Does action planning reduce anger and aggression in at-risk adolescents? A randomised
controlled trial

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Abstract

Background: Interventions that include action planning are more effective than others to reduce aggression among at-risk adolescents. However, they often include other behaviour change techniques. The efficiency of interventions could be improved if action planning on its own could reduce aggression. The current study investigates the effect of a volitional help sheet (VHS) that prompts the creation of action plans to manage anger in response to specific or generic anger triggers. It was hypothesised that participants completing the VHS would have lower levels of aggression and anger at follow-up. The moderation effects of violent intentions, callous-unemotional traits and negative urgency were also tested.

Methods: One hundred adolescents (10-17 years old) with behavioural problems were recruited and randomised to three conditions: specific anger triggers, generic anger trigger or active control. An active control group was used to blind participants and teachers to group allocation. Self-reported data on anger and aggression was collected at baseline, one month and six months after intervention at the participants' schools. This trial was registered at www.clinicaltrials.gov (identification number NCT03693209).

Results: Eighty-one participants completed at least one follow-up and were included in the analysis. Neither VHS had a significant effect on anger or aggression overall, but moderator effects were found; both VHS were effective for participants with high callous-unemotional traits and low negative urgency. There were no differences between specific and generic triggers.

Conclusions: Adolescents with high callous-unemotional traits have traditionally been seen as a difficult population to treat. The VHS is a cost-effective technique to reduce aggression in this population which is easy to implement. Future studies are needed to identify which behaviour change techniques are needed for other groups.

Keywords: aggression, adolescence, action planning, randomised controlled trial, anger management, callous unemotional traits.

Abbreviations: VHS (Volitional Help Sheet)

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Aggression and bullying in adolescence have negative short and long-term consequences for both victims and perpetrators. For example, Ngo et al. (2021) found that being bullied was associated with low quality of life and increased risk of depression and anxiety. For perpetrators, behaving aggressively increases the risk of being referred to juvenile justice, which increases the risk for chronic delinquency (Rhoades et al., 2016).

Although reviews and meta-analyses have consistently found that interventions are more effective when addressed to those adolescents with a higher risk of behaving aggressively (Castillo-Eito et al., 2020; Cox et al., 2016), intervention programs have had mixed effectiveness (Castillo-Eito et al., 2020; Gaffney et al., 2019). A recent meta-analysis attempted to identify the active ingredients of effective interventions and found that *action planning* was the behaviour change technique that was frequent in effective interventions that reduced aggression among at-risk adolescents (Castillo-Eito et al., 2020).

Action planning is defined as “detailed planning of performance of the behaviour” (Michie et al., 2014, p. 260). Interventions tackling aggression often prompt participants to plan the performance of anger management strategies (i.e., the behaviour) in anger-provoking situations (e.g., Goldstein et al., 2007; Yorgun, 2007). However, this technique is often used along with other techniques. In fact, all the interventions reviewed by Castillo-Eito et al. (2020) contained additional techniques. In the current study, we aim to determine whether this technique on its own is effective to reduce anger and aggression among adolescents. A reduction in anger is expected to

mediate the effect on aggression, particularly reactive and physical aggression, as anger is highly related to them (Fives et al., 2011; Kolla et al., 2017).

A Volitional Help Sheet (VHS) is a method used to guide the creation of action plans. A list of situations and a list of actions are provided and participants use them to make plans. It has been effective at changing unwanted behaviours such as alcohol consumption (Armitage, 2015) and suicidal behaviour (Armitage et al., 2016). Gollwitzer and Sheeran (2006) argued that the situations needed to specify context, location, and time to cue the action. However, more recent research has found that a generic trigger is still effective (Epton & Armitage, 2017). In addition, action plans have been shown to be more effective when the person making the plan is motivated to change their behaviour (Armitage & Arden, 2008).

Negative urgency, or the tendency to act impulsively when having strong negative emotions (Scott et al., 2015), may moderate the effect of action planning. Burkard et al. (2013) found, using a computerized inhibition task, that forming action plans was not effective for individuals with high urgency who were emotionally activated. Negative urgency is especially related to reactive aggression (Scott et al., 2015). Therefore, the VHS is expected to be less effective in reducing reactive aggression for participants with higher negative urgency.

Callous-unemotional traits may also moderate the effectiveness of action planning given that it has been found that youth presenting high levels of these traits are less responsive to treatment (Frick & White, 2008). In particular, young people with high callous-unemotional traits have worse outcomes after parent and family interventions than their peers who are lower in callous-unemotional traits (Hawes et al., 2014). However, results for interventions that include direct work with young people show mixed results (Wilkinson et al., 2016).

Therefore, the present study aims to assess whether a VHS for anger management is effective in reducing anger and aggression among at-risk adolescents one month and six months after the intervention. A randomised controlled trial with three groups - one active control group and two intervention groups - will be conducted to evaluate the effect of the VHS with generic and specific anger triggers. In addition, the present study will test whether a reduction in anger mediates the effect of the intervention on reducing aggression. Finally, it is expected that the VHS will be less effective for participants with higher negative urgency or higher callous-unemotional traits and more effective for participants with stronger nonviolent intentions.

Method

Participants

The Ethics Committee of the Department of Psychology of the University of Sheffield provided ethical approval for this study. The protocol for this randomised controlled trial was registered at www.clinicaltrials.gov with identification number NCT03693209.

A power analysis was conducted using the effect size for action planning reported by Castillo-Eito et al. (2020), which was $d = 1.00$. This power analysis indicated that a total sample size of 43 participants was needed to reach a power of 0.80 with an alpha of 0.05. As some attrition was expected, a sample of 100 participants was targeted.

Schools for children with social, emotional and mental health difficulties (SEMH) and mainstream secondary schools in England were contacted and invited to participate in the study. Nine schools (5 mainstream and 4 SEMH) confirmed their participation in the study. Schools were asked to select the students between 10 and 17

years old that had shown behavioural problems in the past such as aggression or anger dysregulation.

One hundred adolescents aged between 10 and 16 years ($M = 12.62$, $SD = 1.54$) completed baseline measures and were randomised to one of the three conditions between September and December 2018. The mean Index of Multiple Deprivation (Ministry of Housing, Communities & Local Government, 2015) was 2.63 ($SD = 2.47$) meaning that, on average, participants lived within the 27% most deprived households in England. Participants were mostly male (73.7% male, 25.4% female, 0.9% other). Sociodemographic characteristics by group at baseline are presented in Table 1. Of the baseline sample, 71 participants completed the one-month follow-up, and 51 completed the six-month follow-up (see Figure 1).

Measures

Sociodemographic data. A short survey asked for participants' age, gender and postcode. The postcode was used to find the Index of Multiple Deprivation.

Aggression. Aggression was measured with the Peer Conflict Scale 20 Item Version for Youth (Russell, 2014) and the Peer Conflict Scale for Teachers¹ at baseline and 1 and 6 months after the intervention. This is a self-report measure of general aggression with 20 items, five for each subscale. The four subscales measure each combination of form (i.e., relational and overt) and function (i.e., reactive and proactive) of aggression. Each item is answered on a 4-point Likert scale where higher scores represent higher aggression. In this study, Cronbach's α for the total scale was .90 and

¹ Due to low response in both follow-ups (i.e., only 33 at 1-month follow-up and 21 at 6-months follow-up) and unequal response rate by condition, analyses were not conducted with this measure.

.75, .85, .76 and .70 for each subscale, respectively, indicating good internal consistency.

Figure 1

CONSORT Flow Diagram

Anger. Anger was measured with the Dimensions of Anger Reactions-5 (Hawthorne et al., 2006) at baseline and 1 and 6 months after the intervention. This is a brief measure composed of four anger response parameter items (i.e., frequency, intensity, duration and antagonism) and one social relationship impairment item. Participants are asked how often they have felt that way in the last four weeks, with responses ranging from 1 to 5 where higher scores represent stronger anger reactions. The internal consistency in the present study was good (Cronbach's $\alpha = .84$).

Nonviolent intentions. Intention to use nonviolent strategies was measured at baseline by the Violent Intentions scale from the Teen Conflict Survey (Dahlberg et al., 2005). This scale asks participants how likely they are to perform eight different behaviours (e.g., "Ignore the situation") the next time they find themselves really angry at someone or something. Responses range from 1 to 4. High scores indicate a stronger intention to use nonviolent strategies. The internal consistency in the present study was acceptable (Cronbach's $\alpha = .73$).

Callous-unemotional traits. Callous-unemotional traits were measured with the 12-item version of the Inventory of Callous-Unemotional Traits (ICU-12; Pechorro et al., 2017). It is composed of two subscales: Callousness and Uncaring. Responses range from 1 to 4, with higher scores representing higher callous-unemotional traits. The internal consistency in the current study for the total scale was lower than desirable (Cronbach's $\alpha = .63$), but it was acceptable for each subscale ($\alpha = .70$ for Callousness and $.74$ for Uncaring). Due to this, moderator analyses were conducted with each subscale.

Negative urgency. Negative urgency was measured with the Negative Urgency subscale from the Short UPPS-P Impulsive Behavior Scale (SUPPS-P; Cyders et al., 2014). It contains 4 items with responses ranging from 1 to 4. Higher scores represent

higher negative urgency. The internal consistency for the negative urgency subscale in the current study was good (Cronbach's $\alpha = .80$).

Conditions and materials

Participants were randomly assigned to one of three conditions: one active control condition and two intervention conditions: a VHS for specific triggers and a VHS with a generic trigger. The materials provided for each condition are in the supporting material.

Participants in the specific triggers condition received a VHS with a list of ten anger triggers phrased as IF statements (e.g., *If I get angry when I see someone bully another person*) and a list of ten anger management strategies phrased as THEN statements (e.g., *... then I'll walk away*; see Section S1). They were asked to link each anger trigger relevant to them with a strategy that they could use to deal with it by drawing a line joining them. In addition, they were asked to choose the most relevant plan for them and write it down. Participants in the generic trigger condition received similar instructions but their VHS had only one generic anger trigger (*If I get angry*, see Section S2).

Participants in the active control condition received the VHS with ten triggers and ten strategies (see Section S3), but were only asked to select the anger triggers relevant to them and then the strategies they considered useful to deal with anger. They were also asked to write down other situations when they get angry. Therefore, they did not link anger triggers to anger management strategies and were not prompted to make plans. The similarity of the presented materials between conditions had the purpose of blinding participants to allocation.

Procedure

Each school sent information sheets and opt-out forms to the carers of the students selected. After two weeks, data collection started. Teachers knew which students were participating in the study but were blinded to condition.

The researcher met the participants either one-on-one or in small groups during school hours according to school preferences. The researcher explained the study and asked for participant consent before starting the survey. The researcher gave the option to read the instructions and items aloud to allow children of varying literacy levels to be included.

After the survey, participants were randomly assigned to condition. A list of random numbers was generated via www.random.org. The list was composed of numbers 1, 2, and 3, each of them referring to a condition. Materials were ordered in a pile according to the list of random numbers before meeting the participants. Each participant was asked to take the sheet on top of the pile and to complete the exercise on it. The researcher explained the instructions if needed.

Despite the written and oral instructions provided, 19% of the participants did not complete the exercise they were assigned (further details can be seen in Figure 1). This was likely due to contamination of participants completing different conditions in the same room.

The researcher went back to the schools to collect follow-up measures one month and six months post-intervention with a similar procedure to the baseline survey.

Analysis

Most outcomes were non-normally distributed and had extreme outliers. Therefore, robust analyses were conducted following Field and Wilcox's (2017)

recommendation. First, one-way ANOVAs based on trimmed means and bootstrapping were used to conduct randomization checks using the package WRS2 (Mair & Wilcox, 2020) for the R environment (R Core Team, 2019).

It is necessary to establish the efficacy - i.e., the maximum effect in ideal conditions - of an intervention before establishing its effectiveness - i.e., the effect in real conditions - (Armijo-Olivo et al., 2009). Therefore, complete case analyses were conducted to establish the efficacy of the VHS as recommended by Armijo-Olivo et al. (2009), as that was the main aim of the study. An as-treated strategy was used, meaning that each participant was analysed according to the intervention they received, and not the intervention to which they were assigned.

Many authors recommend conducting and reporting intention to treat analyses as well as complete case analysis when reporting the results of randomised controlled trials (Jakobsen et al., 2017; Ranganathan et al., 2016). Therefore, intention to treat analyses were also conducted. The results are reported in the supporting material.

ANCOVA is recommended to test the effect of an intervention in a pre-post randomised trial (O Connell et al., 2017). However, the robust ANCOVA of package WRS2 only allows two conditions and one covariate. Therefore, parametric ANCOVAs using type III sums of squares and Helmert contrasts were conducted following Field et al. (2012). Then, robust ANCOVAs based on trimmed means were conducted as a sensitivity analysis as recommended by Field and Wilcox (2017). Separate ANCOVAs for each outcome and each follow-up were conducted to maximise the use of the available data. Effect sizes were calculated using Morris' (2008) formula.

Robust moderation models based on M-estimators were fitted using the package MASS (Venables, 2002) for the R Environment as recommended by Mair and Wilcox

(2020). Moderator analyses tested whether intentions at baseline, callous-unemotional traits and negative urgency moderated the relationships between condition and follow-up outcomes including baseline scores as a covariate. Conditions were dummy coded with the specific triggers condition as the reference category. Where the interaction between any of the dummy variables and any of the moderators was significant, simple slopes using one SD above and below the mean were fitted to investigate the interaction further.

Results

Randomization and attrition checks

Table 1 shows that there were no significant differences between participants assigned to each condition in baseline scores or sociodemographic data. These analyses were repeated with groups defined as treated. No differences were found.

Attrition was not different between conditions at the first ($\chi^2 = 2.54$; $p = .28$) or second follow-up ($\chi^2 = 1.53$; $p = .47$). Participants that dropped out were significantly older (13.47 vs. 12.41; $t(23.95) = 2.36$, $p = .035$). No other differences were found.

Main effects of condition

The parametric ANCOVA showed a significant main effect of condition on anger at 6-months follow-up². Tukey post hoc analyses showed that there was a difference between the specific triggers and the generic trigger conditions ($t = 2.95$, $p = .018$); participants in the specific triggers condition had less anger (Adjusted $M = 9.40$) than participants who had completed the generic trigger condition (Adjusted $M = 14.51$). These findings were confirmed by a robust ANCOVA ($F = 2.65$, $p = 0.03$).

² There were no significant differences by condition at either follow-up point in anger, total aggression or in any of the aggression subscales in the robust ANCOVAs.

Table 1*Demographics and Baseline Data per Assigned Group and Randomisation Checks*

	ST (<i>n</i> = 28)	GT (<i>n</i> = 36)	AC (<i>n</i> = 36)	F-ratio (df) ^a
Age	12.89 (1.53)	12.35 (1.65)	12.67 (1.67)	0.92 (2,36)
Gender (% male)	55.6 %	70.6 %	77.8%	5.73 ^b
IMD	2.86 (2.89)	2.17 (1.79)	2.81 (2.82)	0.14 (2,23)
Anger	17.08 (5.27)	15.47 (5.57)	14.91 (5.04)	1.90 (2,35)
Aggression	31.74 (8.19)	34.41 (12.57)	31.70 (9.34)	0.32 (2,36)
Reactive relational	7.41 (2.68)	7.50 (3.17)	7.30 (2.17)	0.16 (2,35)
Proactive relational	6.67 (2.08)	7.65 (3.27)	7.53 (3.15)	0.86 (2,39)
Reactive overt	10.89 (3.83)	10.94 (4.64)	10.21 (4.28)	0.22 (2,37)
Proactive overt	6.78 (1.78)	7.97 (3.51)	7.71 (3.26)	0.58 (2,38)
Intentions	16.19 (4.07)	17.03 (5.55)	17.09 (4.96)	0.43 (2,37)
Negative urgency	11.56 (3.50)	10.15 (3.55)	9.04 (3.29)	2.31 (2,26)
Callous	13.06 (4.01)	12.37 (4.01)	12.96 (4.62)	0.36 (2,21)
Uncaring	12.06 (3.73)	13.59 (3.42)	14.16 (3.61)	3.09 (2,24)

Note. All variables except gender are represented with M (SD). SS = Specific

triggers; GS = Generic trigger; AC = Active Control; df = degrees of freedom; IMD = Index of Multiple Deprivation

^a Robust one-way ANOVAs based in bootstrapping; ^b Chi-squared test

There were no significant differences by condition at either follow-up point in the other outcomes. Full results for the parametric ANCOVAs including effect sizes are presented in Table 2. Mediation analyses were not conducted as none of the effects on aggression were significant.

Table 2*ANCOVA and Effect Sizes for Each Outcome at Each Follow-up*

Outcome	1 month					6 months				
	F	df	<i>p</i> -value	Cohen's <i>d</i> (95% confidence interval) ^a		F	df	<i>p</i> -value	Cohen's <i>d</i> (95% confidence interval) ^a	
				Specific triggers	Generic trigger				Specific triggers	Generic trigger
Anger	0.69	2,38	.509	-0.29 (-0.93, 0.35)	-0.48 (-1.15, 0.20)	4.85	2,26	.016	-0.89 (-1.55, -0.22)	0.06 (-0.61, 0.72)
Aggression	1.01	2,35	.374	-0.48 (-1.13, 0.17)	-0.57 (-1.25, 0.11)	0.64	2,24	.534	-0.60 (-1.26, 0.05)	-0.52 (-1.19, 0.16)
Reactive relational	1.40	2,39	.260	-0.65 (-1.30, -0.01)	-0.47 (-1.13, 0.19)	0.09	2,25	.916	-0.58 (-1.22, 0.07)	-0.40 (-1.06, 0.26)
Proactive relational	0.29	2,39	.749	0.03 (-0.60, 0.65)	-0.17 (-0.81, 0.48)	0.73	2,26	.490	0.09 (-0.53, 0.72)	-0.11 (-0.75, 0.54)
Reactive overt	1.80	2,38	.180	-0.43 (-1.06, 0.21)	-0.44 (-1.11, 0.22)	2.15	2,26	.137	-0.40 (-1.04, 0.24)	-0.23 (-0.89, 0.43)
Proactive overt	0.34	2,38	.710	0.01 (-0.62, 0.64)	-0.32 (-0.98, 0.34)	0.28	2,25	.759	-0.09 (-0.72, 0.54)	-0.39 (-1.05, 0.27)

Note. Analyses were controlled by baseline scores, age, gender and index of multiple deprivation; df = degrees of freedom

^a Negative effect sizes favour the intervention group.

Moderation effects

Callousness was a significant moderator of the effect on reactive overt and proactive relational aggression at 1-month follow-up (details on Table S1). When callousness was high, participants in the specific trigger condition had lower reactive overt aggression than participants in other conditions. In addition, both intervention groups had lower proactive relational aggression than participants in the control group. At the 6-months follow-up, callousness was a significant moderator for proactive overt aggression. When callousness was high, participants in both intervention conditions had lower levels of proactive overt aggression than participants in the control group. Callousness was not a significant moderator for other outcomes.

Uncaring was a significant moderator of the effect on reactive relational aggression at the 1-month follow-up and on anger 6 months after the intervention (details on Table S2). When uncaring was high at baseline, both intervention groups had lower reactive relational aggression than the control group one month after the intervention and lower levels of anger 6 months after the intervention. Uncaring was not a significant moderator for other outcomes.

Negative urgency was a significant moderator of the effect on reactive relational aggression at 1-month follow-up and on anger at 6-months follow-up (details on Table S3). When negative urgency was low at baseline, participants in both intervention groups had lower reactive relational aggression than participants in the control group after one month and, after six months, participants in the specific triggers condition had lower levels of anger than participants in the other conditions. No other moderator effects were found.

Intentions to use nonviolent strategies did not moderate the relationship between the conditions and any outcome.

Discussion

The study aim was to test the effect of action planning as a standalone intervention to reduce anger and aggression among at-risk adolescents. The intervention did not have a generalized effect. However, the effect sizes' 95% confidence intervals (see Table 2) were compatible with a large effect similar to the one found in Castillo-Eito et al. (2020). The intervals were quite large, indicating that the study was underpowered to detect the effect. This could explain the lack of significant results. The effect sizes found indicate that action planning has a medium effect size. However, a replication of the present study with a larger sample is needed to estimate the effect more precisely. It is plausible that the large effect size found in Castillo-Eito et al. (2020) meta-analysis results from the interventions studied there combining action planning with other techniques in the interventions studied.

Several moderation effects were found. First, and contrary to expectations, the VHS intervention had stronger positive effects when callousness and uncaring were high. This could mean that action planning is a good technique to reduce aggression in adolescents with high callous-unemotional traits. Previous research found that young people with callous-unemotional traits were unresponsive to family interventions (Hawes et al., 2014). However, Dadds et al. (2012) found that young people with high callous-unemotional traits responded better to an individual-focused intervention than to a family intervention. In addition, Wilkinson et al. (2016) found that when the interventions included components that were aimed directly at the young person and not at their family, the young people with high callous-unemotional traits were often as responsive or more than their counterparts with low callous-unemotional traits.

Therefore, individual-focused interventions such as action planning may work better for young people with callous-unemotional traits.

Second, in line with expectations, both VHS interventions were more effective in reducing reactive aggression when negative urgency was low versus high. This finding is consistent with Burkard et al. (2013), who found that action planning was not effective for people with high urgency that were emotionally activated.

Contrary to predictions, nonviolent intentions did not moderate the effect of condition on any outcome. This is a positive finding as it indicates that action planning is as effective for adolescents with no intention to change their aggressive behaviours as for adolescents who want to change their behaviour. Future studies will need to confirm these results.

The study also explored whether a VHS with specific anger triggers and a VHS with a generic trigger had different effectiveness. For most outcomes, both VHS had the same effect following Epton and Armitage's (2017) findings. However, in two situations, making plans for specific triggers was more effective than making plans for a generic trigger. This gives some support to Gollwitzer and Sheeran's (2006) argument, that the trigger needs to be specified for it to cue the behaviour.

Limitations

Randomization of participants to conditions was a strength of the study. However, 19% of participants did not follow the instructions. This raised the question of whether intention to treat analyses were relevant to evaluate the efficacy of the intervention. Therefore, as-treated analyses were used to evaluate the efficacy of the interventions, as they show the maximum treatment efficacy (Ranganathan et al., 2016).

As expected in longitudinal studies of this sort, particularly when focusing on populations displaying antisocial behaviour, there was some attrition across the study. Attrition was mainly driven by truancy, which is common in students with behavioural problems (Vaughn et al., 2013), and a school dropping out from the study due to staff and time constraints. To prevent attrition, it was decided to implement the VHS only on one occasion. However, it is possible that our decision limited the effect of the VHS. There is evidence that making action plans repeatedly boosts its effect (Chapman & Armitage, 2010). For example, a previous study using action planning with an adolescent sample repeatedly over 24 months achieved long-term effects on smoking prevention (Conner & Higgins, 2010). Future studies should test whether similar effects are found on aggression.

Conclusion

The results of this study indicated that action planning had a medium-sized effect, although non-significant, on reducing anger and aggression in at-risk adolescents. Future studies with a larger sample are needed to confirm these effects. The VHS used in the present study was effective in reducing aggression in adolescents with high callous-unemotional traits and low negative urgency. The current results, therefore, suggest that the VHS may be a very cost-effective intervention for adolescents with high callous-unemotional traits and low negative urgency, as it needs little time and few resources to be implemented.

The results were similar using specific triggers and a generic anger trigger. Given that the generic trigger is simpler and can encompass more situations, we suggest that its effect is explored further.

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