Self-affirmation reduces the socioeconomic attainment gap in schools in England

Appendix S1. Supporting Information

The material in this document is additional content that may be useful to the reader of the article but is not essential to its understanding.

Contents

1. Notes for national data

1.1 England – GCSE threshold measure

GCSE results by FSM status and ethnicity are based on figures supplied by the Department for Education for the 2013/14 academic year in state-funded schools in England (Department for Education, 2015b). Detailed calculations are available on request from the lead author.

1.2 USA – Reading and mathematics scores

The reading and mathematics scores are based on of the results of eighth-grade students in 2015, summarised by eligibility for the National School Lunch Program (NSLP) and by ethnicity. We extracted these scores from reports generated by the Nations Report Card website (National Assessment of Educational Progress, 2016) and averaged the reading and mathematics scores to create single composite scores. Detailed calculations are available on request from the lead author.

1.3 England vs USA – limitations of comparisons

In the USA, the number of students eligible for and in receipt of support from the National School Lunch Program (NSLP) in 2015 was 20.2 million (Food and Nutrition Service, 2016) out of 50.7 million (National Center for Education Statistics, 2016) i.e. approximately 40%. In the UK, the corresponding figure for FSM was 14.4% (Department for Education, 2015b).

Our analysis does not take into account interactions between SES and ethnicity. A discussion of these interactions in the context of England can be found at (Strand, 2014).

1.4 Eligibility for free school meals

In England, children are eligible to receive Free School Meals (FSM) if their parents are in receipt of any of the following benefits (Department for Education, 2015a): Income Support; income-based Job Seekers' Allowance; income-related Employment and Support Allowance; support under Part VI of the Immigration and Asylum Act 1999; guaranteed element of State Pension Credit; or Child Tax Credit provided they are not also entitled to Working Tax Credit and have an annual gross income of no more than £16,190, as assessed by Her Majesty's Revenue and Customs.

2. Elimination of participants

The table below sets out the eliminations of students from the analysis, by FSM status and affirmation condition.

The small number of students with significant special educational needs, indicated by having an education, health and care (EHC) plan, are not recorded in order to preserve confidentiality. These students were eliminated in case they were unable to fully understand or complete the exercises.

Where a student changed FSM eligibility during the course of the year, their FSM status at the start of the year was used.

Note that there is an ethnic selection bias introduced by missing baseline Mathematics Key Stage 2 scores. Only nine of the 68 students eliminated due to a missing baseline score were white British students, indicating the possibility that an unrepresentatively high proportion of students eliminated from the analysis were recent immigrants who did not attend primary school in England.

	Non-FSM			FSM			All			
Reason for elimination	**Ctrl**	**Aff**	**All**	**Ctrl**	**Aff**	**All**	**Ctrl**	**Aff**	**All**	**Notes**
On Roll at the start of the Autumn 2015 term	263	288	551	80	91	171	343	379	722	To protect confidentiality, this figure excludes a small number of students with an education, health and care (EHC) plan.
Logically impossible data - eligible for FSM but not Pupil Premium	263 (-)	288 (-)	551 (-)	78 (-2)	89 (-2)	167 (-4)	341 (-2)	377 (-2)	718 (-4)	Logically impossible – if eligible for FSM then must be eligible for Pupil Premium.
No baseline Mathematics Key Stage 2 score available	237 (-26)	250 (-38)	487 (-64)	76 (-2)	87 (-2)	163 (-4)	313 (-28)	337 (-40)	650 (-68)	Mathematics KS2 scores were used as a baseline for academic performance.
Experimenter made an error	236 (-1)	249 (-1)	485 (-2)	76 (-)	86 (-1)	162 (-1)	312 (-1)	335 (-2)	647 (-3)	Student given a control exercise instead of a treatment exercise, or vice versa.
Autumn 2015 exercise not completed	219 (-17)	239 (-10)	458 (-27)	69 (-7)	84 (-2)	153 (-9)	288 (-24)	323 (-12)	611 (-36)	At least one exercise needs to be completed, and theory suggests that the autumn 2015 one was likely to have the most effect.
Mathematics assessment results not available for summer term test.	210 (-9)	224 (-15)	434 (-24)	59 (-10)	69 (-15)	128 (-25)	269 (-19)	293 (-30)	562 (-49)	Main outcome variable must be available.

3. Demographic and prior achievement variables of the sample

The table below sets out demographic and prior achievement variables of the sample of 562 students by affirmation condition.

	Mean (overall)	Mean (affirmed)	Mean (control)	p-value (A-C)
All students				
Free school meals (FSM)	.23	.24	.22	.649
Female	.52	.53	.51	.646
English as an additional language	.30	.32	.29	.423
White	.55	.55	.56	.847
Black	.14	.15	.14	.853
Asian	.21	.21	.20	.913
Mixed	.07	.07	.07	.825
Other ethnicity	.03	-	-	.668
Maths Key Stage 2 (prior achievement) score	28.71	28.58	28.85	.519
FSM students				
Female	.43	.48	.37	.233
English as an additional language	.30	.30	.31	.993
White	.46	.49	.42	.439
Black	.16	-	-	.531
Asian	.23	.23	.22	.878
Mixed	.12	-	-	.963
Other ethnicity	-	-	-	.242
Maths Key Stage 2 (prior achievement) score	28.28	28.45	28.08	.651

Note
'-' indicates that the figure is calculated from a sub-sample of fewer than 11 students. We do not report these figures in order to maintain student confidentiality.

4. Correlations between self-reported measures and academic performance

The table below sets out the Pearson correlations between the self-reported measures in the student survey and academic performance.

	Maths score	Stereotype threat	Stress	Self-integrity	Sense of academic fit
Maths score[1]	1.000				
Stereotype threat	-.111**	1.000			
Stress	-.049	.348**	1.000		
Self-integrity	.051	-.143**	-.235**	1.000	
Sense of academic fit	.126**	-.168**	-.368**	.357**	1.000

*** Correlation is significant at the .01 level (two-tailed).*

[1] Standardized end-of-year maths score.

5. Sensitivity analyses of the primary outcome measure

The table below sets out a summary of the analysis reported in the article, followed by a series of sensitivity analyses. Figures are the mean values of the primary outcome measure (i.e. standardised end-of-year mathematics scores) and, where applicable, confidence intervals and *p*-values. Confidence intervals are 95% bias-corrected and accelerated, and *p*-values are robust to non-normal distribution of residuals (apart from the interaction terms shown in the first column). Note that, while each of the three sensitivity analyses shows a non-significant interaction term (first column), the main effect of affirmation condition on FSM students is in each case significant (column C).

	Interaction	FSM			Non-FSM			FSM vs non-FSM gap			% reduction in gap[1]	
	FSM x Affirmation	Control (A)	Affirmed (B)	Difference (C = B-A)	Control (D)	Affirmed (E)	Difference (F = E-D)	Control (G = D-A)	Affirmed (H = E-B)	Difference (I = G-H)	Method 1 (C/G)	Method 2 (I/G)
Baseline: as reported *N* = 562	*p* = .043	-0.478 [-0.645; -0.305]	-0.099 [-0.280; 0.113]	0.379 [0.128; 0.642] *p* = .003	0.049 [-0.071; 0.171	0.100 [-0.037; 0.239]	0.051 [-0.105; 0.205] *p* = .497	0.527	0.199	0.328	72%	62%
Excluding all covariates[2] *N* = 604	*p* = .109	-0.438 [-0.588; -0.280]	-0.084 [-0.303; 0.164]	0.354 [0.079; 0.642] *p* = .012	0.048 [-0.073; 0.172]	0.088 [-0.039; 0.217]	0.040 [-0.159; 0.224] *p* = .681	0.486	0.172	0.317	73%	65%
1+ exercises completed *N* = 583	*p* = .054	-0.469 [-0.620; -0.299]	-0.109 [-0.293; 0.086]	0.360 [0.123; 0.608] *p* = .003	0.048 [-.073; 0.181]	0.100 [-0.031; 0.233]	0.053 [-0.105; 0.208] *p* = .494	0.517	0.209	0.308	70%	60%
2+ exercises completed *N* = 573	*p* = .056	-0.485 [-0.641; -0.309]	-0.132 [-0.326; 0.059]	0.353 [0.104; 0.601] *p* = .005	0.054 [-.071; 0.171]	0.103 [-0.015; 0.221]	0.049 [-0.100; 0.206] *p* = .514	0.539	0.235	0.304	65%	56%

Notes

[1] We use two methods to interpret the reduction in the FSM/non-FSM gap caused by the intervention. Method 1 calculates that FSM students in the affirmed condition closed the FSM/non-FSM gap in the control condition by X%. Method 2 calculates that in the affirmed condition, the FSM/non-FSM gap was Y% less than the corresponding gap in the control condition. The difference in the two methods arises because for non-FSM students, although the effect of the intervention was non-significant (Column F, all *ps* > .494), the mean in the affirmed condition (Column E) was slightly higher than in the control condition (Column D). If all students across the country undertook the intervention and the results of the affirmed condition were replicated, it would therefore mean a small benefit to non-FSM students as well as the large benefit to FSM students. This slight increase in performance by non-FSM students would cause the FSM/non-FSM gap to be slightly greater than it would otherwise have been. Since the theory that we are examining relates to the psychological consequences of the *gap* in performance rather than on its *absolute* level, Method 2 is more theoretically applicable and we therefore report these results in the main article.

[2] All covariates excluded i.e. Year Group, gender, English as an additional language, baseline maths KS2 scores and ethnicity.

6. Analyses by all other relevant measures provided by the school

Since the study was not pre-registered, and in line with good practice (e.g. Simmons, Nelson, & Simonsohn, 2012), we set out below the *p*-values of the two-way interactions between affirmation condition and all other relevant measures gathered during the course of the study. Analyses are based on the same ANCOVA model used in the main article, but with covariates adjusted to take account of the measure being analysed (e.g. for the analysis of *Female*, the *Female* covariate that was used in the main FSM analysis is replaced by *FSM*).

Measure	Including covariates		Excluding all covariates	
	n[(1)]	*p*-value	*n*[(2)]	*p*-value
Free school meals: as reported	128	.042	132	.109
Pupil Premium[(3)]	239	.640	246	.982
Female	294	.810	314	.422
English as an additional language	170	.084	198	.186
Lower difficulty tier of test	283	.662	309	.479
Asian ethnicity [(4)]	*116*	*.098*	*123*	*.460*
Black ethnicity [(4)]	*81*	*.692*	*86*	*.328*
Mixed ethnicity [(4)]	*39*	*.225*	*43*	*.566*
Other ethnicity [(4)]	*15*	*.653*	*23*	*.447*

Notes

[(1)] Sample $N = 562$

[(2)] Sample $N = 604$

[(3)] Eligibility for Pupil Premium indicates that a student was eligible for free school meals in any of the last six years, is looked after by the state, or is a child of service personnel.

[(4)] vs white ethnicity reference group ($n = 311$ for sample including covariates, $n = 329$ for sample excluding all covariates)

In addition to the student information set out in the table above, the school also provided the following information: Looked after indicator (whether the student was in the care of the state), Year group (i.e. 7, 8 or 9), ethnicity sub-group (e.g. 'Black' was subdivided into 'Black Caribbean', 'Black African' and 'Black – other')[2], Key Stage 2 mathematics scores, Key Stage 2 English reading scores and Key Stage 2 English grammar, punctuation and spelling scores[3], English class, mathematics class, house (registration) group, home language, first language, admission date, age, GCSE mathematics baseline score[4], Year 7 Cognitive Abilities Test (CAT) test score[5], and end-of-term mathematics scores for the first two terms of the school year[6].

[2] Due to the large number of these sub-groups (20) we consolidated them into the five main ethnic groups (White, Asian, Black, Mixed and Other) for the purposes of covariates.
[3] These scores would have been used as a baseline for English outcome measures had these been available. However, due to practical constraints English outcome measures were not available.
[4] Available for Years 7 and 8 only
[5] Cognitive Abilities Tests measure verbal, non-verbal, spatial and quantitative reasoning. We did not use these as a baseline measure of performance because Key Stage 2 mathematics scores are based on tests that are closely aligned to the cognitive skills and knowledge needed in the mathematics tests of our outcome variable. As such they represent a significantly more relevant baseline measure.
[6] We were unable to use these scores in our analysis because there were three versions of the mathematics tests undertaken in the first two terms of the school year (based on three tiers of difficulty) rather than the two versions (based on two tiers of difficulty) taken at the end of the school year. There was thus no way of matching the performance of the different groups across time.

7 Materials

7.1 Introduction

We based the wording of the writing exercises on that reported by Sherman and colleagues (2013). At our request, a teacher informally pre-tested the exercises with three Year 9 students from another school and found no issues with comprehension.

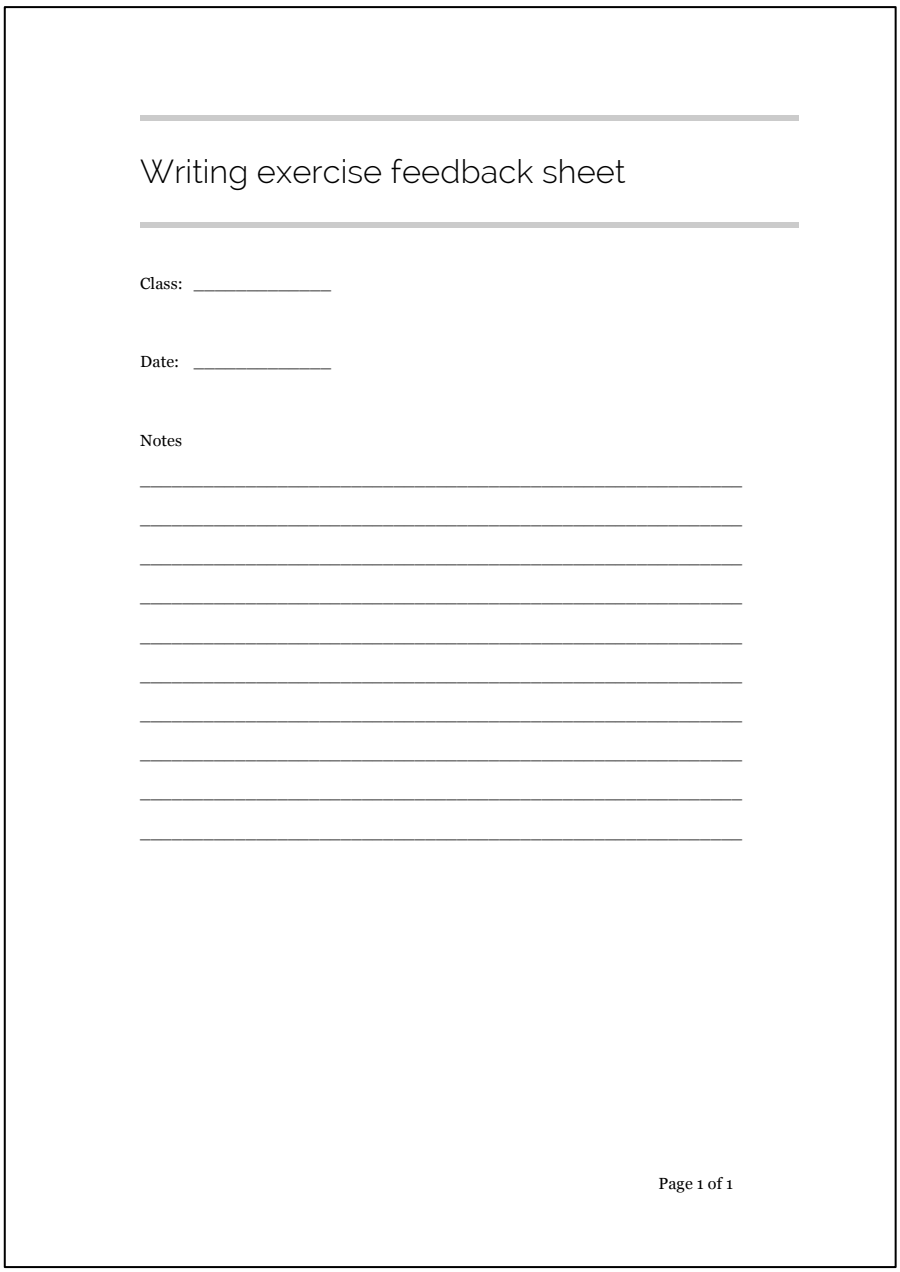
The exercises for each term were different in order to avoid reducing impact through repetition (Lyubomirsky & Della Porta, 2012). The Autumn Term exercise in the affirmation condition was designed to invoke a self-affirmation; in the control condition, the exercise was designed to be psychologically neutral.

The remaining terms' exercises followed a similar pattern, with the exception that the control exercise in the Spring Term asked students to write about their journey to school that morning. The Summer Term self-affirmation exercise was partially tailored so that each student was presented with a selection of eight values that included one that they had written about in the Spring Term.

Each exercise was inserted into an envelope personalised with the student's name and unique identifier. In order to reduce the likelihood of interference between the control and treatment groups, the two sets of exercises for each term were visually similar.

7.2 Writing exercise feedback sheet

English teachers were asked to complete this sheet each time a class performed the exercises. In the teacher briefings in September, they were asked to note any disruption during the exercises in the *Notes* section.



Writing exercise feedback sheet

Class: _____

Date: _____

Notes

_____

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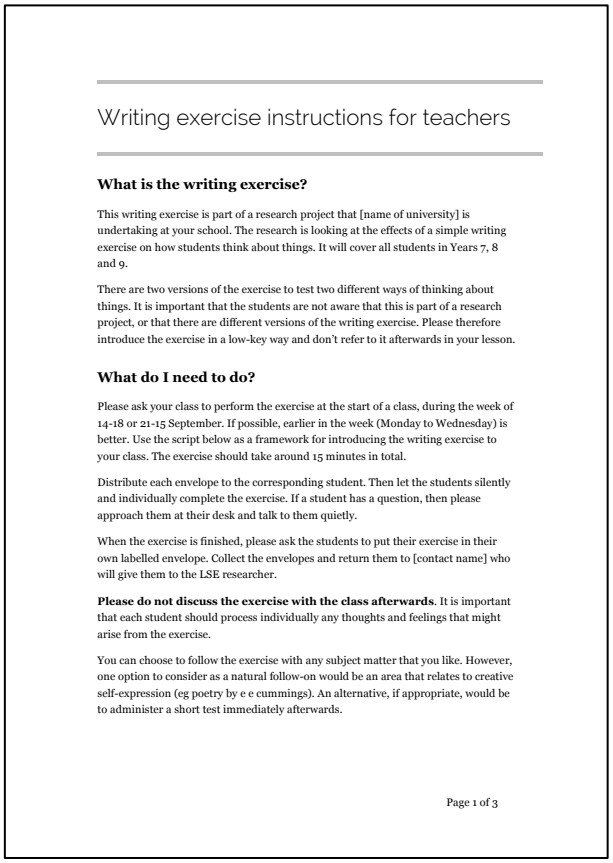
7.3 Writing exercise instructions for teachers

These instructions were used near the start of the Autumn Term 2015 to brief the English teachers who were to administer the exercises in their classes.



Writing exercise instructions for teachers

What is the writing exercise?

This writing exercise is part of a research project that [name of university] is undertaking at your school. The research is looking at the effects of a simple writing exercise on how students think about things. It will cover all students in Years 7, 8 and 9.

There are two versions of the exercise to test two different ways of thinking about things. It is important that the students are not aware that this is part of a research project, or that there are different versions of the writing exercise. Please therefore introduce the exercise in a low-key way and don't refer to it afterwards in your lesson.

What do I need to do?

Please ask your class to perform the exercise at the start of a class, during the week of 14-18 or 21-15 September. If possible, earlier in the week (Monday to Wednesday) is better. Use the script below as a framework for introducing the writing exercise to your class. The exercise should take around 15 minutes in total.

Distribute each envelope to the corresponding student. Then let the students silently and individually complete the exercise. If a student has a question, then please approach them at their desk and talk to them quietly.

When the exercise is finished, please ask the students to put their exercise in their own labelled envelope. Collect the envelopes and return them to [contact name] who will give them to the LSE researcher.

Please do not discuss the exercise with the class afterwards. It is important that each student should process individually any thoughts and feelings that might arise from the exercise.

You can choose to follow the exercise with any subject matter that you like. However, one option to consider as a natural follow-on would be an area that relates to creative self-expression (eg poetry by e e cummings). An alternative, if appropriate, would be to administer a short test immediately afterwards.

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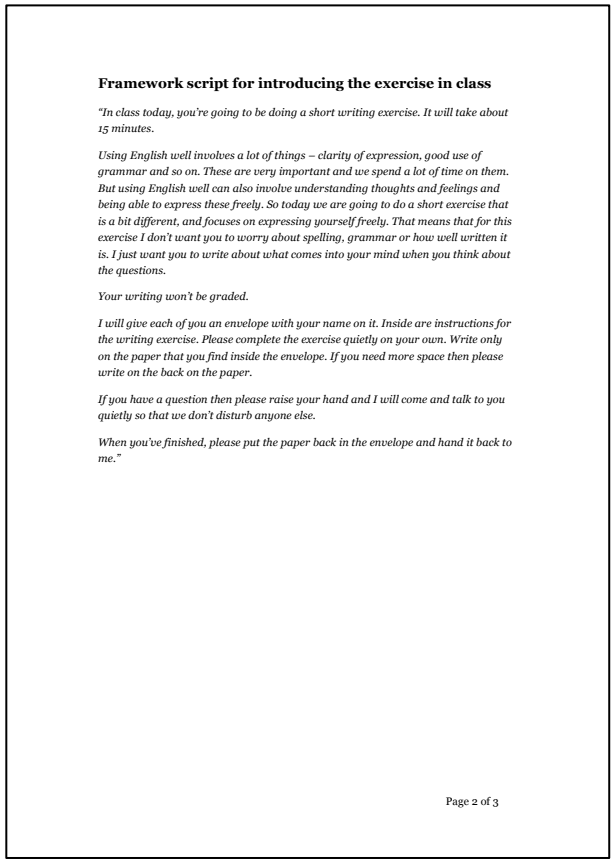

Framework script for introducing the exercise in class

"In class today, you're going to be doing a short writing exercise. It will take about 15 minutes.

Using English well involves a lot of things – clarity of expression, good use of grammar and so on. These are very important and we spend a lot of time on them. But using English well can also involve understanding thoughts and feelings and being able to express these freely. So today we are going to do a short exercise that is a bit different, and focuses on expressing yourself freely. That means that for this exercise I don't want you to worry about spelling, grammar or how well written it is. I just want you to write about what comes into your mind when you think about the questions.

Your writing won't be graded.

I will give each of you an envelope with your name on it. Inside are instructions for the writing exercise. Please complete the exercise quietly on your own. Write only on the paper that you find inside the envelope. If you need more space then please write on the back on the paper.

If you have a question then please raise your hand and I will come and talk to you quietly so that we don't disturb anyone else.

When you've finished, please put the paper back in the envelope and hand it back to me."

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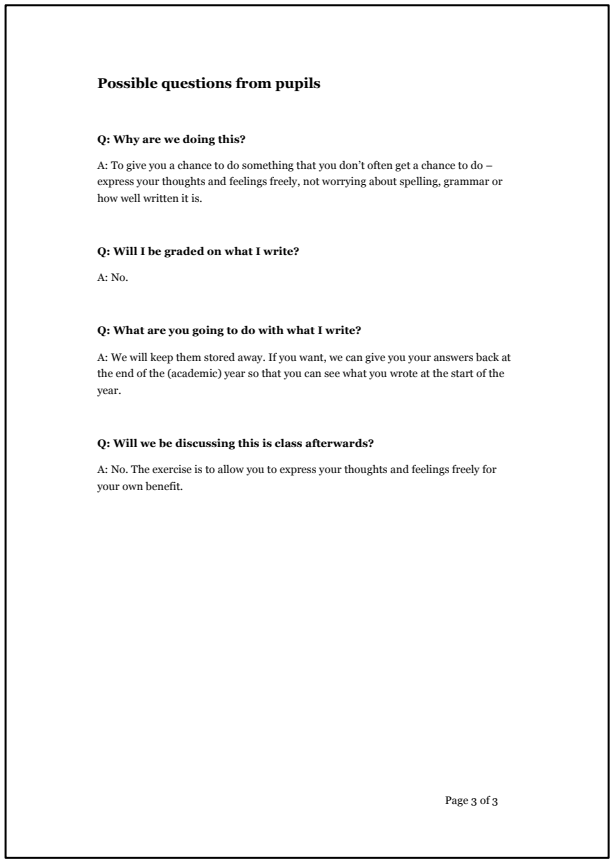

Possible questions from pupils

Q: Why are we doing this?

A: To give you a chance to do something that you don't often get a chance to do – express your thoughts and feelings freely, not worrying about spelling, grammar or how well written it is.

Q: Will I be graded on what I write?

A: No.

Q: What are you going to do with what I write?

A: We will keep them stored away. If you want, we can give you your answers back at the end of the (academic) year so that you can see what you wrote at the start of the year.

Q: Will we be discussing this is class afterwards?

A: No. The exercise is to allow you to express your thoughts and feelings freely for your own benefit.

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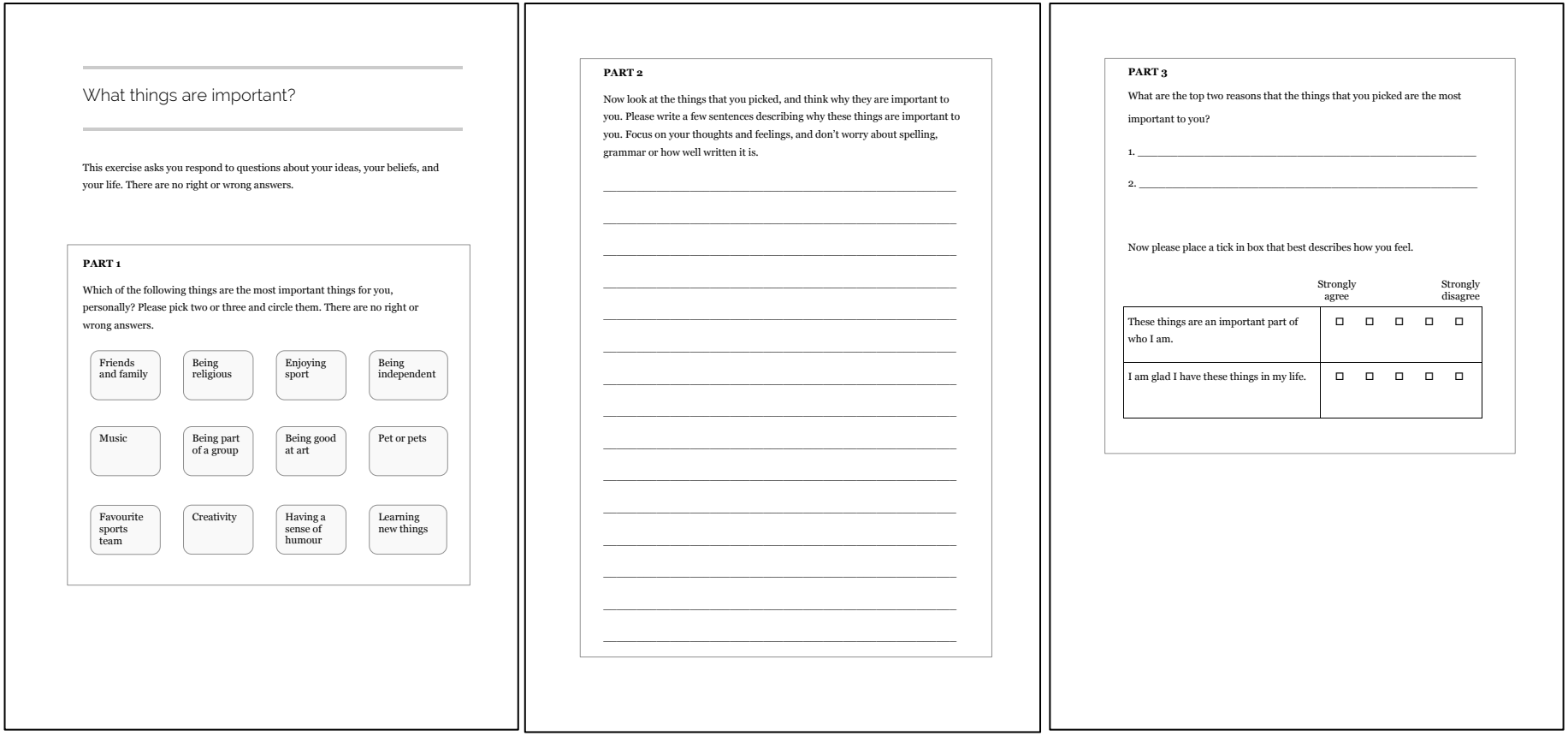
7.4 Treatment and control exercises

Autumn 2015 treatment exercise



What things are important?

This exercise asks you respond to questions about your ideas, your beliefs, and your life. There are no right or wrong answers.

PART 1

Which of the following things are the most important things for you, personally? Please pick two or three and circle them. There are no right or wrong answers.

Friends and family	Being religious	Enjoying sport	Being independent
Music	Being part of a group	Being good at art	Pet or pets
Favourite sports team	Creativity	Having a sense of humour	Learning new things

PART 2

Now look at the things that you picked, and think why they are important to you. Please write a few sentences describing why these things are important to you. Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

PART 3

What are the top two reasons that the things that you picked are the most important to you?

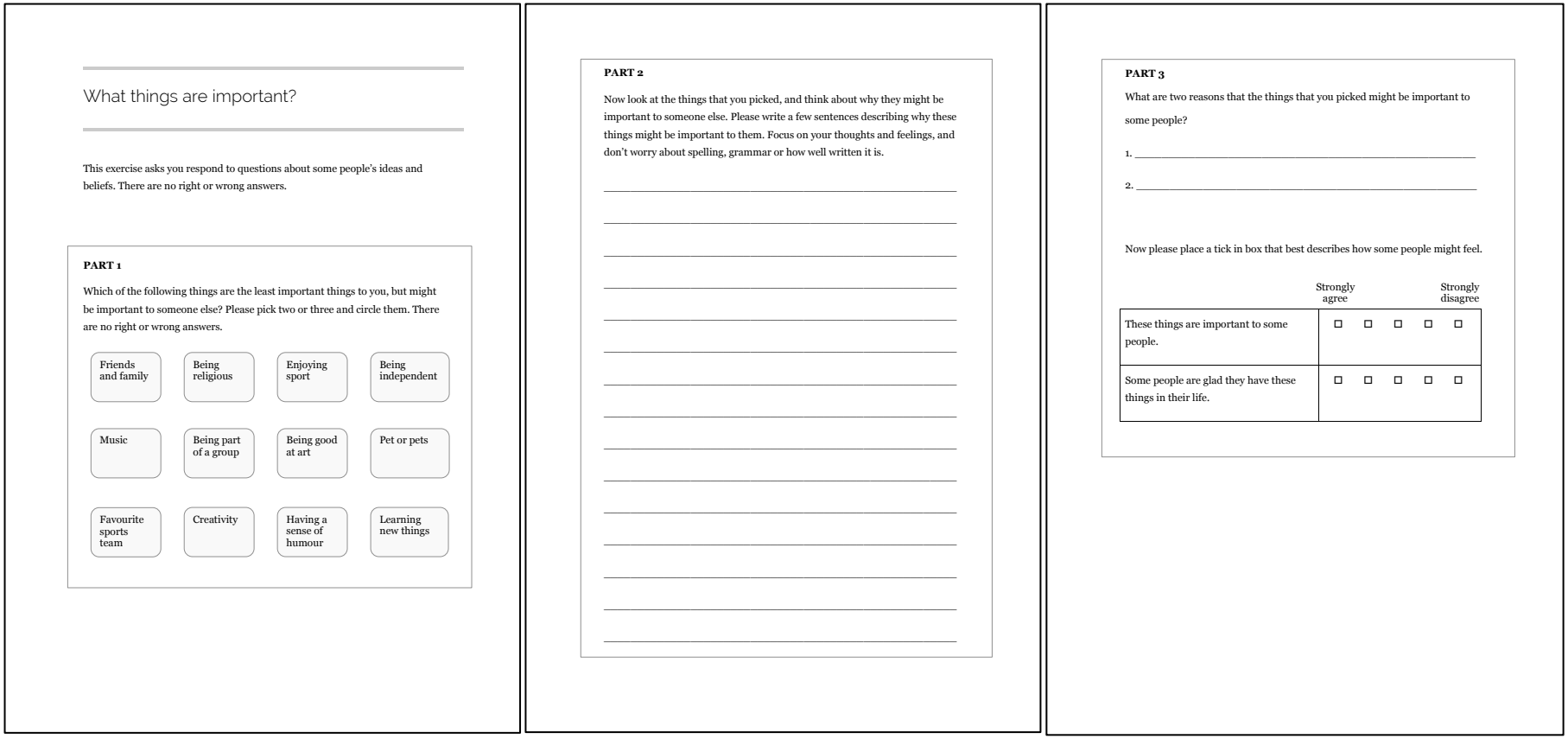
1. _____

2. _____

Now please place a tick in box that best describes how you feel.

	Strongly agree				Strongly disagree
These things are an important part of who I am.	☐	☐	☐	☐	☐
I am glad I have these things in my life.	☐	☐	☐	☐	☐

Autumn 2015 control exercise



What things are important?

This exercise asks you respond to questions about some people's ideas and beliefs. There are no right or wrong answers.

PART 1

Which of the following things are the least important things to you, but might be important to someone else? Please pick two or three and circle them. There are no right or wrong answers.

Friends and family	Being religious	Enjoying sport	Being independent
Music	Being part of a group	Being good at art	Pet or pets
Favourite sports team	Creativity	Having a sense of humour	Learning new things

PART 2

Now look at the things that you picked, and think about why they might be important to someone else. Please write a few sentences describing why these things might be important to them. Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

PART 3

What are two reasons that the things that you picked might be important to some people?

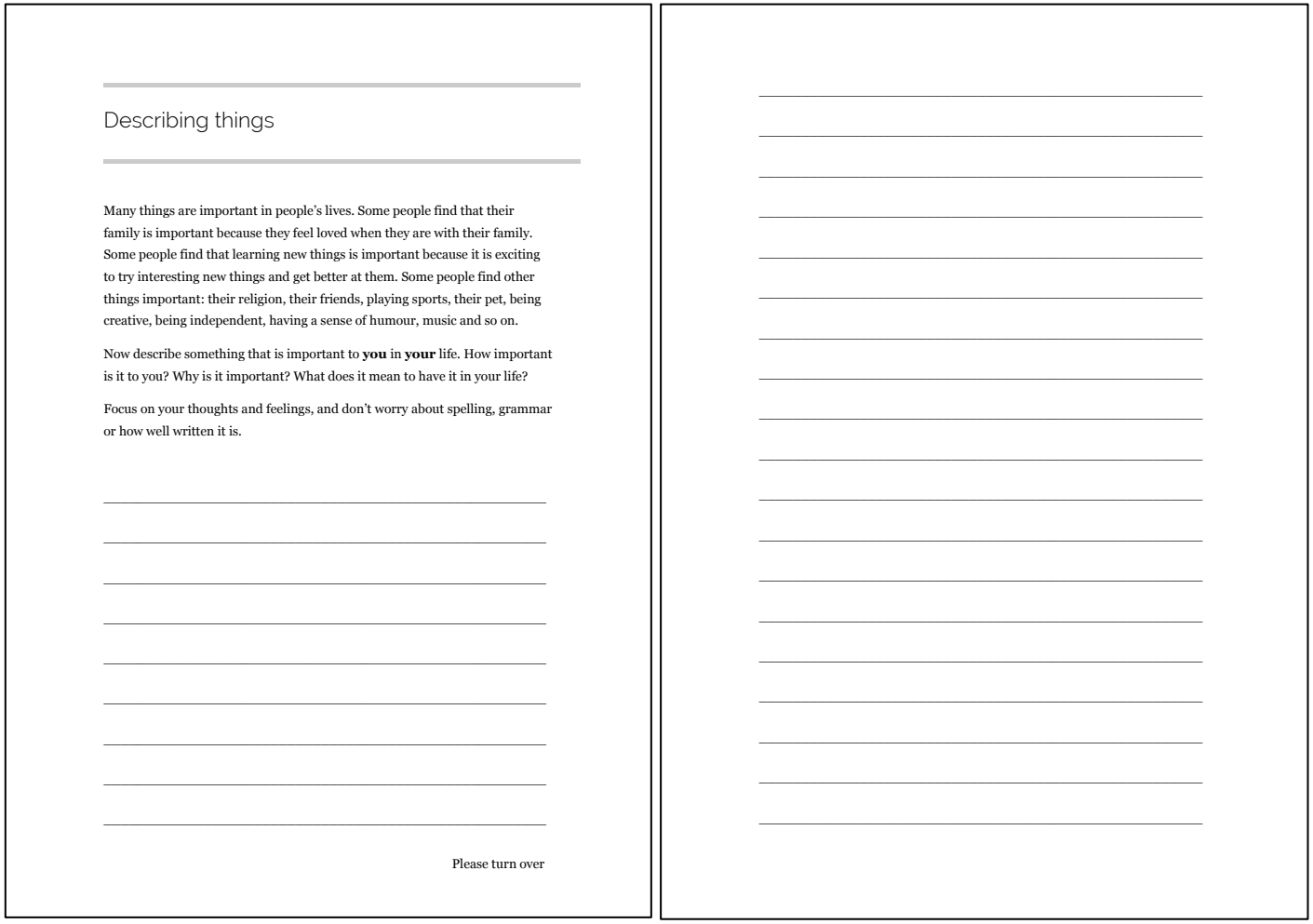
1. _____

2. _____

Now please place a tick in box that best describes how some people might feel.

	Strongly agree				Strongly disagree
These things are important to some people.	☐	☐	☐	☐	☐
Some people are glad they have these things in their life.	☐	☐	☐	☐	☐

Spring 2016 treatment exercise



Describing things

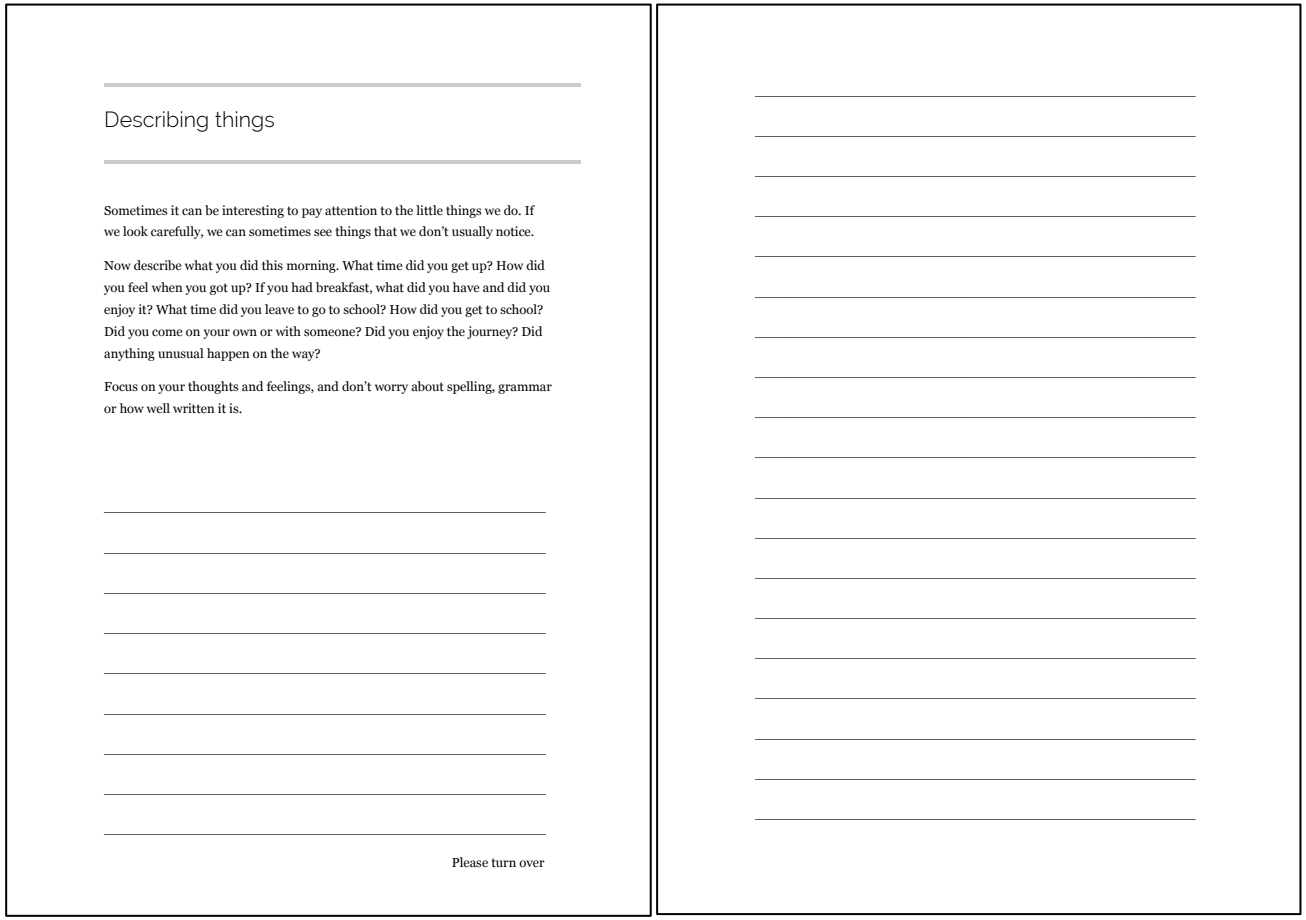
Many things are important in people's lives. Some people find that their family is important because they feel loved when they are with their family. Some people find that learning new things is important because it is exciting to try interesting new things and get better at them. Some people find other things important: their religion, their friends, playing sports, their pet, being creative, being independent, having a sense of humour, music and so on.

Now describe something that is important to **you** in **your** life. How important is it to you? Why is it important? What does it mean to have it in your life?

Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

Please turn over

Spring 2016 control exercise



Describing things

Sometimes it can be interesting to pay attention to the little things we do. If we look carefully, we can sometimes see things that we don't usually notice.

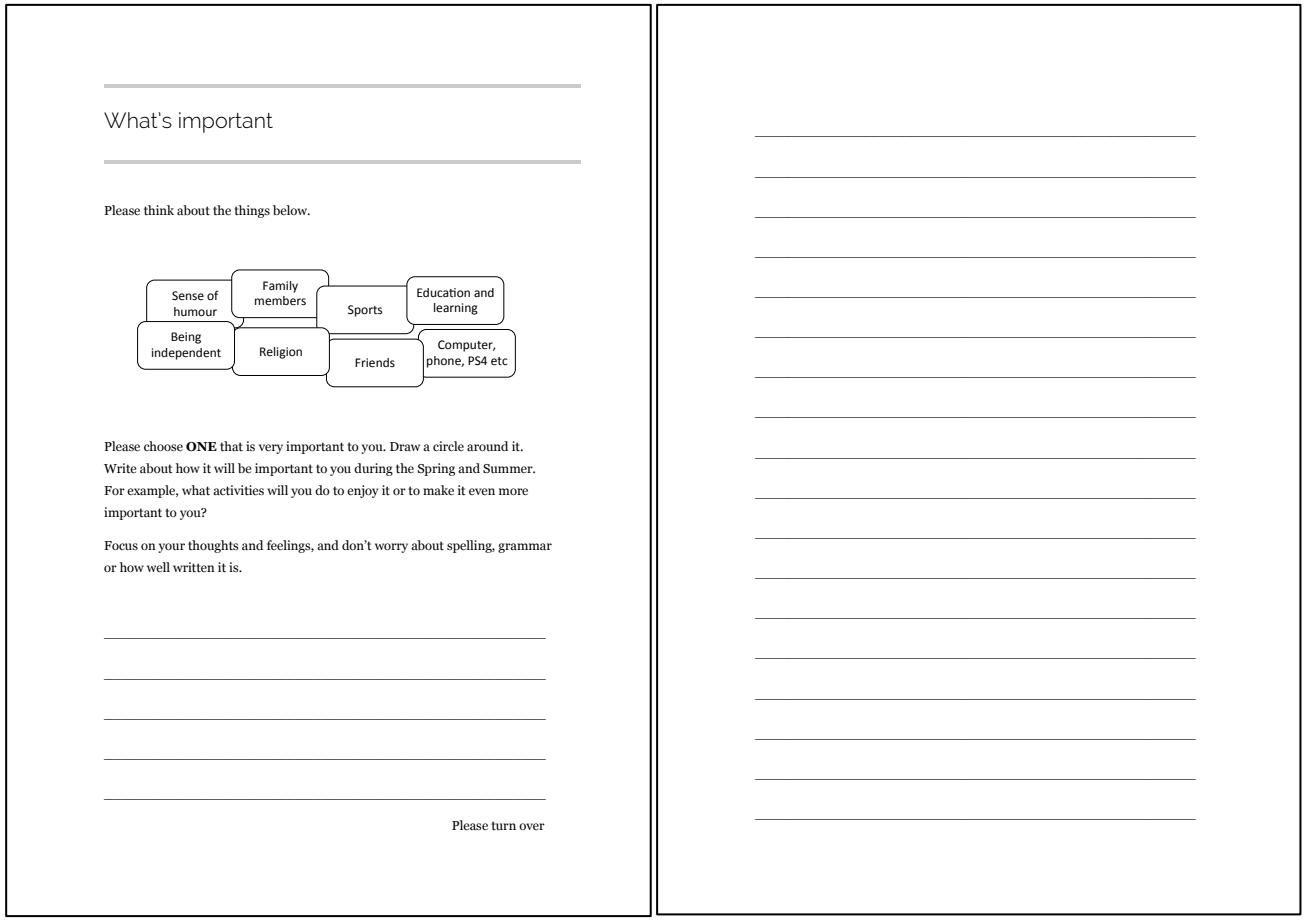
Now describe what you did this morning. What time did you get up? How did you feel when you got up? If you had breakfast, what did you have and did you enjoy it? What time did you leave to go to school? How did you get to school? Did you come on your own or with someone? Did you enjoy the journey? Did anything unusual happen on the way?

Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

Please turn over

Summer 2016 treatment exercise (example)

This is an example of one of the treatment exercises. These were partially tailored to ensure that one of the values that each student had written about in the Spring exercise was presented in the Summer exercise.



What's important

Please think about the things below.

Sense of humour
Family members
Sports
Education and learning
Being independent
Religion
Friends
Computer, phone, PS4 etc

Please choose **ONE** that is very important to you. Draw a circle around it. Write about how it will be important to you during the Spring and Summer. For example, what activities will you do to enjoy it or to make it even more important to you?

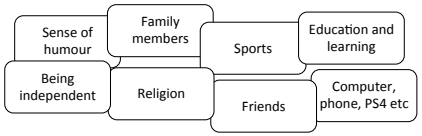
Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

Please turn over

Summer 2016 control exercise

What's important

Please think about the things below.



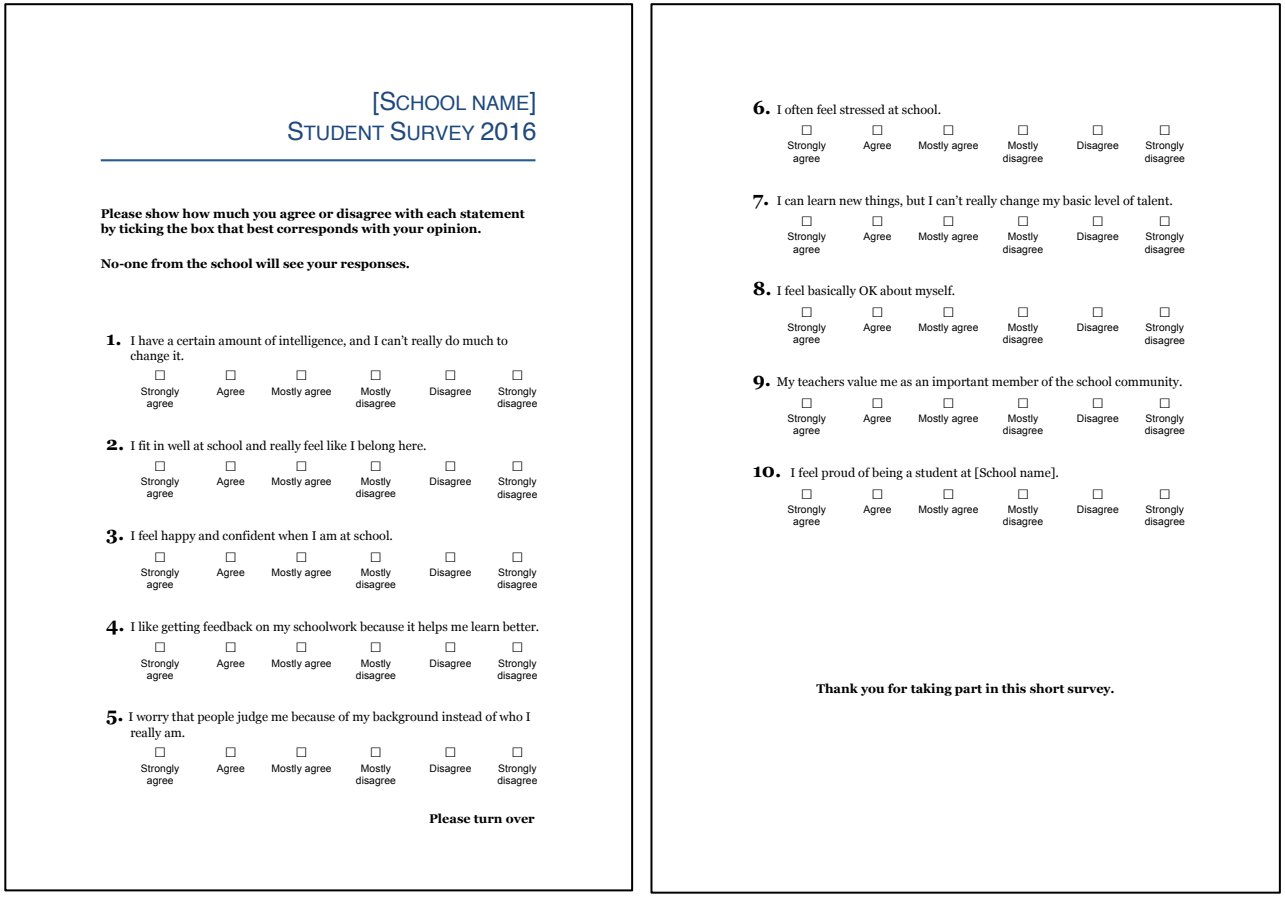
Please choose **ONE** that isn't very important to you but might be important to other people. Draw a circle around it. Write about how it might be important to those people during the Spring and Summer. For example, what activities might those people do to enjoy it?

Focus on your thoughts and feelings, and don't worry about spelling, grammar or how well written it is.

Please turn over

7.5 Student survey, June 2016

Note that statements 1, 4 and 7 were included as a diagnostic aid for a separate initiative being undertaken by the school to embed a growth mindset into the school (cf work by Carol Dweck and others).



[SCHOOL NAME]
STUDENT SURVEY 2016

Please show how much you agree or disagree with each statement by ticking the box that best corresponds with your opinion.

No-one from the school will see your responses.

1. I have a certain amount of intelligence, and I can't really do much to change it.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

2. I fit in well at school and really feel like I belong here.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

3. I feel happy and confident when I am at school.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

4. I like getting feedback on my schoolwork because it helps me learn better.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

5. I worry that people judge me because of my background instead of who I really am.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

Please turn over

6. I often feel stressed at school.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

7. I can learn new things, but I can't really change my basic level of talent.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

8. I feel basically OK about myself.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

9. My teachers value me as an important member of the school community.

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

10. I feel proud of being a student at [School name].

☐ Strongly agree ☐ Agree ☐ Mostly agree ☐ Mostly disagree ☐ Disagree ☐ Strongly disagree

Thank you for taking part in this short survey.

References

Department for Education. (2015a). *National Pupil Database User Guide*. Retrieved from https://www.gov.uk/government/publications/national-pupil-database-user-guide-and-supporting-information

Department for Education. (2015b). *SFR 06/2015. GCSE and equivalent attainment by pupil characteristics, 2013 to 2014 (Revised)*. Retrieved from https://www.gov.uk/government/statistics/gcse-and-equivalent-attainment-by-pupil-characteristics-2014

Food and Nutrition Service, U. S. D. of A. (2016). *Program Information Report: National School Lunch Program data*.

Lyubomirsky, S., & Della Porta, M. D. (2012). Boosting Happiness, Buttressing Resilience: Results from Cognitive and Behavioral Interventions. In J. W. Reich, A. J. Zautra, & J. S. Hall (Eds.), *Handbook of Adult Resilience* (pp. 450–464). Guilford Publications.

National Assessment of Educational Progress. (2016). Extracts from reports generated by the Nations Report Card website. Retrieved from http://www.nationsreportcard.gov/reading_math_2015/

National Center for Education Statistics. (2016). *Back to school statistics* (Vol. 766).

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2012). A 21 Word Solution. *Social Science Research Network*, 1–4. http://doi.org/10.2139/ssrn.2160588

Strand, S. (2014). Ethnicity, gender, social class and achievement gaps at age 16: intersectionality and 'getting it' for the white working class. *Research Papers in Education*, *29*(2), 131–171. http://doi.org/10.1080/02671522.2013.767370