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Evaluating the Violence Prevention Program: group and individual changes in aggression, anger, self-control, and empathy

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ABSTRACT

While youth violence reduction program is a necessity to prevent long-term criminal and violent offending, its effectiveness in youth violent offenders is not well researched. This study investigated the effectiveness of the Violence Prevention Program (VPP) in addressing the aggression, anger, self-control, and empathy of youth violent offenders. One hundred and seventy youths (mean age 15.8 years) who completed VPP from 2008 to 2014 completed self-report measures on study outcomes both before and after the intervention. Repeated measures analyses revealed significant improvement in youths' anger, aggression, and self-control at post-treatment, but changes in youths' empathy were not significant. Subsequent analysis found that only youths with lower empathy scores at pre-treatment showed significant increase in empathy post-treatment. Overall, the results suggest that VPP can reduce aggression and mitigate the criminogenic needs of youth offenders. But its effect on empathy may be contingent on youths' pre-treatment profiles. Limitations and implications for future studies are discussed.

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KEYWORDS Violence; young offenders; treatment effectiveness; intervention; criminogenic need; program evaluation

Introduction

Youth violence is a global public health concern (World Health Organisation, 2015). Victims of violent crime suffer from psychological difficulties, lost productivity, reduced quality of life, and sometimes even loss of their lives. (Miller, Fisher, & Cohen, 2001). Friends, families of the victims, and the communities

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witnessing the violence are distressed (Gorman-Smith, Henry, & Tolan, 2004). Financial cost caused by perpetrators in the criminal justice system, including judicial administration, institutionalization, statutory supervision, and rehabilitation strain limited government budgets (Miller, Cohen, & Wiersema, 1996). In United States, the annual cost of juvenile violence on the state criminal justice system was estimated to be \$46 million (Miller et al., 2001). Hence, the prevention and reduction of violence in youth offenders should be a priority of offender rehabilitation services.

From a developmental perspective, youth violence is an issue deserving of greater clinical and empirical attention. It has been established that an early onset of violence is associated with higher risk of the persistence of such behavior into adulthood (Farrington, 1992; Hawkins et al., 2000). Although repeat offenders typically start off with relatively minor offenses, subsequent infractions tend to be more serious and occur more frequently (Tolan & Gorman-Smith, 1998). This is supported by longitudinal data from the National Youth Survey (NYS), which revealed an escalating trend in the severity and frequency of offenses committed by recalcitrant offenders (Elliott, 1994, 2000). Clearly, unaddressed violent offending can have severe and long-term repercussions. This underscores the need for violence prevention interventions that are effective in mitigating risk factors associated with youth violent offending.

Research evidence suggests that violence reduction programs can be effective in reducing recidivism rates. A review by Cortoni, Nunes, and Latendresse (2006) found that violent offenders who never received any intervention had 2.10 times and 1.36 times higher risks of violent and general recidivism, respectively, than those who completed interventions. Evaluation studies of individual programs in Canada (Dowden, Blanchette, & Serin, 1999), New Zealand (Polaschek, Wilson, Townsend, & Daly, 2005), and Australia (Ware, Cieplucha, & Matsuo, 2011) collectively reported lower recidivism rates for offenders who attended violence reduction programs, compared to offenders who did not receive any treatment. Furthermore, a narrative review of treatment evaluation studies with methodologically sound paradigms by Polaschek and Collie (2004) found that overall, treatment programs for violent offenders were effective in reducing violent and non-violent recidivism, albeit with variation in effect sizes across individual studies. This finding was also confirmed later in a systematic review and meta-analysis by Jolliffe and Farrington (2007).

However, the extant literature is still lacking in two aspects. First, many evaluation studies tend to focus only on recidivism as an outcome. This gives little insight into the mechanism(s) through which a given intervention reduces the risk of violent behavior. While predisposed by many bio-social factors, problematic behaviors (such as violence) directly stem from disturbed psychological processes of the person (Kinderman, 2005). Dodge and Pettit (2003), in their transactional model of violence, proposed that agentic cognitive and emotional processes are the critical factors that mediate the impact of environment and

gene on the actual occurrence of violent behaviors. Individuals attend to stimuli in the environment, interpret their meanings, and select the responses that are most accessible to them. The occurrence of violence can often be due to selective attention to hostile cues and attributions, readily accessible aggressive and angry response styles, and/or failure to withhold impulses to act aggressively and consider other response options (Dodge & Pettit, 2003). Focusing only on recidivism provides little information on these psychological processes and whether they have been changed as a result of the intervention. More importantly, if an intervention is proven to be non-effective, recidivism alone offers little clue regarding the program components that should be modified or improved.

One way to elucidate these issues is by monitoring changes in these psychological processes as a treatment progresses (McGuire, 2008). Evaluation of treatment programs for violent offenders should therefore seek to measure treatment effects on attributes directly associated with violent behavior (Dodge & Pettit, 2003). These attributes – commonly known as ‘criminogenic needs’ (Andrews & Bonta, 2010) – are frequently the main treatment targets of programs, despite not being reported regularly in outcome studies. Criminogenic needs that have been identified as being relevant to youth aggression include: (i) anger (Bryan & Day, 2006; Howells, 2004), (ii) impulsivity (Henry, Caspi, Moffitt, & Silva, 1996; Piquero, MacDonald, Dobrin, Daigle, & Cullen, 2005), and (iii) empathy deficits (Jolliffe & Farrington, 2004; Lauterbach & Hosser, 2007). Empirical findings suggest a promising effect of interventions on reducing the aggression and anger of violent offenders (Blacker, Watson, & Beech, 2008; Davidson et al., 2009; Hornsveld, Nijman, & Kraaimaat, 2008). However, less is known about the effects of treatments on self-control and empathy (Day, Casey, & Gerace, 2010; Mann & Barnett, 2013).

Second, research findings on violent offender treatment have largely been based on adult offender populations; parallel research on youth offenders is less (Humayun & Scott, 2015). A few cognitive-behavioral interventions (e.g. Multi-systemic Therapy, Aggression Replacement Therapy, etc.) have been shown to be successful in reducing violent recidivism in juvenile offenders (Borduin et al., 1995; McGuire & Clark, 2004). Yet, the empirical evidence on how these interventions can mitigate the criminogenic needs of juvenile offenders is still limited. In one study, 20 youths after completing a 10-week Aggression Replacement Therapy training under custodial setting reported decreases in aggressive behaviors and thoughts. But the same effects were not observed in the reports of justice workers (Currie, Wood, Williams, & Bates, 2012). In a more recent report, 32 juvenile offenders showed reduction in physical aggression at the end of a Turkish adaptation of Aggression Replacement Therapy. However, their self-reported anger demonstrated little change at the end of the program (Kaya & Buzlu, 2016). Clearly, there is a dearth of empirical evidence on the effectiveness of violent offender treatment program for juveniles’ criminogenic needs. It will be of great value to examine this question using a larger sample, and on a more diverse list of violence risk factors.

Violence Prevention Program (VPP): an intervention for youth violent offenders in Singapore

In Singapore, youth arrests (inclusive of violent crimes) account for 10% of all crimes in the population (Singapore Police Force, 2015). Several local studies have shown that the criminogenic needs of these youth offenders were closely linked to the type of offenses, and were predictive of violent and non-violent recidivism (Chu, Goh, & Chong, 2016; Chu et al., 2015; Lai, Zeng, & Chu, 2016). Treating the criminogenic needs, therefore, is pertinent in the rehabilitation work with these youth offenders. The VPP was first developed in 2003 by a team of forensic psychologists from the Ministry of Social and Family Development (MSF), Singapore. Being a group therapy program based on cognitive-behavioral principles, VPP was designed to provide youth offenders with knowledge and skills to prevent future violent reoffending. The program consists of a total of 22 modules, covering topics such as psychoeducation about violence, motivation to change, anger management, social skills training, victim empathy, and relapse prevention. Learning activities such as group discussions and therapeutic games provide opportunities for participants to apply their knowledge and skills. The overall duration of VPP typically ranges from 6 to 8 months in length. Sessions take place weekly, with each session lasting approximately two hours. VPP was most recently revised in 2008 to incorporate well-established theoretical frameworks of offender rehabilitation into its core program components (Bonta & Andrews, 2007). In Singapore, only youth offenders assessed to be at moderate risk of violent recidivism or higher were considered eligible for VPP.

The present version of VPP aims to reduce violent recidivism through mitigating several risk factors. Educating offenders on the consequences of their behaviors encourages the development of empathy toward victims and potential targets of violence. Improving their abilities to challenge pro-violence cognitions discourages them from engaging in antisocial thinking and motivates them to act in more pro-social ways to achieve their goals. Helping them identify situations that increase their propensity for violent behavior, coupled with training in affect regulation and conflict resolution skills, increases self-control and anger management abilities, and reduces their tendencies to engage in aggressive behavior.

The present study: aims and hypotheses

The present study aimed to evaluate the effectiveness of VPP in reducing youth aggression and the risk factors associated with it, specifically: anger management, self-control, and empathy. This study was part of a continuous effort in evaluating program outcomes and improving the quality of services provided to youths in MSF. To date, few studies have examined the effects of treatment programs on criminogenic needs commonly identified as relevant to youth

violent offenders. The findings of this study will therefore be useful in addressing the earlier described gaps in the existing literature.

It was hypothesized that youth offenders who completed VPP would exhibit the following changes, relative to before they started VPP: (1) lower levels of aggression; (2) lower levels of anger; (3) higher levels of self-control; and (4) higher levels of empathy.

Method

Sample

Participants were youth offenders referred to MSF by the juvenile justice system for violence-related offenses from 2008 to 2014. All offenders underwent a structured violence risk assessment at intake. Risk estimates of violent recidivism were based on ratings using either the *Structured Assessment of Violence Risk in Youth* (SAVRY; Borum, Bartel, & Forth, 2006) or the *Historical, Clinical, Risk Management-20* (HCR-20; Webster, Douglas, Eaves, & Hart, 1997).

Offenders were assessed to be eligible for VPP if they met the following criteria: (i) aged between 11 and 21 years, (ii) obtained a severity rating of 'Moderate' or higher on the SAVRY or HCR-20, and (iii) had at least 12 months to the date of discharge from probation or custodial sentence. The youth offenders were excluded if they presented with active psychiatric symptoms or low intellectual functioning.

Two hundred and sixty-seven offenders were assessed to be eligible for VPP. Of these, 19 (7%) declined to participate in the study. The remaining ($n = 248$) were briefed on the purpose of this research study and provided informed consent. Of the 248 VPP participants, 92 either failed to complete the program, or did not complete the evaluation questionnaires upon program completion. Thus, the final sample consisted of 156 participants with complete pre- and post-VPP data.

Average age of participants ($n = 156$) was 15.8 years old ($SD = 1.18$, age range = 11–21 years). Participants were mostly males (97.4%) and were ethnically diverse (consisting mainly of Chinese, Malay, and Indian). Investigation of participants' baseline scores¹ showed that those who remained in the final sample did not differ from those who dropped out from the study on any of the program measures.

Measures

To assess changes in criminogenic needs, participants were asked to complete a battery of self-report questionnaires before and after attending VPP.

Aggression

The Reactive–Proactive Aggression Questionnaire (RPAQ; Raine et al., 2006) consists of 23 items which assess either *reactive* (11) or *proactive* (12) aggression. Items ask about the frequency of aggressive behaviors exhibited across a variety of situations in everyday life. Example items include: ‘How often have you had fights with others to show who was on top?’, and ‘How often have you hit others to defend yourself?’ Items are rated on a three-point scale ranging from 0 (*never*) to 2 (*often*). Individual scores are summed up to obtain total and domain-specific scores, with higher scores indicating higher levels of aggression. Confirmatory factor analyses consistently supported a two-factor reactive–proactive structure across different samples (Raine et al., 2006). Reliability of both subscales and the total scale were good ($\alpha \geq .81$). Construct validity was evident from moderate associations with other measures of aggression and delinquency (r ranges from .15 to .50, Raine et al., 2006). The RPAQ had also been validated in Singapore (Fung, Raine, & Gao, 2009; Seah & Ang, 2008). Internal consistency (Cronbach alpha) of scales in the current sample was all above .80.

Self-control

The Brief Self-Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004) is an abbreviated version of the longer Self-Control Scale (Tangney et al., 2004). It consists of 13 items which measure dispositional self-control processes in relation to thoughts, emotions, impulses, performance regulation, and habit breaking. Example items include: ‘I do certain things that are bad for me, if they are fun’, and ‘People would say that I have iron self-discipline’. Items are rated on a five-point scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). Individual scores are summed up to obtain a singular overall score, with higher scores indicating higher levels of self-control. Despite some disagreement on the unidimensional structure of the instrument, there was no substantial evidence supporting a multidimensional factor structure (Maloney, Grawitch, & Barber, 2012; Morean et al., 2014; Nebioglu, Konuk, Akbaba, & Eroglu, 2012; Unger, Bi, Xiao, & Ybarra, 2016). The BSCS has been widely used across different age and ethnic groups to measure individual variation in self-control (e.g. Nebioglu et al., 2012). It has also been shown that people who scored low on BSCS are more likely to show aggression when provoked (DeWall, Baumeister, Stillman, & Gailliot, 2007). Internal consistency was reported to be good for the original validation sample ($\alpha = .83$), as well as a sample of Chinese undergraduate students ($\alpha = .75$; Tangney et al., 2004; Unger et al., 2016). Internal consistency (Cronbach alpha) of the scale in the current sample was .82.

Anger

The Novaco Anger Scale and Provocation Inventory (NAS-PI; Novaco, 2003) consists of two questionnaires which measure different facets of anger. The NAS measures dispositional anger. It consists of 48 items subdivided into four

subscales: (i) Cognitive (COG), (ii) Arousal (ARO), (iii) Behavior (BEH), and (iv) Regulation (REG). Example items include: 'When something wrong is done to me, I am going to get angry', and 'When I get angry, I stay angry for hours'. Items are rated on a three-point scale ranging from 1 (*never true*) to 3 (*always true*). Individual scores are summed up to obtain total and subscale scores, with higher scores indicating higher levels of anger (except Regulation subscale). High internal consistencies were reported for COG (.82), ARO (.84), BEH (.89), REG (.76), and NAS Total (.94) in a sample consisting of both adults and children. Similar reliability estimates were also obtained for a subset of youths aged 9 to 11 years old (Novaco, 2003). The Provocation Index (PI; Novaco, 2003) comprises 25 items and assesses tendency to experience anger over a variety of social situations. These scenarios are designed to be provocative in nature (e.g. disrespectful treatment, unfairness). Reliability of the PI scale was reported to be excellent ($\alpha \geq .90$) for different populations (Novaco, 2003). Construct validity of the PI was supported in its correlation with other measures of anger such as the State Trait Anger Expression Inventory (STAXI; Spielberger, 1999) as well as with measures of juvenile delinquency and externalizing behavior (Novaco, 2003). Both NAS and PI have been translated and tested in many countries (e.g. Germany, the Netherlands, Sweden) other than United States, where the items were initially generated and tested (Kehn, Culhane, Kolmans, & Bongard, 2015; Lindqvist, Dåderman, & Hellström, 2003; Moeller, Novaco, Heinola-Nielsen, & Hougaard, 2015). Internal consistency (Cronbach alpha) of scales in the current sample was all above .80.

Empathy

The Basic Empathy Scale (BES; Jolliffe & Farrington, 2006a) is a generic measure of empathy. The scale was developed based on Cohen and Strayer's (1996) definition of empathy as 'the understanding and sharing in another's emotional state or context'. The BES consists of 20 items subdivided into two domains: (i) cognitive empathy (9 items), and (ii) affective empathy (11 items). Cognitive empathy reflects knowledge of others' thoughts and feelings, whereas affective empathy reflects emotional congruence with others' perceptions and sentiments. Example items include: 'I find it hard to know when my friends are frightened', and 'My friend's unhappiness doesn't make me feel anything'. Participants rate these items on a five-point scale based on how much they agree with each statement. Negatively worded items are recoded before individual scores are summed up, such that higher scores reflect higher levels of empathy. Internal consistency was satisfactory for both cognitive empathy ($\alpha = .75$) and affective empathy ($\alpha = .76$) in a group of Singaporean adolescents (Ang & Goh, 2010). Evidence of construct validity was demonstrated through positive correlations with other measures of empathy and perspective taking, as well as inverse associations with self-reported violence (Jolliffe & Farrington, 2006a, 2006b; Olate, Salas-Wright, & Vaughn, 2012). Although the internal consistency

of Affective subscale and total scale in the current sample was acceptable (.72 and .78, respectively), reliability of the Cognitive subscale was only marginal (.64).

Procedure

Approval of the research study was obtained from MSF. Participants were requested to complete the questionnaire battery by their treating psychologists or research assistants prior to program commencement. VPP was conducted in a 'close-group' format, meaning that participants within the same group started and completed their treatment at the same time. Participants were administered the questionnaire battery a second time during the last VPP session.

Statistical analyses

All statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS), Version 21.0. Descriptive statistics were first computed. Continuous data were expressed in means and standard deviations, and explored for normality and outliers. Bivariate correlations were computed to explore associations between outcome variables. For measures with multiple subscales – namely, the RPAQ, NAS, and BES – Multivariate Analysis of Variance (MANOVA) was conducted with treatment (pre-test vs. post-test) as the within-subject factor. The Bonferroni Correction was used to adjust for family-wise error rates in pairwise tests of univariate effects. Since multiple subscales capturing different aspects of the same construct (e.g. anger) tend to be correlated, results of separate comparisons of these subscale scores before and after VPP may be subjected to family-wise error engendered from multiple comparisons. Hence, it is generally recommended to use multivariate methods to investigate the differences in inter-dependent measures of the same construct, and adjust the *p* value used in subsequent pairwise analyses (Maxwell, 1980; Stevens, 2009). Finally, Reliable Change Indices (RCI; Jacobson, Follette, & Revenstorf, 1984) were calculated to examine if intra-individual differences converge with aggregate findings from the analyses of sample means. Following the recommendation by Jacobson and colleagues (1984), RCI was computed by obtaining a difference score between post-test and pre-test, divided by the standard error of measurement:

$$RCI = \frac{(x_2 - x_1)}{s_1 \sqrt{1 - r_{xx'}}$$

where x_2 refers to the post-test of a given measure, x_1 refers to the pre-test of a given measure, s_1 refers to the standard deviation of pre-test, and $r_{xx'}$ refers to the reliability of the measure.

An RCI with an absolute value larger than 1.96 was deemed unlikely to occur without actual change ($p < .05$). Thus, RCIs with values beyond ± 1.96 were considered a significant RCI (Jacobson et al., 1984). Therefore, for RPAQ and most scales in NAS-PI, RCIs lower than -1.96 were considered as significant improvements; for BSCS, BES, and Anger Regulation subscale in the NAS-PI, RCIs higher than 1.96 were considered significant improvements.

Results

Descriptive statistics

Table 1 provides a summary of scale reliabilities and descriptive statistics. Paired t -test statistics of pre- and post-treatment differences are also provided. There were significant differences in the total scores of RPAQ, $t(155) = 5.77, p < .01$, BSCS, $t(155) = 4.92, p < .01$, NAS, $t(155) = 5.48, p < .01$, and PI, $t(155) = 5.11, p < .01$. However, the difference observed for BES total score was non-significant, $t(155) = 1.31 (ns)$.

Table 2 displays coefficients of all bivariate correlations. Scales of anger (NAS-PI) and aggression (RPAQ) demonstrated strong positive correlations with

Table 1. Mean and standard deviations for study measures.

	Pre-Test Scores		Post-Test Scores		Paired Sample T-test	Effect Size	Internal Consistency
Variable	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>d</i>	<i>alpha</i>
RPAQ							
Reactive aggression	11.58	4.41	9.11	4.49	5.77**	.46	.85
Proactive aggression	7.07	4.49	4.85	4.35	5.23**	.42	.84
RPAQ Total	18.65	8.34	13.96	8.21	5.85**	.47	.91
Brief self control scale	35.40	7.87	38.43	7.11	-.92**	.39	.82
NAS-PI							
Cognition	33.31	5.67	30.37	5.56	5.62**	.45	.84
Arousal	30.38	6.31	27.95	5.85	4.40**	.35	.87
Behavior	31.07	6.21	27.90	6.03	5.26**	.42	.87
NAS Total	94.77	16.79	86.22	16.02	5.48**	.44	.95
Regulation	23.64	4.12	24.38	4.04	-2.09*	.17	.80
Provocation index	70.27	13.09	63.97	13.53	5.11**	.41	.92
Basic Empathy Scale							
BES	31.64	4.10	31.89	4.52	-.66	.05	.64
Cognitive BES	33.48	5.71	34.03	5.61	-1.27	.10	.72
Affective BES Total	65.13	8.43	65.92	8.15	-1.31	.10	.78

Notes: RPAQ = Reactive-Proactive Aggression Questionnaire; NAS-PI = Novaco Anger Scale and Provocation Inventory.

* $p < .05$; ** $p < .01$.

Table 2. Bivariate Correlations for Study Measures before and after VPP.

Variable	1	2	3	4	5	6	7
RPAQ							
1. Reactive Aggression		.75**	.94**	.69**	.72**	.75**	.78**
2. Proactive Aggression	.72**		.94**	.54**	.53**	.62**	.61**
3. RPAQ Total	.93**	.93**		.66**	.66**	.73**	.74**
NAS-PI							
4. Cognition	.58**	.48**	.58**		.75**	.76**	.90**
5. Arousal	.57**	.50**	.58**	.73**		.82**	.93**
6. Behavior	.64**	.59**	.66**	.77**	.80**		.93**
7. NAS Total	.65**	.57**	.66**	.90**	.92**	.93**	
Variable	8	9	10	11	12	13	
RPAQ							
1. Reactive Aggression	-.36**	.59**	-.56**	.06	.20*	.17*	
2. Proactive Aggression	-.32**	.44**	-.50**	-.12	.02	-.04	
3. RPAQ Total	-.36**	.55**	-.56**	-.03	.12	.06	
NAS-PI							
4. Cognition	-.26**	.65**	-.47**	-.01	.15†	.10	
5. Arousal	-.21*	.60**	-.41**	.06	.25**	.20*	
6. Behavior	-.40**	.58**	-.46**	-.03	.09	.04	
7. NAS Total	-.32**	.66**	-.48**	.01	.18*	.12	
Variable	1	2	3	4	5	6	7
8. Regulation	-.16†	-.11	-.15†	-.03	.05	-.14†	-.05
9. Provocation Index	.54**	.39**	.51**	.64**	.51**	.59**	.62**
10. Brief Self Control Scale	-.39**	-.40**	-.43**	-.50**	-.47**	-.52**	-.54**
Basic Empathy Scale							
11. BES Cognitive	-.03	-.15†	-.10	.01	.01	-.00	.01
12. BES Affective	.14†	.05	.11	.06	.13	.06	.09
13. BES Total	.08	-.05	.02	.04	.10	.04	.07
Variable	8	9	10	11	12	13	
8. Regulation		-.21**	.24**	.14†	.03	.09	
9. Provocation Index	-.09		-.38**	-.01	.11	.07	
10. Brief Self Control Scale	.49**	-.40**		.09	-.17*	-.07	
Basic Empathy Scale							
11. BES Cognitive	.32**	-.02	.07		.46**	.80**	
12. BES Affective	-.04	.10	-.03	.28**		.90**	
13. BES Total	.15	.06	.02	.75**	.85**		

Notes: Correlations above diagonal are for the pre-test scores, correlation below diagonal are for the post-test scores. RPAQ = Reactive-Proactive Aggression Questionnaire; NAS-PI = Novaco Anger Scale and Provocation Inventory.

† $p < .10$; * $p < .05$; ** $p < .01$.

each other, $r(154) = .44 - .78, p < .01$. Scores on BSCS were negatively correlated with subscales of the RPAQ and NAS-PI, $r(154) = -.38 - -.56, p < .01$, and positively correlated with the Regulation subscale of NAS-PI, $r(154) = .49, p < .01$. BES total score and Cognitive Empathy subscale score did not correlate significantly with most of the study measures. Affective Empathy subscale score was found to be positively correlated with RPAQ Reactive Aggression, NASPI Arousal, and NASPI total score, and negatively correlated with BSCS, but the sizes of the correlations were modest (all coefficients smaller than .30).

Main analyses

Aggression

Repeated measures MANOVA revealed a significant overall change in participants' aggression, $F(2, 154) = 17.31, p < .01$, Wilk's lambda = .82, $\eta_p^2 = .18$. Univariate tests revealed significant differences in both Reactive $F(1, 155) = 33.27, p < .01, \eta_p^2 = .18$, and Proactive Aggression subscale scores, $F(1, 155) = 27.38, p < .01, \eta_p^2 = .15$, following treatment. In summary, reactive and proactive aggression levels were significantly lower after the completion of VPP.

Anger

Repeated measures MANOVA on cognition, behavior, and arousal subscales of NAS-PI revealed significant changes in levels of anger, $F(3, 153) = 11.03, p < .01$, Wilk's lambda = .82, $\eta_p^2 = .18$. Separate univariate tests revealed significant differences in these subscales following treatment – Cognition: $F(1, 155) = 31.61, p < .001, \eta_p^2 = .17$; Arousal: $F(1, 155) = 19.35, p < .001, \eta_p^2 = .11$; Behavior: $F(1, 155) = 27.66, p < .001, \eta_p^2 = .15$. Furthermore, repeated-measures ANOVA also showed a significant difference in Regulation, $F(1, 155) = 4.35, p < .05, \eta_p^2 = .03$; and Provocation Index after treatment, $F(1, 155) = 26.08, p < .001, \eta_p^2 = .14$. In general, youths reported significantly lower levels of anger cognition, anger arousal, anger behavior at post-treatment. They also reported higher levels of anger regulation and lower tendencies toward being provoked in socially challenging situations after completing the program.

Empathy

Repeated measures MANOVA revealed no main effect of treatment, $F(2, 154) = .92, ns$, Wilk's lambda = .99, $\eta_p^2 = .01$. Despite the lack of change in aggregate empathy levels, it is possible that youths with greater empathy deficits may benefit from the intervention. To investigate whether the intervention effect on empathy was moderated by pre-treatment empathy levels, a median split was performed on pre-treatment BES total scores to divide the sample, so as to form a 'high' empathy group and a 'low' empathy group. Repeated-measures MANOVA on BES subscales was performed again, including the additional variable as a between-subject factor (i.e. high vs. low). While there was no significant main effect of treatment on empathy measures, $F(2, 153) = 1.60, ns$, Wilk's lambda = .98, $\eta_p^2 = .02$, a significant Treatment \times Group interaction was observed, $F(2, 153) = 12.20, p < .01$, Wilk's lambda = .86, $\eta_p^2 = .14$. Pairwise comparisons examining the univariate effect showed that this interaction effect was significant for both Cognitive Empathy $F(1, 154) = 15.00, p < .01, \eta_p^2 = .09$, and Affective Empathy, $F(1, 154) = 11.26, p < .01, \eta_p^2 = .07$. To investigate the simple effects, four pairwise comparisons were conducted. It was discovered that youths with lower pre-treatment empathy scores had significant improvements in both Cognitive Empathy (Figure 1), $t(71) = -3.22, p < .01$, 95% CI of mean

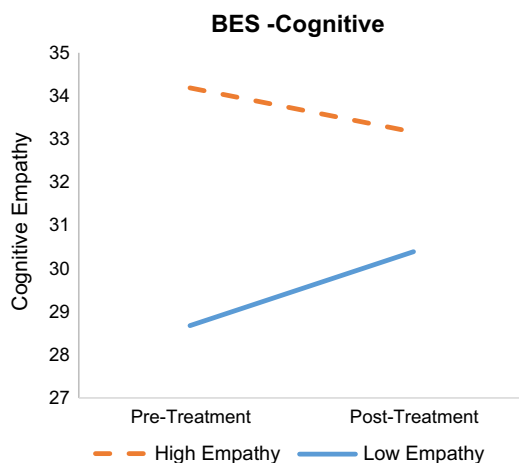


Figure 1. Interaction between treatment and pre-test empathy score on Cognitive Empathy.

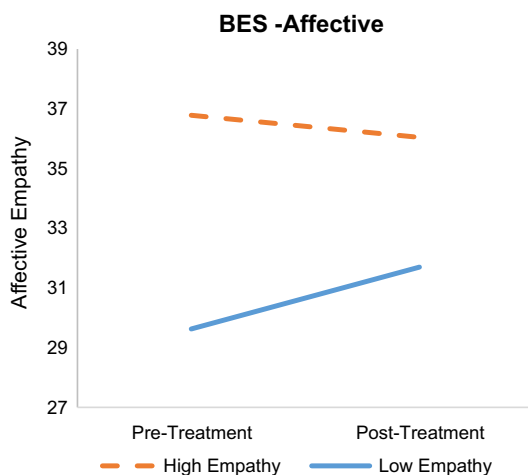


Figure 2. Interaction between treatment and pre-test empathy score on Affective Empathy.

difference $[-2.74, -.69]$, and Affective Empathy (Figure 2), $t(71) = -3.37, p < .01$, 95% CI of mean difference $[-3.28, -.85]$. For youths with higher pre-treatment empathy scores, there was a trend of decreasing Cognitive Empathy at post-test, $t(83) = 2.18, p = .035$, 95% CI of mean difference $[.07, 1.97]$. But the effect failed to reach significance after multiple comparisons were taken into account. Additionally, the difference in Affective Empathy scores before and after the treatment for the higher pre-treatment empathy subgroup was non-significant, $t(83) = 1.31, ns$, 95% CI of mean difference $[-.38, 1.87]$. While splitting the sample by median may lose variance in the analysis, it provided basis for further exploration of different offender subgroups and how treatments could be planned

specifically to meet their needs in the future. Supplementary analysis using the data as a continuous variable obtained identical results.

Reliable change index

Reliable Change Index (RCI) was also computed for all measures to determine the percentage of statistically significant changes occurred at the individual level (Christensen & Mendoza, 1986; Jacobson et al., 1984). As can be seen in Table 3, 70 participants (44.9% of the sample) demonstrated clinically significant reduction in RPAQ total score. The respective percentage of significant RCI in NAS total score and Provocation Index was 43.6 and 46.8%. For BSCS, 48 participants (30.8% of the sample) demonstrated clinically significant increase. Nonetheless, the percentages of clinically significant improvement for BES Cognitive, Affective, and total score was only 14.1, 17.3, and 16.0%, respectively. A closer examination of the RCI by participants' total empathy score at pre-treatment revealed that, for people with low initial empathy levels, the percentage of significant improvements was, 22.2, 23.6, and 22.2% for cognitive, affective, and total empathy, respectively. But for people with high initial empathy, the respective percentages were only 7.1, 11.9, and 10.7%.

Associations between changes in aggression and changes in other study variables

To further explore whether changes in the reported criminogenic factors were due to intervention, correlations between RCIs of RPAQ and other study

Table 3. Percentage of reliable change ($n = 156$).

Variable	Significantly improved		No Change		Significantly deteriorated	
	No. of RCIs	% RCIs	No. of RCIs	% RCIs	No. of RCIs	% RCIs
RPAQ						
Reactive aggression	52	33.3	86	55.1	18	11.5
Proactive aggression	55	35.3	84	53.8	17	10.9
RPAQ Total	70	44.9	62	39.7	24	15.4
Brief self control scale	48	30.8	88	56.4	20	12.8
NAS-PI						
Cognition	49	31.4	90	57.7	17	10.9
Arousal	53	34.0	83	53.2	20	12.8
Behavior	57	36.5	79	50.6	20	12.8
NAS Total	68	43.6	59	37.8	29	18.6
Regulation	24	15.4	93	59.6	39	25.0
Provocation index	73	46.8	58	37.2	25	16.0
Basic empathy scale						
BES cognitive	22	14.1	116	74.4	18	11.5
BES affective	27	17.3	109	69.9	20	12.8
BES Total	25	16.0	113	72.4	18	11.5

Note: RPAQ = Reactive-Proactive Aggression Questionnaire; NAS-PI = Novaco Anger Scale and Provocation Inventory.

measures were computed. As Table 4 shows, all RCIs of anger scales on NAS-PI were positively correlated with RCIs of RPAQ, $r(154) = .41 - .73, p < .01$. In other words, participants who demonstrated larger reductions in anger also tended to have larger reductions in aggression. RCIs of anger regulation and BSCS were negatively associated with RCIs of RPAQ, $r(154) = -.19 - -.44, p < .05$. Participants with larger improvements in self-control and anger regulation were more likely to show larger reductions in aggression. RCI of Cognitive Empathy was negatively correlated with RCI of Proactive Aggression, $r(154) = -.19, p < .05$, and marginally correlated with Total Aggression, $r(154) = -.15, p = .07$. The RCI correlations between RPAQ and other aspects of BES were, however, non-significant.

Discussion

Interventions for youth violent offenders have largely relied on recidivism as indicators of program success. Less is known regarding how these programs change the underlying psychological processes. This study sought to evaluate the effectiveness of VPP, a locally developed intervention for youth offenders based on changes in their criminogenic needs. Criminogenic needs identified to be of relevance to violent offenders in the literature were monitored before and after VPP. In general, findings support the effectiveness of VPP in addressing criminogenic needs related to violence.

Patterns of inter-relationships among measures of anger, aggression, and self-control were generally congruent with the existing literature. Anger-related cognitions, behaviors, and physiological reactions were positively correlated with aggression. Self-control was negatively correlated with anger and aggression. These findings are in line with past research (e.g. Fives, Kong, Fuller, & DiGiuseppe, 2011; Novaco, 2003), suggesting that the relationships between

Table 4. Correlations between RCIs of aggression and other study measures.

Reliable change index on	Reactive aggression	Proactive aggression	RPAQ Total
NAS-PI			
Cognition	.68**	.56**	.66**
Arousal	.66**	.56**	.65**
Behavior	.69**	.61**	.69**
NAS Total	.73**	.62**	.72**
Regulation	-.20*	-.19*	-.21*
Provocation index	.54**	.41**	.50**
Brief self control scale	-.44**	-.39**	-.44**
Basic empathy scale			
BES cognitive	-.09	-.19*	-.15 [†]
BES affective	.09	-.00	.04
BES Total	.01	-.12	-.06

Notes: Correlations above diagonal are for the pre-test scores, correlation below diagonal are for the post-test scores. RPAQ = Reactive-Proactive Aggression Questionnaire; NAS-PI = Novaco Anger Scale and Provocation Inventory.

[†] $p < .10$; * $p < .05$; ** $p < .01$.

the constructs of anger, aggression, and self-control among youths in Singapore are similar to those of their Western counterparts.

Treatment change

The study findings revealed that VPP was generally effective in mitigating youth aggression and the related risk factors. There were reductions in self-reported tendencies to engage in aggressive behaviors. There were also reductions in anger, and improvements in anger regulation. Participants reported to have better capacity to control their impulses at the end of program as well. Previous research has shown that cognitive behavioral therapy (CBT) was effective in reducing anger and aggression in various populations, such as incarcerated offenders (Blacker et al., 2008), forensic outpatients (Hornsveld et al., 2008), and individuals with mental illnesses or mild mental disabilities (Reiss, Quayle, Brett, & Meux, 1998; Taylor, Novaco, Gillmer, Robertson, & Thorne, 2005). Our research extends these findings by demonstrating that CBT can be effective in reducing anger and aggression for youth offenders as well.

Compared with anger and aggression, self-control has received less attention in the adult violence literature. Self-control undergoes substantial maturation in adolescence (Steinberg et al., 2008), and has been shown to predict youth violence across different countries (Finkenauer, Engels, & Baumeister, 2005; Gudjonsson, Sigurdsson, Skaptadottir, & Helgadóttir, 2011; Turanovic & Pratt, 2013; Vettenburg, Brondeel, Gavray, & Pauwels, 2013). Furthermore, lack of self-control has also been linked to other delinquent characteristics which may predispose individuals to violence, such as anti-social cognition, deviant peer association, and substance abuse (Baron, 2003; Finkenauer et al., 2005; Perrone, Sullivan, Pratt, & Margaryan, 2004; Turanovic & Pratt, 2013; Wills & Dishion, 2004). Improving self-control should therefore be an essential component of youth violence prevention efforts. Our findings suggest that VPP has been successful in achieving this outcome.

Moderation effect of baseline empathy on treatment effectiveness

Our study indicated that there was no overall change in youths' empathy levels. This contradicts findings by previous researchers, where improvement in empathy was observed for adult offenders (Pithers, 1994, 1999). However, Pithers's study was conducted on sexual offenders and was based on a relatively smaller sample. Mann and Barnett (2013), in their review of empathy interventions with sexual offenders, concluded that empirical support for empathy intervention was equivocal. Even less is known about the effect of empathy intervention for violent offenders (Day et al., 2010). Our research suggests that targeting empathy may not be suitable for all violent youths in Singapore, given that

their aggregate empathy levels were found to be relatively similar to those of non-offending youths (Ang & Goh, 2010).

Though there was no overall change in empathy level following VPP, the findings indicate that individuals with greater empathy deficits benefited from the program. Youths with low pre-treatment empathy scores showed significant improvements on both cognitive and affective empathy at the end of their treatments. This effect was not observed for youths with high pre-treatment empathy scores. This finding is consistent with the work by Beech and colleagues, who found that the effect of empathy intervention was more pronounced for offenders deemed to have higher treatment needs (Beech, Beckett, & Fisher, 1998).

Reliable changes of study outcomes

Consistent with the changes observed at the group level, investigation of RCI_s showed that changes also occurred at individual levels. Substantial percentage of youths demonstrated statistically reliable reductions in their anger and aggression. Similarly, many participants reported statistically reliable increases in their self-control and anger regulation as well. For a small group of youths, the outcomes deteriorated. Inspection of the data revealed that these youths may have minimized their problems at the start of the treatment by reporting aggression or anger that was way below the sample average. It is likely that through participating in the treatment program and building up better rapport with the clinicians that they became more open toward reporting their real problems at the end of the program, which resulted in increases in scores. Yet, it should be noted that this interpretation could not rule out the possibility that psychological treatments may, at times, cause harm to participants. To differentiate the various reasons for score deterioration, more information from different sources will be necessary in the future to verify the findings (e.g. institutional records).

In addition to individual improvement, our study also showed that reliable changes in youth offenders' aggression levels were associated with reliable changes in other study outcomes. In particular, reductions in anger states as well as improvements in anger regulation and self-control were both associated with reductions in youths' aggression. This finding is consistent with studies showing that changes in these psychological processes mediated the changes in youth violence (Guerra & Slaby, 1990; Simons, Simons, Chen, Brody, & Lin, 2007). These associations provided further evidence on how treatment programs could modulate violence by targeting youths' criminogenic needs. The associations between reliable changes in empathy and youths' aggression were weak. Only improvement in cognitive empathy was found to be associated with reduction in proactive aggression. Interestingly, similar results have been reported previously. Ang and Goh (2010) found that only lower cognitive empathy was associated with higher cyberbullying among Singaporean secondary school students, regardless of the levels of affective empathy. A stronger relationship between

cognitive empathy and offending was also reported in a meta-analysis of 35 empirical studies (Jolliffe & Farrington, 2004). These findings, in conjunction with the moderated treatment effect on empathy mentioned earlier, suggest that there may not be a simple linear relationship between empathy and juvenile violence. More research in the future is required to understand the nuanced differences between cognitive and affective empathy, as well as how empathy may exert different influences on violence for youths with different profiles.

Limitations and future directions

Findings of this study must be considered in light of the following limitations. Owing to ethical and operational constraints, no suitable comparison group could be used for the purposes of this study. Although having a comparison group allows for stronger conclusions about the causal influences of VPP to be made, withholding treatment from violent youth offenders would raise concerns about the quality of rehabilitation of youth offenders. As a result, this study had to rely on a single-cohort design to examine changes in outcomes of interest. Notwithstanding this, correlational designs are still frequently used in the studying of associations among psychological phenomena, and provide foundation for more rigorous investigations of causality (DiGiuseppe & Tafrate, 2003). Future research should build on the preliminary findings provided by this study, and seek to establish treatment effects using more rigorous designs with suitable comparison groups.

Another limitation of the current study is that the measurement of treatment outcomes was solely based on responses to self-administered questionnaires. This type of information is subjective and may be biased by the effects of social desirability (Ones, Viswesvaran, & Reiss, 1996). Though all youths in the current study were informed that responses on these questionnaires would bear no influence on the services that they were receiving, it may still be possible for them to fake good so as to appeal to the treating therapists, or provide desirable responses because of subjective self-beliefs (Paulhus, 1998). To provide more confidence in the treatment effect, information from other sources should be collected as well. Research has already shown that prospective observation of violence and aggression, as well as institutional records of violent misconduct, can be used to document the effect of intervention (Hornsveld et al., 2008; Serin, Gobeil, & Preston, 2009). Future research should harness these methods and corroborate treatment effects observed through self-report with more holistic information.

Finally, changes in psychological outcomes were only captured at the immediate completion of the program. Maintenance of treatment gains over the longer term therefore remains unknown. Future studies should continue to track youths after program completion so as to observe any possible attenuation of program effect across time. Other outcomes such as recidivism should

also be tracked to provide evidence of long-term treatment effectiveness, and to explore the mediating effects of psychological risk factors on recidivism as a result of treatment.

Conclusion

The findings of this study provide valuable information on reducing the violence for youths. It replicated the findings from previous research on treating adult violent offenders by showing that anger and aggression management are still critical in the prevention of youth violence. Moreover, it demonstrated that self-control capacity is a promising area that would complement the conventional violence treatment framework when working with violent juveniles. Changes in anger and impulse control were associated with changes in aggression. Individual variability existed in the treatment responsivity of empathy. Future research should be pursued to substantiate these findings with the use of more rigorous designs. Other factors that are specific to youth violence (e.g. family, peers) should be explored in future research as potential locus of intervention as well. Intervention programs for violent youth share similar treatment targets with those for violent adults. Yet, the two are distinct in specific risk factors and would require different approaches in treatment planning and service delivery. Appreciation of these facts will enable us to produce services and interventions that can enhance youths and adolescents' adaptive functioning, and that can work for their best interest in the long run.

Note

1. 'Baseline scores' refer to scores obtained by clients on psychometric measures before commencing VPP.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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