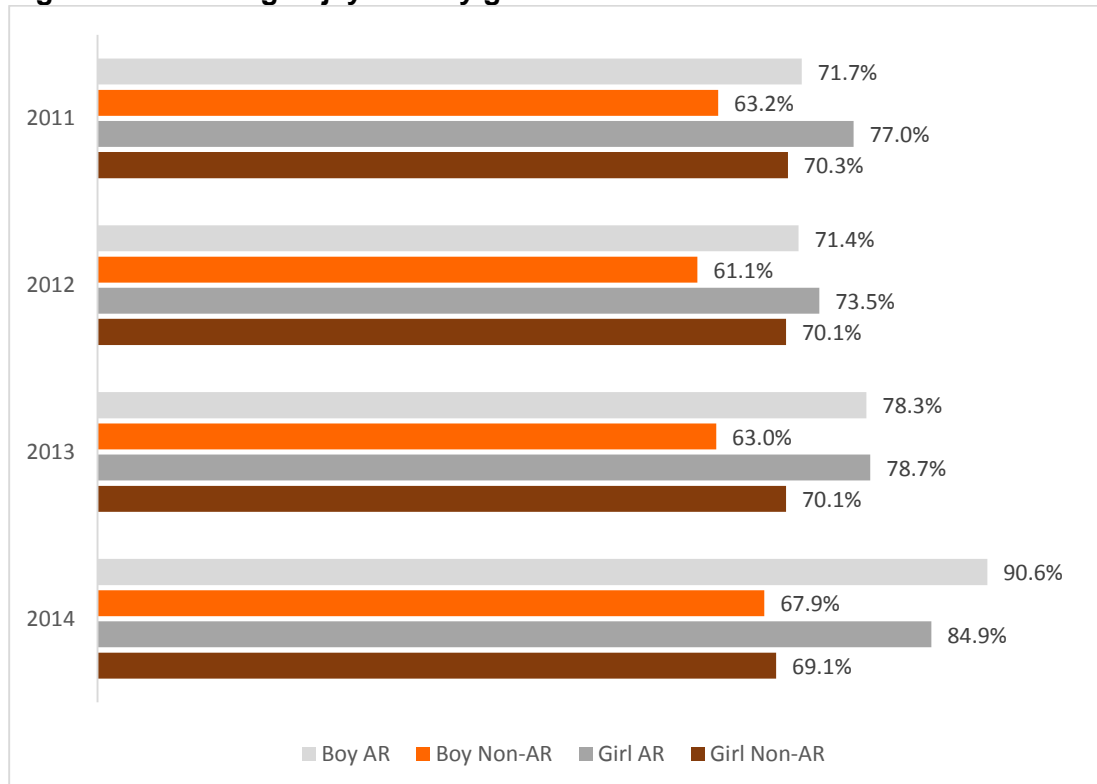
Appendix 2

Reading enjoyment also including gender

In addition to the difference between AR and non-AR children already outlined above, there was also a significant difference between boys and girls in 2011, with girls enjoying reading more than boys³⁴. However, there was no significant interaction between doing AR and gender. These differences remained true for the following three years.

Figure A1 illustrates the relationship between reading enjoyment, gender and AR in percentages.

Figure A1: Reading enjoyment by gender and AR in 2011 to 2014



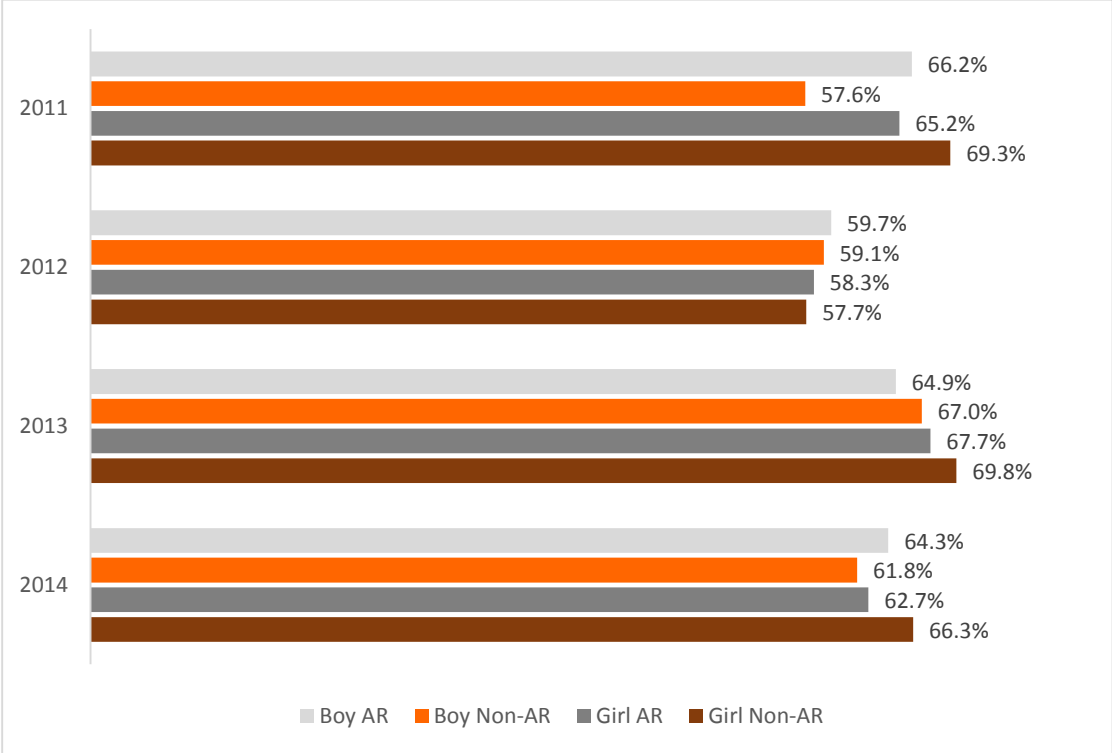
Reading frequency also including gender

There was no difference between Y3 boys and girls in 2011 in the frequency with which they read outside class and there was no interaction between gender and AR (see **Figure A2**). These insignificant differences remained true for 2012, 2013 and 2014³⁵.

³⁴ Main effects and the interaction were tested using an ordinal regression, with the nominal variables AR and gender as the factors. 2011: AR x gender: $p = .445$; 2012: AR x gender $p = .173$; 2013: AR x gender $p = .912$; 2014: AR x gender $p = .829$

³⁵ 2011: gender $p = .078$, gender x AR interaction $p = .843$; 2012: gender $p = .047$, gender x AR interaction $p = .969$; 2013: gender $p = .071$, gender x AR interaction $p = .439$; 2014: gender $p = .074$, gender x AR interaction $p = .966$

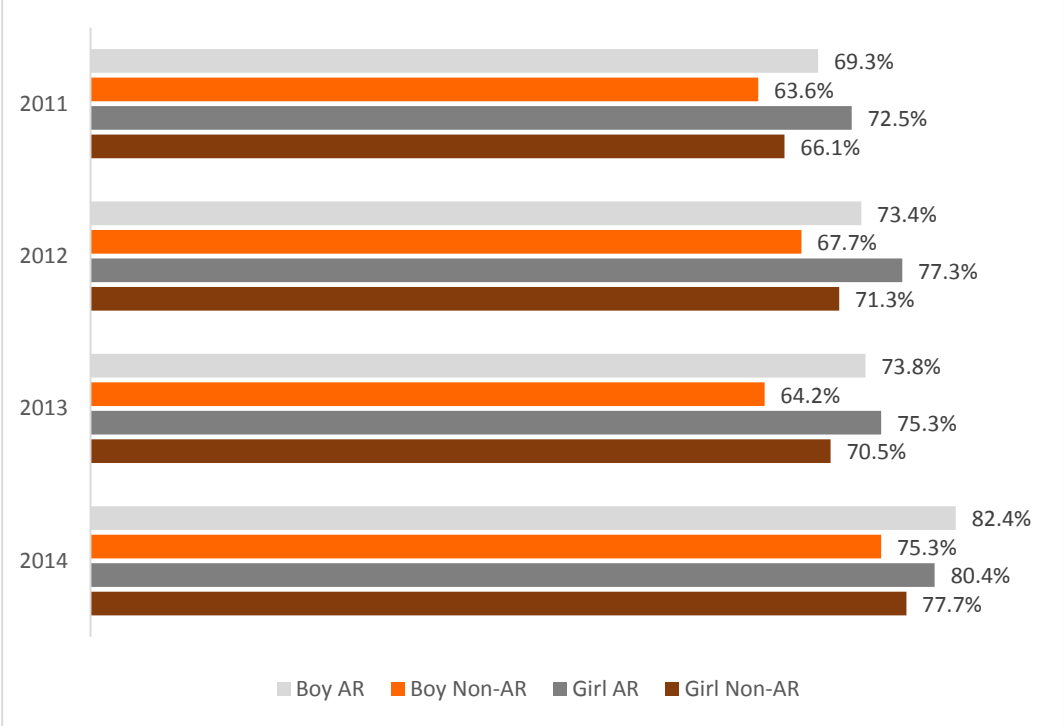
Figure A2: Reading outside class at least a few times a week by gender and AR in 2011 to 2014



Reading length also including gender

There also was no significant interaction between gender and AR in 2011, 2012, 2013 or 2014 (see **Figure A3**).

Figure A3: Reading 30 minutes or more by gender and AR in 2011 to 2014

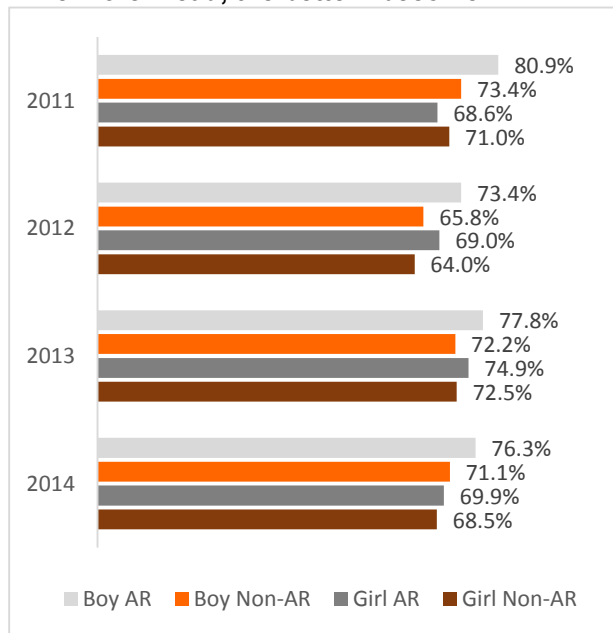


Reading attitudes also including gender

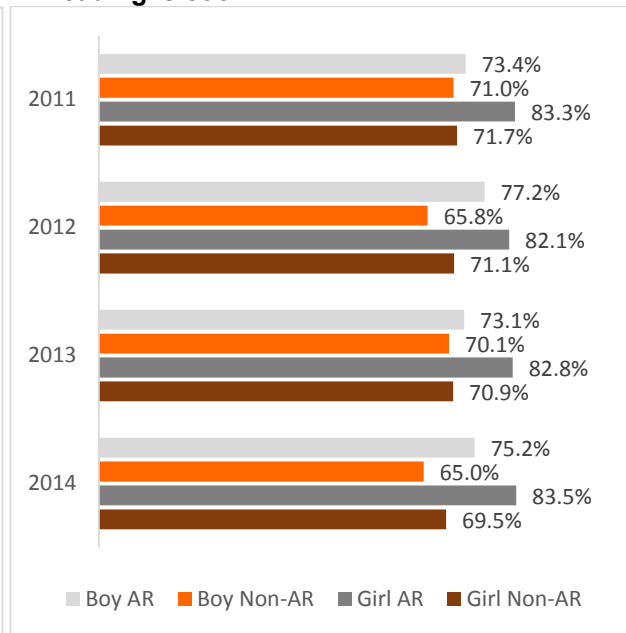
Our previous two reports into AR had shown that girls and boys who use AR have more positive attitudes towards reading than boys and girls not using AR. While there were also significant differences by gender in 2011, with girls ($3.938 \pm .036$) thinking more positively about reading than boys ($3.835 \pm .037$), there was no significant interaction between AR and gender. This remained true for the following three years (see **Figure A4**).

Figure A4: Percentage agreement with attitudinal statements by gender and AR in 2011 to 2014

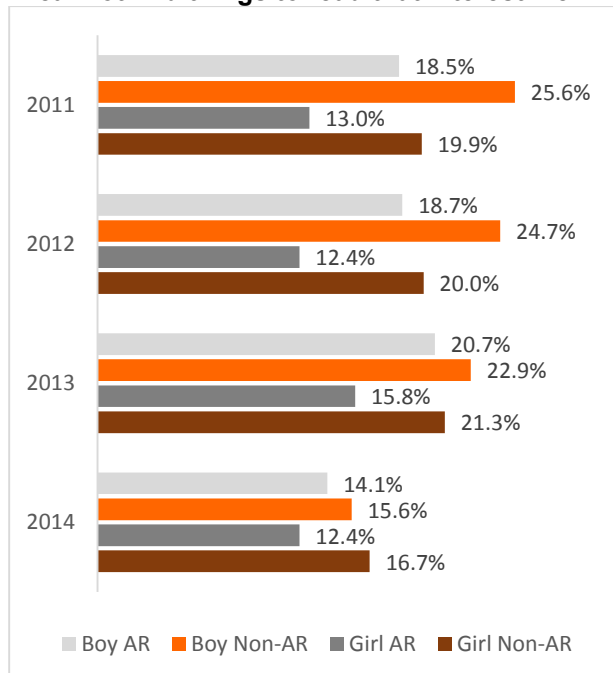
“The more I read, the better I become”



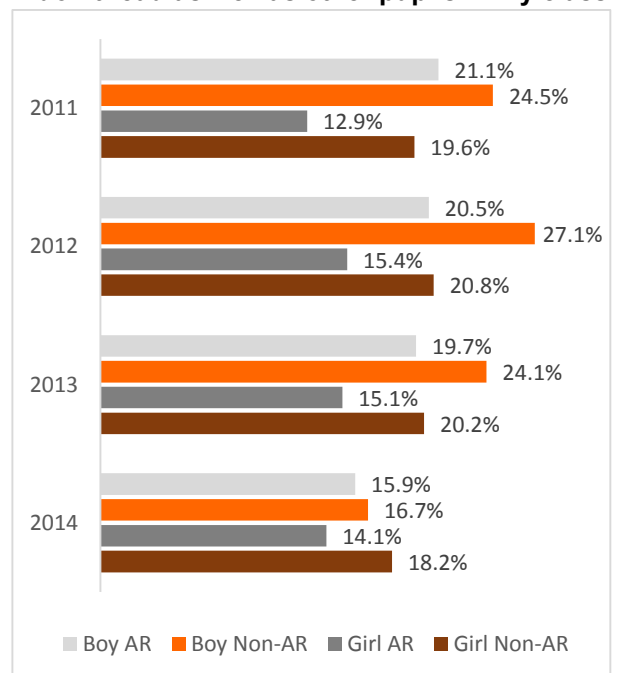
“Reading is cool”



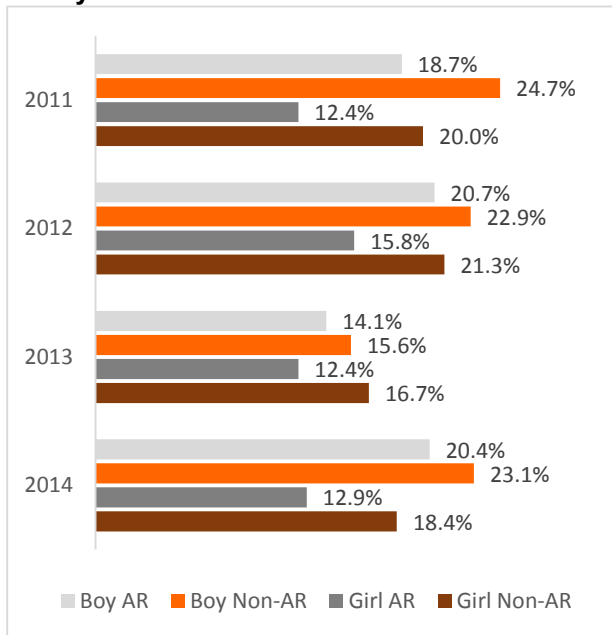
“I cannot find things to read that interest me”



“I don’t read as well as other pupils in my class”



“I only read when I have to”



“I would be embarrassed if my friends saw me read”

