Statistical Analysis Plan for Positive Action
Queen's University Belfast

For some evaluation teams, the trial manager and statistician may be the same person and for others not. In all cases, the SAP should be written for a statistician or analyst to be able to carry out the analysis without prior knowledge of the trial. This is important in order to avoid bias. Describing the analyses in sufficient detail for someone else to carry it out with certainty avoids conscious or sub-conscious decisions being made on the basis of results seen. The SAP, if written sufficiently early, also provides continuity should key members of the evaluation team leave their institution during the course of the trial.

Depending on the level of detail within the trial protocol, some sections of the SAP can be cut and pasted from it. Others will require further detail. The SAP should be written at least three months before the analysis is conducted and will be reviewed by one of a panel of EEF SAP reviewers. For new EEF projects, a SAP will be appended to the protocol at the beginning of the trial and this will be updated three months before the analysis. This template should be used in conjunction with the EEF Analysis Guidelines and EEF Report Template.

INTERVENTION	**Positive Action**
DEVELOPER	Positive Action
EVALUATOR	Queen's University Belfast, Centre for Evidence and Social Innovation
TRIAL REGISTRATION NUMBER	This is a implementation study with no control group. Therefore, as it is not an RCT we have not submitted for trial registration. However, we are intending to submit the study protocol to the International Journal of Educational Research for publication
TRIAL STATISTICIAN	Liam O'Hare
TRIAL CHIEF INVESTIGATOR	Liam O'Hare
SAP AUTHOR	Liam O'Hare, Patrick Stark, Karen Orr
SAP VERSION	1st submission
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EEF DATE OF APPROVAL	16/06/17
DEVELOPER DATE OF APPROVAL	22/06/17

Protocol changes
None made since last reported changes in protocol[1].

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[1]

https://educationendowmentfoundation.org.uk/public/files/Projects/Evaluation_Protocols/Character_round-_Positive_Action_updated_protocol.pdf

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Introduction

Positive Action Programme is an evidence-based comprehensive Social-Emotional and Character Development (SECD) program that includes a school-wide climate change component together with a sequenced curriculum that is delivered to all student levels. The Positive Action program is an approach to teaching positive actions/behaviours for the whole self: the physical, intellectual, social and emotional. It teaches positive actions for all ages in schools—reception through high school—through age-appropriate lesson manuals. Positive Action aims to promote character development, academic achievement, and social-emotional skills and to reduce disruptive and problem behaviour.
This project is a two phase implementation study of Positive Action. The first phase explores initial reactions to the programme over 6 months. The second phase explores implementation factors that have a relationship with any observed outcome change during a full school year of the programme.

The analysis will investigate a theory of change for the programme, by looking at correlations between pre-test and post-test change on the three outcome domains of think, act and feel. Theory of intervention will also be investigated, by analysing the relationship between classroom activity, whole school activity and outcome change. The analysis will also investigate which implementation factors (e.g. exposure, engagement, fidelity and delivery quality) influenced outcome change.

Study design

A sample of 15 primary schools was recruited for the study by the delivery team (Positive Action UK). No eligibility criteria were applied to the sample and all schools received the intervention. The Year 4 cohort from each school participated in Phase 1 of the study (2015/2016), and the Year 5 cohort from each school participated in Phase 2 of the study (2016/2017). In Phase 1, all schools participated in classroom observations of a Positive Action lesson. Also in Phase 1, a group of 4 schools participated in a pilot study of the outcome measure, at one time point. In Phase 2, all pupils received pre-test and post-test outcome measures and a classroom observation. A post-test implementation/satisfaction questionnaire will also be administered to all pupils at the end of Phase 2. All teachers were asked to complete implementation surveys at the end of each of the 6 units of Positive Action and all head teachers were asked to complete a school climate questionnaire. Also in Phase 2, a group of 5 schools completed pupil focus groups and teacher interviews at one time point, towards the end of the programme.

Randomisation

This was an implementation study of the Positive Action programme and all schools received the intervention. No randomisation was required.

Calculation of sample size

As this was an implementation study, a sample size of 15 schools was chosen to allow for an in-depth investigation of implementation factors using surveys, classroom observations, focus groups and interviews, alongside the pupil outcome measure.

Follow-up

As the SAP has been written prior to post-testing, the extent of missing data is not yet known. Pre-test data was collected for 473 children.

Outcome measures

Primary outcomes

The primary outcome measure was designed to assess change across the "Think Act Feel" model of Positive Action. This measure is a battery of previously published tests, shown in Table 1 below.

Table 1: Primary Outcome Measure sources

Original Standardized measure	Outcome Area covered	Number of items
Child self-control rating scale (CSCRS, Rohrbeck et al., 1991)	"THINK" - Self-regulation	33
The Aggression Scale: A self-report measure of aggressive behavior for young adolescents (Orpinas & Frankowski, 2001)	"ACT" - Aggressive behaviours	10
Peer relations and Pro-Social Behaviour questionnaire (Rigby & Slee, 1993)	"ACT" - Pro-social behaviour	12
Penn State Worry Questionnaire for Children (PSWQ-C, Chorpita et al., 1997)	"FEEL" - Worry and anxiety	14
Psychological Well-being (Ravens-Sieberer et al., 2003)	"FEEL" - Feelings about self and life	6

Primary outcomes

Reliability analysis will be carried out on the primary outcome measures (sample table shown in Table 2 below).

Table 2: Reliability of Primary Outcome scales at pre-test and post-test

Scale	Cronbach's Alpha at pre-test	Cronbach's Alpha at post-test
Child self-control rating scale	.89	
The Aggression Scale	.84	
Peer relations and Pro-Social Behaviour questionnaire	.81	
Penn State Worry Questionnaire for Children	.78	
Psychological Well-being	.84	

Implementation factor measures

These measures will be used to cover the implementation factors in the research questions: "*Is there a distinction between the relationship between whole school and classroom activity on outcome change? (Phase 2)*" and "*What implementation factors influenced outcome change? (Assessed at the end of Phase 2)*".

Table 3: Secondary outcomes

Measure	Implementation covered	Level of Measurement	Number of items
Teacher end of unit survey	Classroom activities used	Teacher	9
Teacher end of unit survey	Whole school activities used	Teacher	6
Pupil satisfaction questionnaire	Program Engagement	Pupil	9
Pupil satisfaction questionnaire	Pupil/teacher relationship	Pupil	20
Teacher end of unit survey	Exposure (dosage)	Teacher	5
Climate questionnaire (head teacher completed)	Climate	Head-teacher	26
School records	Free school meals (proxy for disadvantage)	Pupil	%

Analysis

Primary analysis

The primary analysis will examine each of the three research questions which are described below with their subsequent analysis.

Research Question 1. What is the relationship between the 'think-act-feel' outcomes in the program (i.e., the program theory of change)?

Basically, this question asks how programme outcomes are related to one another, if they have changed at the pupil level over the course of the intervention and what influence implementation has had on change.

To answer this, the first step in the analysis will be to examine correlations between the Primary Outcome Scales (Table 4).

Example Table 4: Correlations of Primary Outcome Scales

		Child self-control rating scale	The Aggression Scale:	Mate-Tricks Pro-social behaviour questionnaire	Penn State Worry Questionnaire for Children	Psychological Well-being
Child self-control rating scale	Correlation					
	Sig					
	N					
The Aggression Scale	Correlation					
	Sig					
	N					
Peer relations and Pro-Social Behaviour questionnaire	Correlation					
	Sig					
	N					
Penn State Worry Questionnaire for Children	Correlation					
	Sig					
	N					
Psychological Well-being	Correlation					
	Sig					
	N					

Secondly, pre-test to post-test change in each of the Primary Outcome Scales will be examined using t-tests.

Example Table 5 – Pre-test to Post-test change in Primary Outcome Scales

Scale	Pre-test mean	Pre-test SD	Post-test mean	Post-test SD	t-test sig diff
Child self-control rating scale					
The Aggression Scale					
Peer relations and Pro-Social Behaviour questionnaire					
Penn State Worry Questionnaire for Children					
Psychological Well-being					

Research Question 2. Is there a differential relationship between the program outputs (whole school activities and classroom activities) and pupil outcomes (i.e., the program theory of intervention)?

This research question will be answered by using multilevel regression models to regress pre-test score, classroom activity score (from teacher surveys) and whole school activity score (from teacher surveys) onto post-test score for each Primary Outcome scale (see Tables 11 to 15). These regression models will investigate how change in each of the primary pupil outcomes is affected by classroom and whole school level activity. The regression model presented in Table 11, for example, will tell us how change in self-control is affected by classroom activity and by whole school activity. For each model we will also present the R^2 and sample size. We will also explore multicolinearity in these models by generating Variance Inflation Factor (VIF) estimates by regressing independent variables on each other. If any of the VIF estimates are above 5 for any of the independent variables we will use a Partial Least Squares Regression (PLS) to identify the model of best fit and report the factor loading of the independent variables for each dependent variable.

Table 6 – Summary table of regression models for Research Question 2

Model	*Dependent variable*	*Independent variable 1*	*Independent variable 2*	*Independent variable 3*
1	Post-test - Child self-control rating scale	Pre-test - Child self-control rating scale	*Classroom activity*	*Whole-school activity*
2	Post-test - The Aggression Scale	Pre-test - The Aggression Scale	*Classroom activity*	*Whole-school activity*
3	Post-test - Peer relations and Pro-Social Behaviour questionnaire	Pre-test - Peer relations and Pro-Social Behaviour questionnaire	*Classroom activity*	*Whole-school activity*
4	Post-test - Penn State Worry Questionnaire for Children	Pret-test - Penn State Worry Questionnaire for Children	*Classroom activity*	*Whole-school activity*
5	Post- test - Psychological Well-being	Pre- test - Psychological Well-being	*Classroom activity*	*Whole-school activity*

Example Table 7 – Regression analysis of independent variables: pre-test score, classroom activity and whole school activity onto post-test score for Child self-control rating scale.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Child self-control rating scale					
	Classroom activity					
	Whole school activity					

Example Table 8 – Regression analysis of independent variables: pre-test score, classroom activity and whole school activity onto post-test score for the Aggression Scale.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score the Aggression Scale					
	Classroom activity					
	Whole school activity					

Example Table 9 – Regression analysis of independent variables: pre-test score, classroom activity and whole school activity onto post-test score for the pro-social behaviour questionnaire.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Peer relations and Pro-Social Behaviour questionnaire .					
	Classroom activity					
	Whole school activity					

Example Table 10 – Regression analysis of independent variables: pre-test score, classroom activity and whole school activity onto post-test score for the Penn State Worry Questionnaire for Children.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Penn State Worry Questionnaire for Children					
	Classroom activity					
	Whole school activity					

Example Table 11 – Regression analysis of independent variables: pre-test score, classroom activity and whole school activity onto post-test score for Psychological Well-being.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Psychological Well-being					
	Classroom activity					
	Whole school activity					

a) Readiness for trial

Research question 3. What implementation factors were associated with outcome change?

This research question will be answered by using multilevel regression models to regress pre-test score and implementation factors (Climate, Dosage, Program engagement, FSM, Pupil/teacher relationship

) onto post-test score for each Primary Outcome Scale (see Tables 16 to 20). These regression models will investigate how change in each of the primary pupil outcomes is affected by the various implementation factors. The regression model presented in Table 16, for example, will tell us how change in self-control is affected by

Climate, Dosage, Program engagement, FSM and Pupil/teacher relationship

. For each model we will also present the R^2 and sample size.

Table 18 – Summary of regression models for Research Question 3

Model	Dependent variable	Independent variable 1	Independent variable 2	Independent variable 3	Independent variable 4	Independent variable 5	Independent Variable 6
1	Post-test - Child self-control rating scale	Pre-test - Child self-control rating scale	Climate	Dosage	Program engagement	FSM	Pupil/teacher relationship
2	Post-test - The Aggression	Pre-test - The Aggression	Climate	Dosage	Program engagement	FSM	Pupil/teacher relationshi

							p
	Scale	Scale					
3	Post-test - Peer relations and Pro-Social Behaviour questionnaire	Pre-test - Peer relations and Pro-Social Behaviour questionnaire	*Climate*	*Dosage*	*Program engagement*	*FSM*	Pupil/teacher relationship
4	Post-test - Penn State Worry Questionnaire for Children	Pret-test - Penn State Worry Questionnaire for Children	*Climate*	*Dosage*	*Program engagement*	*FSM*	Pupil/teacher relationship
5	Post- test - Psychological Well-being	Pre- test - Psychological Well-being	*Climate*	*Dosage*	*Program engagement*	*FSM*	Pupil/teacher relationship

Example Table 19 – Regression analysis of independent variables: pre-test score, climate, dosage, pupil satisfaction and FSM onto post-test score for Child self-control rating scale.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Child self-control rating scale					
	Climate					
	Dosage					
	Programme Engagement					
	FSM					
	Pupil teacher Relationship					

Example Table 20 – Regression analysis of independent variables: pre-test score, climate, dosage, pupil satisfaction and FSM onto post-test score for Aggression Scale.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Aggression Scale					
	Climate					
	Dosage					
	Programme Engagement					
	FSM					
	Pupil teacher Relationship					

Example Table 21 – Regression analysis of independent variables: pre-test score, climate, dosage, pupil satisfaction and FSM onto post-test score for pro-social behaviour questionnaire.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Peer relations and Pro-Social Behaviour questionnaire					
	Climate					
	Dosage					
	Programme Engagement					
	FSM					
	Pupil teacher Relationship					

Example Table 22 – Regression analysis of independent variables: pre-test score, climate, dosage, pupil satisfaction and FSM onto post-test score for Penn State Worry Questionnaire for Children.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Penn State Worry Questionnaire for Children.					
	Climate					
	Dosage					
	Programme Engagement					
	FSM					
	Pupil teacher Relationship					

Example Table 23 – Regression analysis of independent variables: pre-test score, climate, dosage, pupil satisfaction and FSM onto post-test score for Psychological Well-being.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)					
	Pre-test score Psychological Well-being					
	Climate					
	Dosage					
	Programme Engagement					
	FSM					
	Pupil teacher Relationship					

Missing data

If the proportion of missing data is low (less than 5%) a missing at random data analysis will tell us whether imputation is required. If so, data will be imputed using multiple imputation which will be presented as a sensitivity analysis.

References

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