

recommendations for educational psychology practice and for future research, are discussed.

Introduction

Attribution Theory

Attribution Theory (AT) proposes that individuals seek to determine the cause of observable behaviours and outcomes (Heider, 1958), and attribute feelings, beliefs, and intentions to others in an attempt to explain what they have observed. An individual may believe the cause to be: internal or external; controllable or uncontrollable; stable or unstable (Weiner, 1985). Their interpretation will impact their thoughts and, in turn, their subsequent behaviour (Frederickson & Cline, 2007).

processing difficulties (Dodge et al., 1986); traumatic life events (Frederickson & Cline, 2007); early adverse childhood experiences (Verhoef et al., 2019); harsh parenting and peer rejection (Dodge, 1980). Dodge's (2006) model of social information processing provides support for this theory. The model states that aggressive individuals are more likely to interpret others' motives as confrontational in ambiguous situations, rather than harmless or neutral.

Social Cognitive Theory states that this can lead to the development and maintenance of aggression (Verhoef et al., 2019), with individuals becoming aggressive as a way to retaliate or defend themselves. This maintenance occurs due to the aggressive individual not having the opportunity to challenge their hostile beliefs or learn more prosocial behaviour strategies. A vicious cycle can then be generated where hostile attribution bias leads to aggression and further rejection by their peer group. This can then lead the aggressive individual to perceive the world as a hostile place and this

and others. In this review, this means adapting a child's hostile attribution bias in order to reduce their aggressive behaviour.

AR interventions have been studied in a variety of settings, including clinics (Hilt, 2004) and schools (Robertson, 2000), and have been shown to be successful in adapting attributions relating to achievement (Chodkiewicz & Boyle, 2014), as well as behaviour (Lapointe & Legault, 2004). There are dedicated AR programs, such as the Brain Power Program (Hudley et al., 1994), as well as study-specific AR interventions (Vassilopoulos et al., 2015; Van Bockstaele et al., 2020). This means that studies on AR interventions can vary according to: environmental factors; length of the intervention; number of sessions; content and target group. They have also been carried out on whole classes (Ziegler & Heller, 2000) and smaller groups (Chodkiewicz & Boyle, 2014). Content delivery can also vary depending on the methods used, such as the use of written resources (Vassilopoulos et al., 2015) and video simulations (Van Bockstaele et al., 2020) and techniques employed can also vary and include: persuasion; motivation; problem-solving; modelling; calming exercises and the use of self-talk.

Rationale and Relevance

One of the most common forms of social difficulty among school-aged children is the exhibiting of externalising behaviours such as aggression and anger (Wilmshurst, 2009). These result in difficulties with peer relationships, poor self-concept and academic underachievement in the short term (Vassilopoulos et al., 2015) and can lead to substance misuse and criminality in the long term (Reef et al., 2011). This highlights the need for effective strategies to be put in place in order to support children in reducing these behaviours.

How effective are school-based Attribution Retraining interventions in reducing peer-directed aggression in school children?

Critical Review of the Evidence Base

Literature search

A systematic literature search using the Web of Science; PsycINFO (OVID); SCOPUS and ERIC (EBSCO) databases was carried out on 15th

relationship
between
participation in an
AR intervention^a in
a school and
changes in
aggression^b

Table 3: References of included studies

Studies in this review

- 1 Vassilopoulos, S. P., Brouzos, A. & Andreou, E. (2015). A Multi-Session Attribution Modification Program for Children with Aggressive Behaviour: Changes in Attributions, Emotional Reaction Estimates, and Self-Reported Aggression. *Behavioural and Cognitive Psychotherapy*, 43 (5), 538 – 548. <https://doi.org/10.1017/S1352465814000149>
- 2 Hudley, C., Britsch, B., Wakefield, W. D., Smith, T., Demorat, M. & Cho, S. J. (1998). An attribution retraining program to reduce aggression in elementary school students. *Psychology in the schools*, 35 (3), 271-282. [https://doi.org/10.1002/\(SICI\)1520-6807\(199807\)35:3<271::AID-PITS7>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)1520-6807(199807)35:3<271::AID-PITS7>3.0.CO;2-Q)
- 3 Van Bockstaele, B., van der Molen, M. J., van Nieuwenhuijzen, M. & Salemink, E. (2020). Modification of hostile attribution bias reduces self-reported reactive

Weight of Evidence (WoE)

In order to effectively evaluate the quality and relevance of the studies identified, Gough's (2007) Weight of Evidence (WoE) framework was used, which considers: the methodological quality (WoE A), methodological relevance (WoE B) and topic relevance (WoE C) of each study.

An adapted version of Gersten et al.'s (2005) coding protocol was used to assess methodological quality (WoE A) as it was designed for use with studies that employ group experimental designs.

The author used Petticrew and Roberts (2003) 'typology of evidence' to develop a protocol which analysed the strengths and weaknesses of each study's methodological relevance (WOE B).

A protocol designed by the author was used for WoE C, to assess each study's topic relevance in relation to the review question. It specifically considered: the intervention focus; the outcome measures; the intervention setting; intervention implementation and the instructor used for each study.

WoE A, B and C were given equal weighting and the sum of these were averaged and rounded to the nearest whole number to give an overall Weight of Evidence D (WoE D). This indicates the strength of evidence in each study in relation to the research question posed. A summary of WoE ratings for each study is outlined in Table 4.

The criteria and rationale for all WoE ratings are outlined in Appendix B. The adapted Gersten et al.'s (2005) coding protocol is outlined in Appendix C, with rationale for changes, and completed examples of the WoE A, B and C coding protocols are given in Appendix D.

Participants were identified as aggressive from a variety of peer sociometric nominations and teacher rating scales across all five studies with threedies with

Research Design

Randomised controlled trials (RCTs) are considered the most appropriate research design for 'effectiveness' questions (Petticrew & Roberts, 2003) and so were in this review's inclusion criteria. The design used in each study was evaluated using the WoE A and B ratings. All of the studies were RCTs, so received a high WoE B.

All of the studies had an AR experimental group and four of the studies had a test-retest control group (Hudley et al., 1998; Hudley & Graham, 1993; Vassilopoulos et al., 2015; Van Bockstaele et al., 2020). The fifth study had a wait-list control group (Abdulmalik et al., 2016). The existence of a 'no-intervention' condition decreased the likelihood that the positive effects observed were due to factors external to the experimental condition (Barker et al., 2015). However, it may have been useful to have an 'active' control condition across all five studies as well so that the comparative benefits of the AR intervention could be assessed relative to other aggression-reducing interventions.

Once the sample was derived, the participants were randomly allocated to either the experimental or control group. The use of random allocation reduces the likelihood of selection bias and allows for a direct comparison to occur between conditions. It also ensures that the data demonstrates a more valid representation of how the wider population would respond to AR (Barker et al., 2015), which justifies the high WoE B rating this type of design, and the studies in this review, received.

Intervention Analysis

Each study varied in terms of the number of sessions; the length of the intervention; the group size; the intervention program and the outcome measures used, as can be seen in Table 5. The content of each intervention is summarised in Table 6.

The intervention content, implementation and outcome measures will be explored in more detail over the next two sections.

Intervention Content and Implementation

As can be seen in Tables 5 and 6 below, each study differed in terms of intervention content and implementation.

Three out of the five studies (Vassilopoulos et al., 2015; Hudley et al., 1998; Van Bockstaele et al., 2020) provided only the title of the instructor with no other details about their background, training or experience, which lowered their scores within both the WoE A and C ratings. The remaining two provided detailed information on the instructor and so were awarded a higher score, which improved their overall WoE A rating. However, Abdulmalik et al. (2016) did not use a teacher to implement the AR intervention therefore still received a rating of 2 for WoE C.

In addition to this, two out of the five studies (Hudley et al., 1993; Abdulmalik et al., 2016) did not provide sufficient information about the intervention content and implementation in order to enable replicability, which lowered their scores within their WoE A rating. The remaining three studies either used a recognised program, which

The intervention took place in a school in all of the included studies, however, only Abdulmalik et al. (2016) intervention took place in a classroom therefore all of the studies received a WoE C of 2 for 'setting' except Abdulmalik et al. (2016), which received a 3. This is because it was thought generalisability would more likely to be achieved within a classroom environment.

Finally, WoE C also looked at 'implementation' of the AR intervention. In the Vassilopoulos et al. (2015)

Table 5: Table outlining the intervention content, implementation and outcome measures

Study	Number of sessions	Group size	Length of intervention	Intervention Program	Instructor(s)	Outcome measures
Vassilopoulos et al. (2015)	3	Not specified	A lesson (duration unknown) One week	Cognitive Bias Modification of Interpretations procedure (CBM-I) (created by author for the purpose of the study)	1 Research Assistant	The Aggression Scale (aggression) (Orpinas & Frankowski, 2001) An ambiguous vignette paradigm (attribution) (Vassilopoulos et al., 2009)
Hudley et al. (1998)	12	6 4 Aggressive students and 2 non-aggressive students	60 minutes Twice weekly 6 weeks	The Brain Power Program (Hudley, 1994)	Group Leaders	Social Skills Rating System (SSRS-T) (aggression) (Gresham & Elliot, 1990) Student attribution task (attribution) - designed by authors for this study
Van Bockstaele et al. (2020)	5	Individually	20 minutes 2 weeks	Computer-based AR intervention designed by authors for this study	Adult experimenters	Adapted Reactive Proactive Questionnaire (aggression) (Dutch translation) (Cima et al., 2013) Adapted Interpretation Recognition Task (attribution) (Houtkamp et al., 2017)

Hudley & Graham (1993)	12 (min. of 10 to be attended)	6 4 Aggressive students and 2 non-aggressive students	40-60 minutes Twice weekly 6 weeks	AR intervention designed by authors for this study	2 African
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Table 6: Intervention content for each study

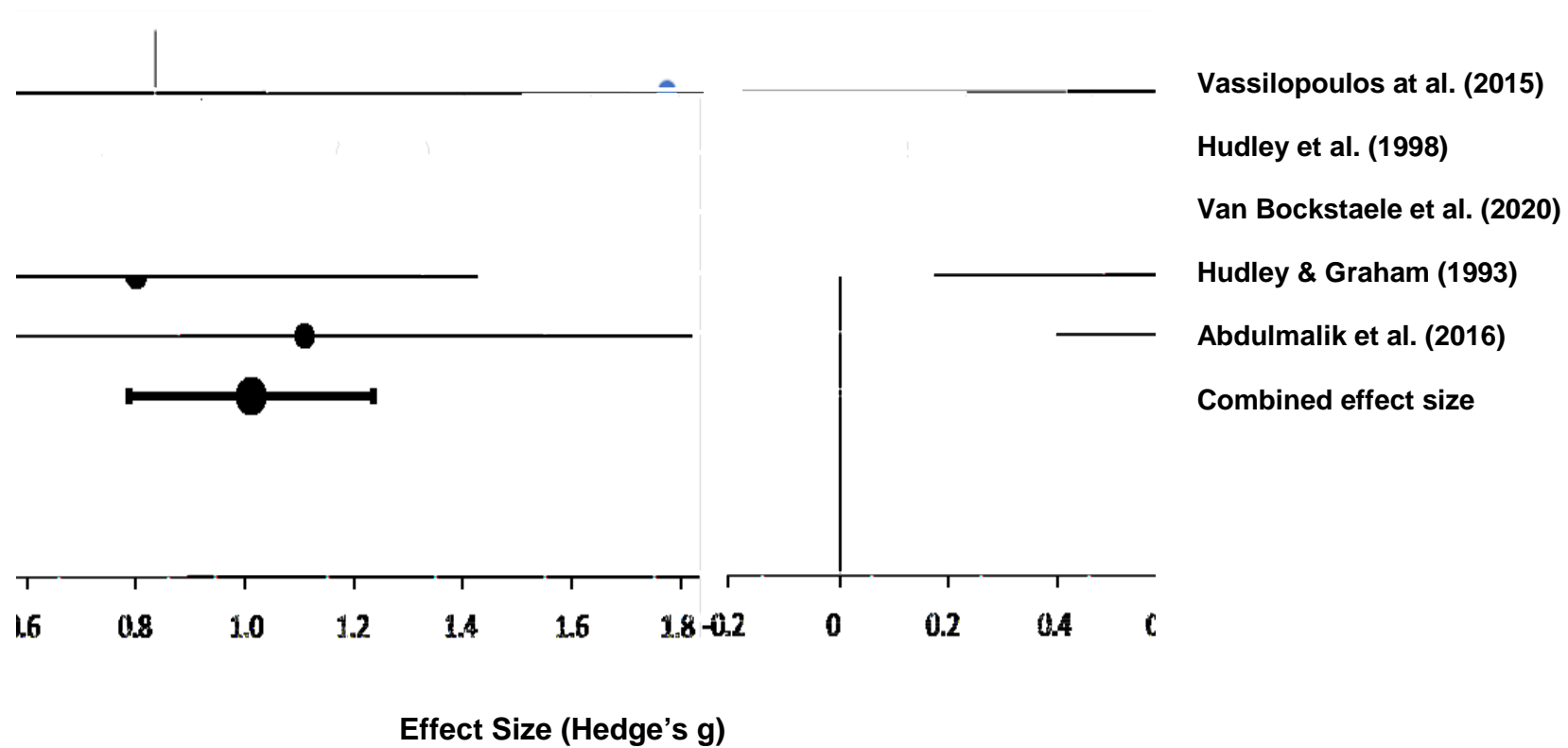
Study	Intervention	Content
Vassilopoulos et al. (2015)	Cognitive Bias Modification of Interpretations procedure (CBM-I)	Each

	assessments were carried out so the long-term effect of AR is unclear.				
Hudley & Graham (1993)	Aggressive participants in the AR intervention group were less likely to presume hostile intent from peers in hypothetical and lab-based simulations of ambiguous provocation post-intervention. Further to this, participants were rated as less aggressive in teacher feedback following the interventions completion. The authors did not carry out any follow-up assessments so the long-term effect of AR is unclear.	Laboratory Analogue task (aggression) - designed by authors for purpose of this study Teacher Checklist – aggression subscale (aggression) (Coie, 1990) Formal Disciplinary Referrals (aggression) – school-based logs	44	0.80 Large	3 High
Abdulmalik et al. (2016)	The AR intervention group had significantly lower teacher rating of aggressive behaviour and lower ratings on the self-rated aggression scale, 1-week post intervention. The authors reported that this demonstrated that the incidence of aggressive behaviours in the AR group had decreased relative to the control group. The authors did				

Table 8: Descriptors for Cohen's d and Hedge's g (Cohen, 1992)

Effect Size	Descriptor
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Figure 2 Forest Plot of Effect Sizes (95% CI) of the Five Included Studies and the Combined Effect Size from the Meta-Analysis



is because all of the studies had a no-intervention comparison group, meaning comparison between AR and other interventions was not possible.

Limitations of the Review

It could be argued that this review's inclusion criteria included studies which implemented AR interventions in a wide variety of formats, alongside utilising various outcome measures, which may have impacted the comparability of these studies. However, this was taken into consideration in WoE C and a random-effects meta-analysis was carried out in order to try to mitigate the impact of this.

recommending it to schools where there is a concern about aggressive behaviour. This is important given the damaging effect aggressive behaviour can have on the long- and short-term outcomes for children.

Despite this, none of the studies were carried out in the UK and therefore, it is unclear whether the results are generalisable to the UK school population, given its cultural disparity and the different schooling systems. This may impact upon EPs' confidence in recommending AR, without further UK-based evidence. In addition, the findings of this review suggest that the effectiveness of AR interventions decreased over time, which may give EPs further reservations.

Despite this, within the current review, results did replicate between different countries, languages and school systems. Therefore, it may be inferred that similar results would be found within a UK sample. In addition, only one study in this review conducted follow-up assessments and therefore it is not possible to make robust conclusions without further research on long-term impact.

Overall, given the benefits of school-based AR interventions for aggressive school children, it should be seriously considered for use by EPs, with a view that further research could be carried out to explore the UK context and longer-term effects.

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Appendix A

A list of the references for the studies, which were excluded at full text screening is provided in Table A. References are not provided for studies excluded at title and abstract screening but the total number of studies excluded is shown in Figure 1.

Table A: Articles excluded after full-text screening

Excluded Study	Rationale for exclusion	Exclusion criteria (Table 2)
Sukhodolsky, D. G., Golub, A., Stone, E. C. & Orban, L. (2005). Dismantling Anger Control Training for Children: A Randomized Pilot Study of Social Problem-Solving Versus Social Skills Training Components. <i>Behavior Therapy</i> , 36 (1), 15-23. https://doi.org/10.1016/S0005-7894(05)80050-4	Attribution Retraining (AR) is not a separate invention therefore it cannot be assessed whether AR leads to a reduction in aggression.	4
Hudley, C. & Friday, J. (1996). Attributional bias and reactive aggression.	Tee(a)65(re)9(n)-£	

Hudley, C. A. (1992, April 20-24). *The Reduction of Peer Directed Aggression among Highly Aggressive African-American Boys* [Paper presentation]. American Educational Research Association, San Francisco, California, USA.
<https://eric.ed.gov/?id=ED346204>

Not a peer-reviewed journal article

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Hudley, C. A. (1994, April 4-6). *Attribution Retraining and Behavior Change among Highly Aggressive and Nonaggressive African-American Boys*

Table B3: Each studies WoE B Rating

	Vassilopoulos et al. (2015)	Hudley et al. (1998)	Van Bockstaele et al. (2020)	Hudley & Graham (1993)	Abdulmalik et al. (2016)
3 (High)					
Randomised Controlled trials (RCTs)	3	3	3	3	3
At least one control/comparison group					
2 (Medium)					
Cohort studies or Quasi-experimental studies (non-random assignment)					
At least one control/comparison group					
1 (Low)					
Research that collects qualitative data, surveys, non-experimental studies					
No control/comparison group					

Note: WoE ratings are described as: 'High' = 3; 'Medium' = 2; and 'Low' = 1.

WoE C: Topic Relevance

Weight of Evidence C (WoE C) evaluates the relevance of the focus of the study relative to the review question. Studies were rated on five areas: intervention, outcomes, setting, implementation and instructors, and the criteria are outlined in more detail below along with the rationale (see Table B4). The WoE C ratings for each study are outlined in Table B5 and a completed example of a WoE C protocol is provided in Appendix D.

Table B4 Criteria and Rationale for WoE C Ratings

Criteria	Rating	Rationale
A. Intervention	3- AR is the sole intervention or the primary feature of the main intervention. 2- AR is combined with another intervention or adapted in a minor way, which does not impact the fidelity of the AR aspect of the intervention being carried out. 1- Attribution retraining is not a core feature of the intervention.	It is important to understand how effective AR was in the intervention condition. As a result, any studies which do not have AR as the main component will be excluded.
B. Outcomes	3- Outcomes measured using a standardised assessment of aggression 2- Outcomes are not measured using a standardised assessment of aggression. 2- Multiple non-standardised measures such as an instructor constructed assessment of aggression and/or peer rating scale(s) have been used	Outcome measures must accurately assess the effect AR has on aggression. Standardised measures can provide a more accurate portrayal but use of multiple measures allows for triangulation which can improve the accuracy of results.

	1- Outcomes measures indirectly assess aggression e.g. hostile attribution bias, anger.	
C. Setting	<p>3 The intervention was conducted in a classroom setting within the school the participant is attending</p> <p>2- The intervention was carried out in a separate location within the school the participant is attending</p> <p>1- The intervention was carried out in a non-school setting e.g. clinic</p>	<p>In order for results to be generalisable, the ideal location for the intervention would be in the classroom. However, within the same school could still be beneficial in this respect. Studies which conducted AR interventions outside of school have been excluded as this review is looking at school-based interventions.</p>
D. Implementation	<p>3- The intervention is multi-faceted and involves a variation of instruction, practice, direct attributional feedback and consolidation work.</p> <p>2- The intervention provides direct attributional feedback</p>	

Weight of Evidence D (WoE D): Overall Weight of Evidence

WoE D provides a judgement of the overall weight of evidence for each study and is calculated by averaging the ratings from WoE A, B and C for each study. This overall rating is important as it specifies the extent to which each study has contributed evidence towards the review question. The WoE D for each study is outlined in Table B6.

Table B6: Weight of Evidence D for included studies

Study	WoE A	WoE B	WoE C	WoE D
Vassilopoulos et al. (2015)	3 High	3 High	2 Medium	3 High
Hudley et al. (1998)	3 High	3 High	3 High	3 High
Van Bockstaele et al. (2020)	3 High	3 High	2 Medium	3 High
Hudley & Graham (1993)				

{Was severe overall attrition (30% or more) avoided? Is attrition comparable across samples?}

[Rationale: It was possible that some studies may meet the first part of the criteria

Appendix D

Example of a completed WoE A coding protocol from one study

Coding protocol:

Gersten, R., Fuchs, L. S., Compton, D., Coyne, M., Greenwood, C., & Innocenti, M. (2005). Quality indicators for group experimental and quasi-experimental research in special education. *Exceptional Children*, 71, 149-164.

Study 1: Vassilopoulos et al. (2015)

Essential Quality Indicators

Quality indicators for describing participants

Was sufficient information provided to determine whether the participants demonstrated the difficulties presented?

Yes

No

Unknown/Unable to Code

Were appropriate procedures used to increase the likelihood that relevant characteristics of participants in the sample were comparable across conditions?

Yes

No

Unknown/Unable to Code

Was sufficient information given characterizing the instructors or teachers provided? Did it indicate whether they were comparable across conditions?

Yes

No

Unknown/Unable to Code

Quality indicators for implementation of the intervention and description of comparison conditions

Was the fidelity of implementation described and assessed?

Yes

No

Unknown/Unable to Code

Was the nature of services provided in comparison conditions described?

Desirable Quality Indicators

Was data available on attrition rates among intervention samples?

Yes – assume no one left the study based on N reported in results being same as in methods section

No

Unknown/Unable to Code

Was severe overall attrition (30% or more) avoided? Is attrition comparable across samples?

Yes

No

Unknown/Unable to Code

Did the study provide not only internal consistency reliability but also test-retest reliability and interrater reliability (when appropriate) for outcome measures?

Yes

No

Unknown/Unable to Code

Were data collectors and/or scorers blind to study conditions and equally (un)familiar to examinees across study conditions?

Yes

No

Unknown/Unable to Code

Were outcomes for capturing the intervention's effect measured beyond an immediate post-test? Code

Did the research team assess not only surface features of fidelity implementation (e.g. number of minutes allocated to the intervention or teacher/interventionist following procedures specified), but also examine quality of implementation?

Yes

No

Unknown/Unable to Code

Was any documentation of the nature of instruction or series provided in comparison conditions?

Yes – no intervention control group – test-retest

No

Unknown/Unable to Code

Did the research report include actual written, audio or videotape excerpts that capture the nature of the intervention?

Yes – written examples of materials used

No

Unknown/Unable to Code

Were results presented in a clear, coherent fashion?

Yes

No

Unknown/Unable to Code

Overall Rating of Evidence: 3 2 1 0

Example of a completed WoE B coding protocol from one study

Coding protocol:

Created for the purposes of this review. Criteria rationale based on “Typology of evidence” recommendations for research best suited to studying the effectiveness of interventions (Petticrew and Roberts, 2003).

Study 1: Vassilopoulos et al. (2015)

Criteria WoE B Rating Criteria 3

Randomised Controlled trials (RCTs)

At least one control/comparison group

Criteria WoE B Rating Criteria 2

Cohort studies or Quasi-experimental studies (non-

Example of a completed WoE C coding protocol from one study

Coding protocol:

Created for the purposes of this review.

Study 1: Vassilopoulos et al. (2015)

A. Intervention

3- Attribution retraining is the primary intervention or the core feature of the main intervention condition.

2- Attribution retraining is combined with another intervention.

1- Attribution retraining is the secondary or tertiary intervention.

As many studies combine attribution retraining with other interventions, it is important to understand how significant of a feature attribution retraining was in the intervention condition.

B. Outcomes

3- Outcomes have been measured using a standardised assessment of aggression.

2- Outcomes have been measured using a teacher/instructor constructed assessment of aggression and peer rating scale.

1- Outcomes have been measured using an assessment that indirectly measures aggression.

This question focuses on the effect of attribution retraining on aggression, so outcome measures must accurately measure this. Standardised and/or validated measures will produce a more accurate portrayal.

C. Setting

3 The intervention was conducted in a classroom setting.

2- The intervention was carried out in a separate location within a school.

1- The intervention was carried out in a non-school setting such as a psychology lab or office.

As the intervention is intended to be used in school, the study should also take place in a realistic school setting in order for results to be generalisable.

D. Implementation

3- The intervention involves direct attributional feedback, instruction, practice and consolidation.

2- The intervention involves direct attributional feedback.

1- The intervention involves indirect attributional feedback through modelling, face-to-face or via video.

Attribution retraining does not have clear implementation guidelines but it does contain some key elements that should be included. The level of which these features are included will impact how closely the study reflects how attribution retraining will be implemented in practice.

E. Instructor

3- The intervention is delivered by a member of the teaching staff who has been trained in Attribution Retraining.

2- The intervention is delivered by a researcher who has been trained in Attribution Retraining.

1- The intervention is delivered by an individual who has received minimal training in Attribution Retraining.

The intervention is intended to be delivered in schools and by trained school staff, so if the study does so it will more closely reflect how Attribution Retraining will be implemented in practice. If the instructor is untrained in Attribution Retraining then the intervention is unlikely to be effective in retraining attributions.

Overall Rating of Evidence: 3 2 1 0