Violent Ideation as a Mediator for the Link Between Exposure to Violent Media, Aggression and Delinquency

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Abstract

Based on previous research on violent ideations (e.g. Murray, Eisner, Obsuth & Ribeaud, 2017b), exposure to violence in media and the indirect effect of violent ideations on aggression/youth delinquency were analysed in the Zürich study on the Social Development of Children and Youths (z-proso) cohort. The primary predictors for both of Proactive Aggression and Delinquency were the direct effect of violent media, while for Reactive Aggression the primary predictor was the indirect effect. These results were partially mirrored in analysing the effect of different types of media (Film, Internet and Videogame). However, unlike the other two variables, Reactive Aggression showed highly media-dependent results, suggesting further research is needed. Making assumptions on whether exposure to violent content caused subsequent aggression or individuals with pre-existing aggressive tendencies gravitated towards violent media is practically impossible to determine. Despite the strong effects, these findings should not be taken as an unidirectional effect (i.e. 'violent content in media causes aggression'), but a bidirectional effect with many potential additional influences.

Keywords: media violence, youth violence, youth delinquency, aggression

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Introduction

Early Consensus

Since as early as the 1950's the potential negative effects of violence in media has been a great public health concern (Anderson et al., 2003). During early 2000's the consensus of research in this field remained that there was strong evidence for the existence of unhealthy effects resulting from media violence (Cantor, 2000; Wiedeman et al., 2015; Rydell, 2016). The relation of media violence exposure to antisocial behaviour, aggression and violence was argued to be bidirectional; not only do violent youth have a tendency to seek out violent entertainment in media, but research shows the relation may also work in the other direction (Cantor, 2000). This is supported by following research by Gentile and colleagues (2004), linking playing of violent videogames in adolescents to aggressive cognitions, attitudes and behaviours. Results not only showed a positive correlation between exposure to videogame violence and trait hostility, but also correlation of hostility with measures of violent content (Gentile et al., 2004). Moreover, the findings of Gentile and colleagues (2004) showed that in addition to increased hostility greater exposure to videogame violence also was linked to reduced school performance and increased likelihood to get into physical fights.

However, this is not exclusive to physical aggression. According to the review by Cantor (2000) negative effects of violence in media can be seen in increased antisocial behaviour, ranging from imitative violence directed at toys to criminal violence, with further consequential outcomes rooting from changes in attitudes and feelings surrounding violence. Similar findings can also be seen in the research by Uhlmann and Swanson (2004), showing evidence that exposure to violent videogames leads to automatic learning of aggressive self-views. Automatic aggressive self-views were also shown to be predicted by self-reported prior exposure to videogame violence (Uhlmann & Swanson, 2004). In a similar vein, Coyne, Archer and Elsea (2004) studied the immediate effect of viewing indirect and direct aggression on subsequent aggression through evaluation of a confederate and responses to a vignette. These results showed that participants tended to respond to an ambiguous situation with the same type of aggression they'd been exposed to, but also that when participants viewed either indirect or direct

aggression they gave a more negative evaluation and less money to the confederate than those that viewed no aggression (Coyne, Archer & Elsea, 2004). However, a generalization effect, suggesting viewing one form of aggression can increase the manifestation of other forms in participants, was found in a study by Coyne and colleagues (2008). The findings showed that viewing either relational or physical aggression would increase relational or physical aggression (Coyne et al., 2008). In spite of the strong evidence for the existence of an effect, this does not explain a mechanism or why.

Limitations in Research

In spite of the years of research supporting the notion that aggression could be linked to exposure to violent media, especially in the case of videogame violence, weaknesses of the empirical research have begun to emerge. Studies like that of Savage (2004) showed that while a link may exist, this could not be extrapolated to criminal violence while meta-analytic research into the field of aggression and violence in media observed issues with methodological problems and publication bias (Bushman & Anderson, 2007; Ferguson, 2007; Ferguson & Kilburn, 2009). It was shown that a publication bias exists for experimental and non-experimental studies of aggressive behaviour and thoughts (Ferguson, 2007), and once studies were corrected for publication bias they showed very little support for the underlying theory of a link between exposure to media violence and aggressive behaviours or thoughts (Ferguson & Kilburn, 2009). Moreover, according to Ferguson (2007) studies that employed less standardized and reliable measures of aggression had a tendency to yield larger effect sizes. This was corroborated by Ferguson and Kilburn (2009) showing that poor measures of aggression tended to inflate effect size of studies, giving an unreliable perspective of the strength of this link.

Two of the major limitations of the research of violence in videogames involve issues with variables. Firstly, there is a tendency that when studies compare violent and non-violent games, researchers have failed to equate them in levels of competitiveness, difficulty and pace of action (Adachi & Willoughby, 2011). Because of these unmatched factors in the games, assumptions that differences are due to simply violent content are premature. Finding two matched games, or creating such for experimental purposes, one with violent content and one without is highly unlikely. However, when it comes to confounding factors that may easily be mistaken for aggression, such as competitiveness, this should be taken into account more appropriately. Secondly, measures of aggression can often also measure competitiveness, leading to potential misjudgement of the relationship (Adachi & Willoughby, 2011). Moreover, in spite of previous research talking up the usefulness of videogames in the study of the effect of media on aggression (Funk et al., 2004; Lin, 2013), the inherent problems in videogame research and the lack of clear results in recent studies would suggest otherwise. In a 2013 study it was stated that 'no consensus has been reached regarding the influence of such games' (Jerabeck & Ferguson, 2013, p. 2573), with even their results showing no effect of violent content on measures of aggressive behaviour or self-perceptions of empathy. A review of three studies by Ferguson and colleagues (2015)

showed that none of the studies provided evidence linking violence in videogames to aggressive behaviours or reduced empathy in participants.

Due to the limitations and inconsistencies arising in the research of violent media and aggression, new approaches to tackle the problem have to be considered. Previous research has shown inconsistencies in the effect observed with older children and teenagers, with further inconsistencies when measuring long-term outcomes in all ages (Browne & Hamilton-Gianchritsis, 2005). However, research also shows a small but significant association between media violence and aggression, with an effect size showing a substantial effect on public health (r = .13 to .32) (Anderson et al., 2003; Browne & Hamilton-Gianchritsis, 2005). Browne and Hamilton-Gianchritsis (2005) discussed this problem in their paper, suggesting that theories of aggression used to explain the observed effects predict that influence of violent content in media could be attributed to a predisposition for aggressive behaviour, personality, situational factors or a combination of these. What this would mean is that a multi-factorial approach, taking into account these different factors involved in aggression, is needed to appropriately research this link. In addition to this, another potential method of analysis to consider is that of cumulative risk analysis. An example of this is the research of Boxer and colleagues (2009) studying the role of violent media preferences and other acknowledged risk factors in the analysis of cumulative risk for violence and general aggression. According to the findings, violent media preferences in childhood and adolescence contribute significantly to prediction of subsequent violence and aggression (Boxer et al., 2009). This would suggest that by taking a step back and considering a cumulative multi-factorial approach in the study of the relationship between aggression and violence in media could potentially explain a great deal of the effect rather than observing small pieces of it separately.

Theories

One of the early theories for the relation between media violence and subsequent aggression is the effect of desentisization. This was discussed by Cantor (2000), stating that desentisization was observable after viewing violent media through reduced arousal and emotional disturbance when witnessing violence, lower tendency to intervene in a fight and showing less empathy for victims of violence (Cantor, 2000, p. 32). Funk and colleagues (2004) conducted a study on whether repeated exposure to media violence altered cognitive, affective and behavioural processes through desensitization. The results showed that both violence in videogames and movies was associated with stronger proviolence attitudes, however only videogame violence was associated with lower empathy measures. Funk and colleagues hypothesized several reasons why there was an added negative impact seen from violence in videogames, although causality was not investigated (Funk et al., 2004). The notion of desentisization being an important factor in explaining the link between media violence exposure and aggression is also seen in more modern research. Engelhardt and colleagues (2011) showed neurological evidence for the association, furthermore showing that a neural marker can in part account for the causal link

between violent game exposure and increased aggression. When participants who had limited exposure to videogame violence played a violent videogame a reduction in the P3 component of the event-related potential to violent images was shown (Engelhardt et al., 2011). This brain response, indicating a physiological desensitization to violent imagery, also mediated the effect of videogame content on subsequent aggressive behaviour (Engelhardt et al., 2011).

Another theory in explaining this link is the mediating effect of Hostile Expectation Bias, or in other words the tendency to perceive hostile intent on the part of others (Hasan, Bègue & Bushman, 2012; Hasan et al., 2013). In their first study exploring this idea, the findings of Hasan and colleagues (2012) showed a pattern in which exposure to videogame violence increased hostile expectation bias, which in turn increased levels of aggression in participants, supporting the hypothesis that hostile expectations may act as a mediating influence. Moreover, these results support theoretical predictions posed by the General Aggression Model, wherein hostile expectations are conceptualised as mediators of violent videogame-related aggression (Hasan et al., 2013). In a follow-up study, Hasan and colleagues (2013) studied the cumulative long-term effects of hostile expectation bias on partiticipants, with participants undertaking three consequtive days of testing playing violent or non-violent videogames. As predicted, the results showed that violent videogames increased hostile expectations and aggressive behaviours, but this was not seen in the non-violent videogame condition (Hasan et al., 2013). In addition to this, results showed that there was a cumulative effect of violent videogames on aggressive behaviour and hostile expectations over days of testing, with the effect growing stronger each day, but not in the nonviolent condition (Hasan et al., 2013). Moreover, increases in aggression could be partially explained due to the increased hostile expectations (Hasan et al., 2013). While both desensitization and hostile expectations are valid theories with strong empirical support, they can also be viewed as pieces of a larger model explaining the relationship between exposure to media violence and aggression.

As of yet one of the most comprehensive frameworks unifying different elements that lead to aggression in humans is that of the General Aggression Model (GAM) (Anderson & Bushman, 2002). While other theories seem to simply focus on one piece of the puzzle, GAM takes a step back and observes the whole larger picture by taking into account inputs from personal and situational factors, through pathways of arousal, affect and cognition to outcome behaviours (Anderson & Bushman, 2002; DeWall, Anderson & Bushman, 2011; Allen, Anderson & Bushman, 2017; Allen & Anderson, in press). The GAM has been applied to research in media violence (e.g. Adachi & Willoughby, 2011). Anderson and Carnagey's (2009) findings showed that unique increases in aggression-related variables (such as aggressive cognition and aggressive affect) were linked to violent content, as would be predicted by General Aggression Model (also supported by Carnagey, Anderson, & Bushman, 2007). Previously, Bushman and Anderson (2002) linked their model to higher hostile expectations in participants that played a violent videogame than those that played a non-violent videogame, further showing how these ideas can be linked into a larger framework. Taking from the previously discussed theories, Greitemeyer

(2014) proposed that daily life acts of aggression could be made to seem inoffensive by exposure to intense acts of violence in videogames through a bias in perception of what counts as aggressive, and in turn evoke aggressive behaviour in participants. This pattern could be explained by taking into account desensitization, hostile expectation bias and the overarching General Aggression Model as a whole.

Other Factors

Recent studies have been aimed in this new direction, focusing their efforts on examining potential mediators in the relationship between aggression and exposure to media violence. Studies by both Wiedeman and colleagues (2015) and Coker and colleagues (2015) focused on sociodemographic factors, individual psychological characteristics (such as aggressiveness, intelligence and mental health), factors related to the individual's environment (family and peer characteristics; home and neighborhood violence), and limited measures of media violence exposure (such as time spent viewing media and content of media). Research by Coyne and colleagues (2010) has also considered whether exposure to media violence may act as a mediator between psychopathy and aggression. While results showed exposure to media aggression (both physical and relational) related to the perpetration of relationship aggression, this did not act as a mediator between psychopathy and aggression (Coyne et al., 2010).

Recent research has also considered whether delinquency follows a similar pattern. The two-year study of Hopf, Huber and Weiß (2008) showed that frequent consumption of violent content media during childhood correlated highly with increased aggression and delinquency at age fourteen. However, the findings of Rydell (2016) showed that while violent delinquency did not affect consumption of violent media, after controlling for violent delinquency the consumption of violent media predicted increased proactive aggression. Furthermore, high callous-unemotional traits predicted frequent consumption of violent media, but not the reverse (Rydell, 2016). Although these factors are all important to the understanding of the 'big picture', other contemporary research has shifted its focus on factors related to the media itself (Lin, 2013; Crouse Waddell & Peng, 2014; Matthews, 2015).

Media Factors

With the rise in popularity of videogames research into the mediating effects that the type of media may have on the link between exposure to violence in media to aggression has become more important to the discussion. In studying the effect of media interactivity Lin (2013) found that participants that played videogames, as opposed to watching gameplay or watching movies with equivalent content, showed greater increases in aggressive affect, cognition and physiological arousal. This suggested that

media interactivity could exarcerbate short-term aggressive responses (Lin, 2013). In addition to this, Lin (2013) attempted to explore whether character identification would affect this response. However no mediation of character identification on the effect of interactivity on aggression was found, although there were inconsistencies in the findings regarding this (Lin, 2013).

The wide range of videogames being produced have also given researchers the opportunity to explore the possible effect different styles of play may have. For instance, Jerabeck and Ferguson (2013) attempted to study the difference between cooperative play and playing alone in violent/non-violent games on prosocial and aggressive behaviour. The findings did not show any effect of violent content on prosocial/aggressive behaviour or self-perceptions of empathy, however cooperative play was found to increase prosocial behaviour and decrease aggressive behaviour, whether the game was violent or non-violent (Jerabeck & Ferguson, 2013). Similar findings were presented by Crouse Waddell and Peng (2014), showing no main effects for hostility in different gaming conditions (either cooperative or competitive), suggesting that changing goals is not enough to trigger the given response.

Research by Matthews (2015) comparing higher and lower skilled players showed that after controlling for the amount, type and context of violence in videogames, higher skilled players experienced lower levels of hostility, lower levels of aggression related cognitions and greater levels of flow. Moreover, skill was found to alter players' perceptions, with higher skill players showing higher construal levels and lower perceptions of violence. Taking into account these results shows how the effect of even one type of media, videogames, on the effect of exposure to violence on aggression is not a simple, but multi-faceted area of research.

Violent Ideations as Mediator

The notion of violent or aggressive ideations, defined as 'thoughts, daydreams or fantasies of harming another', have recently been implemented into research of aggression and mental health (Murray, Obsuth, Eisner & Ribeaud, 2016b; Murray, Eisner, Obsuth & Ribeaud, 2017a). Through their research on violent ideations as seen in the Zurich project on social development (z-proso) cohort, Murray and colleagues suggested a strong relevance to mental health and related behaviours (Murray et al., 2017a). Moreover, in their 2016 study, Murray and colleagues hypothesized and found supporting evidence for the idea that violent ideations are not the cause of aggressive behaviours, but instead are a reaction, or reflection of shared causes with aggressive behaviour (Murray et al., 2016b).

In a similar vein, the research of Wagar and Mandracchia (2016) explored the relationship between aggression and criminogenic thinking, in terms of exposure to violent media. These findings on the other hand, showed evidence supporting the theory that the link between violent media exposure and aggression was largely influenced by criminogenic thinking patterns, with criminogenic thinking acting as a mediating influence (Wagar & Mandracchia, 2016). While violent ideations and criminogenic thinking are not directly related, they speak to similar ideas within the human psyche. Due

to this, new research exploring the possible mediating influence of violent ideations on the link between exposure to media violence and aggression is needed.

Present Research

Based on the research of Wagar and Mandracchia (2016) and the research of Murray and colleagues (2016b; 2017a), the current research will aim to explore violent ideations as a mediating influence in the relationship between exposure to media violence and aggression in the Zürich project on Social Development (z-proso) cohort. In light of the theory and research previously discussed, it appears likely that exposure to violent media could increase the development of violent ideations, which in turn would increase the likelihood of aggressive behavior. So as the first research hypothesis, we hypothesized that violent ideations would positively mediate the relationship between violent media exposure and aggression. To further explore this relationship, the effect of different types of media exposure (films, internet and videogames) and whether this pattern also existed for juvenile delinquency were considered. According to this, two more research hypotheses were posed. So the second research hypothesis for the current research is that violent ideations would positively mediate the relationship between violent media exposure and delinquency. The third research hypothesis is two-fold. First, hypothesizing that the different media types will have an effect on the model of violent ideation mediating the relationship between exposure to violent media and aggression/delinquency; and second, that the different media types will influence the mediation model in different ways.

Methods
Participants

The sample consisted of 1306 youths (659 males, 647 females) with ages ranging from 16.1 to 18.8 years (M = 17.5, SD = 0.37) who participated in the most recent wave, contributing data on the constructs of interest for this study, of the Zürich study on the Social Development of Children and Youths (z-proso). This sample represents 78% of the original target sample (N = 1675). Z-proso is a longitudinal cohort study focussed on youth development, more specifically the development of pro- and anti-social behaviours in late childhood and adolescence. A comprehensive description of the study in terms of recruitment, attrition, measures and sample characteristics can be found on the study website: http://www.z-proso.ethz.ch/. In brief, respondents were initially invited to participate in 2004 (when aged 7) if they attended one of the schools selected for the study, based on a stratified random sampling procedure that took into account school size and location. Follow-up data collection waves have been conducted at regular intervals since (7 main waves of data collection in total) with the most recent measurement wave completed in 2015. The sample was diverse in terms of social, socio-economic and cultural background.

Measures

All of the original measures were administered in German, reflecting the official language of Zürich. Each measure is described in detail below.

Aggressive behaviour

Previous research on aggressive behaviour in the z-proso cohort (e.g. Murray et al., 2017b) used items originally selected from the Social Behaviour Questionnaire (SBQ; Tremblay et al., 1991). The SBQ has been used widely in past empirical research of aggressive behaviours, with validity and reliability of the selected aggression items supported by psychometric evaluations (e.g. Murray, Eisner, & Ribeaud, 2016a). In the current study, the two sets of items used were Proactive Aggression and Reactive Aggression. Proactive Aggression was measured using the average of 4 items, referring to scaring others to force them to do something, bossing others around, humiliating others and threatening others to get something. Reactive Aggression was measured using the average of 4 items, referring to the respondent being aggressive when teased, insulted, having something taken from them and when not getting something they wanted. Items were rated on a five-point scale from 'never' to 'very often'.

Delinquency

As a measure of delinquency, four items from the original z-proso data collection on whether the youth had previously had to deal with the police because of various types of criminal activity were collated into a single sum measure of criminal activity. Items were given either a 'yes' or 'no' response. For the purposes of analysis the total sums were recoded into youths with 'no offences' and '1 or more offence'.

Violent Media Exposure

The z-proso data collection has throughout asked youths on their consumption of media with violent or pornographic content. Each of these items was rated on a seven-point scale from 'never' to 'daily'. For the measures of violent media exposure in the current study, items involving pornographic content and one item involving the recording of violent content on cellphone were discarded. With little theoretical evidence for significance in distinguishing certain items, they were combined for the purposes of this study. Items concerning violent content in film ("Watched 'NC-17' rated horror films" and "Watched 'NC-17' rated films (thriller, action)") were combined into one measure, and items concerning violent content on the internet ("Searched for, and watched, violent content on the internet" and "Watched videos with violent content on your cell phone, and shared them with friends") into one measure. The final measures were Film Violent Content, Internet Violent Content, Videogame Violent Content and Total Media, a total score of the previous three.

Violent Ideations

As a measure of violent ideation, the Violent Ideations Scale (VIS; Murray et al., 2017b) was used. The VIS includes 12 items referring to thoughts of harming another individual where harm includes, for example, killing, beating up, bullying, causing pain and humiliating. The aggressive acts vary in the target referred to (e.g. a stranger, a person close to the respondent, a person despised by the respondent) as well as the seriousness of the imagined act (e.g. humiliating someone, beating someone up, killing someone). Items also refer to thoughts of both provoked and unprovoked aggression, mirroring the reactive versus proactive distinction identified in aggressive behaviour research (e.g. Raine et al., 2006). Each of the VIS items was rated on a five-point scale from 'never' to 'very often'. For the purposed of this study, the measure of violent ideations was coagulated as the total sum of the 12 VIS item scores.

Statistical Procedure

The analysis of the current study was split into four steps. First, conducting a Structural Equation Modelling (SEM) analysis of a mediation model of the total violent content media (Total Media) relationship with Proactive Aggression mediated by Violent Ideation (VIS), and similar SEM analysis of a mediation model for Reactive Aggression. These two are based around the first research hypothesis, hypothesizing that violent ideations would positively mediate the relationship between violent media exposure and aggression. Second, conducting a SEM analysis of a mediation model of the total violent content media relationship with Delinquency mediated by Violent Ideation, based on the second research hypothesis, stating that violent ideations would positively mediate the relationship between violent media exposure and delinquency. Third, another series of SEM analyses of mediation models of the individualized violent content media (Film, Internet, and Videogame) relationship with each of the dependent variables (Proactive Aggression, Reactive Aggression and Delinquency) mediated by Violent Ideation, based on the third research hypothesis, stating that different media types will have an effect on the model of violent ideation mediating the relationship between exposure to violent media and aggression/delinquency; and that the different media types will influence the mediation model in different ways.. Finally, running these models again with respondent age and sex as covariates to rule out these as having an undue effect over the models. All of these analyses were conducted using the lavaan and psych packages in R statistical software (Rosseel, 2012; Revelle, 2017; R Core Team, 2016), with missing data handled with the Full Information Maximum Likelihood (FIML) methodology.

Results

Descriptive Statistics

From our sample (N=1306), 659 of the youths were males and were 647 female. From the total number of youths that responded to the question (N=1301), 1143 youths had committed no offenses, 158 had committed 1 or more offenses. As can be seen in Table 1 (Appendix 1) the majority of variables showed a positive skew greater than 1, denoting a likelihood for youths to score low on the relevant criteria. Skewness will be defined as highly skewed if less than -1 or more than 1, moderate for values between -1 and -0.5 or 0.5 and 1, and finally approximately symmetric if skewness is between -0.5 and 0.5.and The data showed highly positive skewed values for Proactive Aggression, Total Ideation (VIS), Total Media, Film and Internet. The remaining two variables, Reactive Aggression and Videogame, showed moderate positive skew. The distribution of the data would suggest that the majority of the youths did not watch violent media excessively, and had low to moderate self-reported levels of aggression and violent ideations.

As can be seen from the correlation matrix (refer to Appendix 2), all of the relevant variables correlated with each other positively. The only strong correlation was between total violent media exposure (Total Media) and internet violent media exposure (Internet) (r(1302)= .88), which would suggest that this is the primary form of media through which violent content is consumed. The moderate correlations are in order of strength, Total Media and Videogame (r(1302)= .76), Total Media and Film (r(1302)= .75), Total Media and Reactive Aggression (r(1302)= .61), Internet and Videogame (r(1302)= .55) and Internet and Film (r(1302)= .50). These correlations would suggest several things. Firstly, that although internet violent content has the strongest correlation with Total Media, violent content is also consumed readily through the other two media types. Secondly, that there are moderate correlations between types of media, suggesting that youths consume more than one type. Finally, that the strongest correlation between an aggression variable and a violent media content variable is between total consumption of violent media content and Reactive Aggression. These correlations also suggest that there is only a weak relationship between violent ideation (Total Ideation) and any of the media variables or either of the aggression variables. There is also only a weak relationship between Proactive Aggression and Reactive Aggression, Total Ideation or any of the media variables.

Proactive Aggression

The mediation models for Proactive Aggression, with standardised regression coefficients (β) for direct, indirect, and total effects as well as associated p-values, shown in Fig 1 and Fig 2. Both the Total Media model and the Split-Media model show a significant positive effect of Violent Ideation (VIS) on Proactive Aggression. In the first mediation model (Fig 1.), Total Media has a significant positive effect on Violent Ideation and on Proactive Aggression. The indirect effect for this model, although significant (β= .156), is overall weaker than the significant positive effects for the total effect of the Total Media

model (β= .305) and the direct effect (β= .305). This would suggest that although there is an indirect influence of violent ideation on the interaction between the total exposure to violent media and proactive aggression, the direct effect is still the primary predictor.

Figure 1. Total Media model for Proactive Aggression.
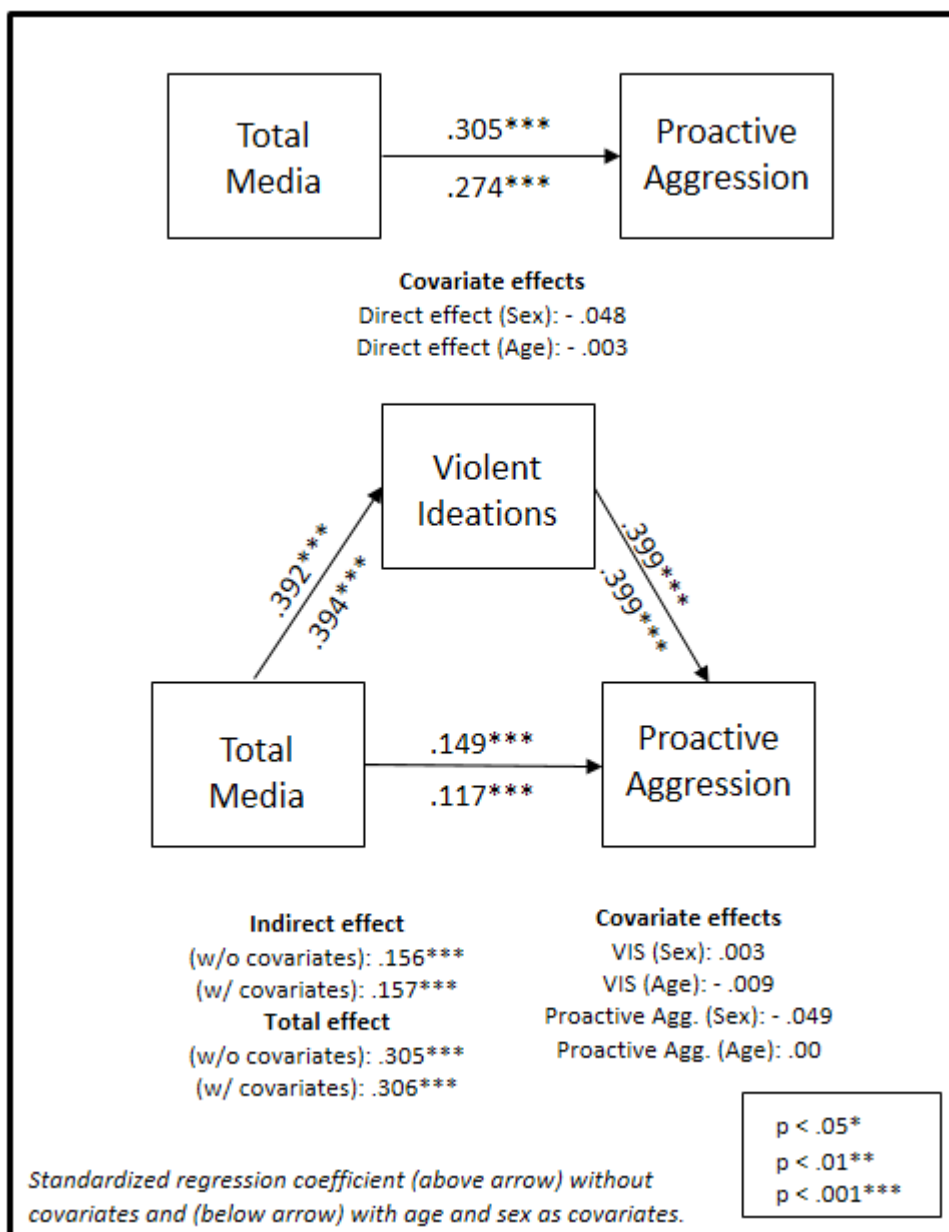
According to the Split-Media mediation model (Fig 2.), the exposure to violent content in Film and Internet show significant positive effects on Proactive Aggression. Film, Internet and Videogame show significant positive effects on Violent Ideation. For Film, both the indirect effect (β= .047) and the total effect (β= .116) show significant positive effects on Proactive Aggression, however the direct effect of exposure to violent content in film on Proactive Aggression is stronger (β= .232). For Internet, both the indirect effect (β= .112) and the total effect (β= .189) show significant positive effects on Proactive Aggression, however the direct effect of exposure to violent content via internet on Proactive Aggression is stronger again (β= .284). Finally, for Videogame like with the previous two media types, both the indirect effect (β= .029) and the total effect (β= .088) show significant positive effects on Proactive Aggression, however the direct effect of exposure to violent content in Videogames on Proactive Aggression is stronger (β= .209). These results would suggest that although in part, Violent Ideations mediate the relationship between violent content in media and Proactive Aggresion, the direct effect still tends to be the primary predictor in the overall interaction.

Figure 2. Split Media model for Proactive Aggression.
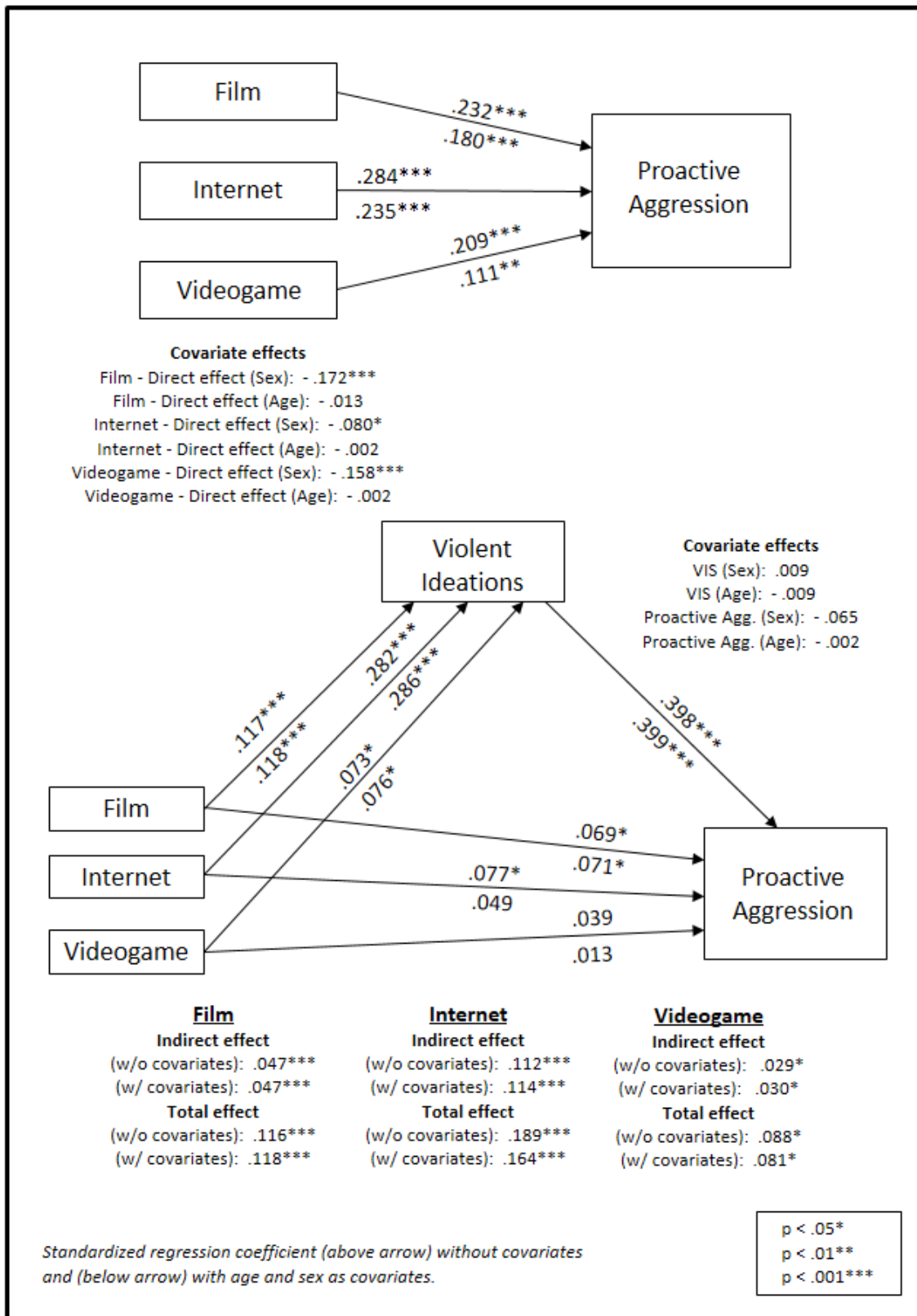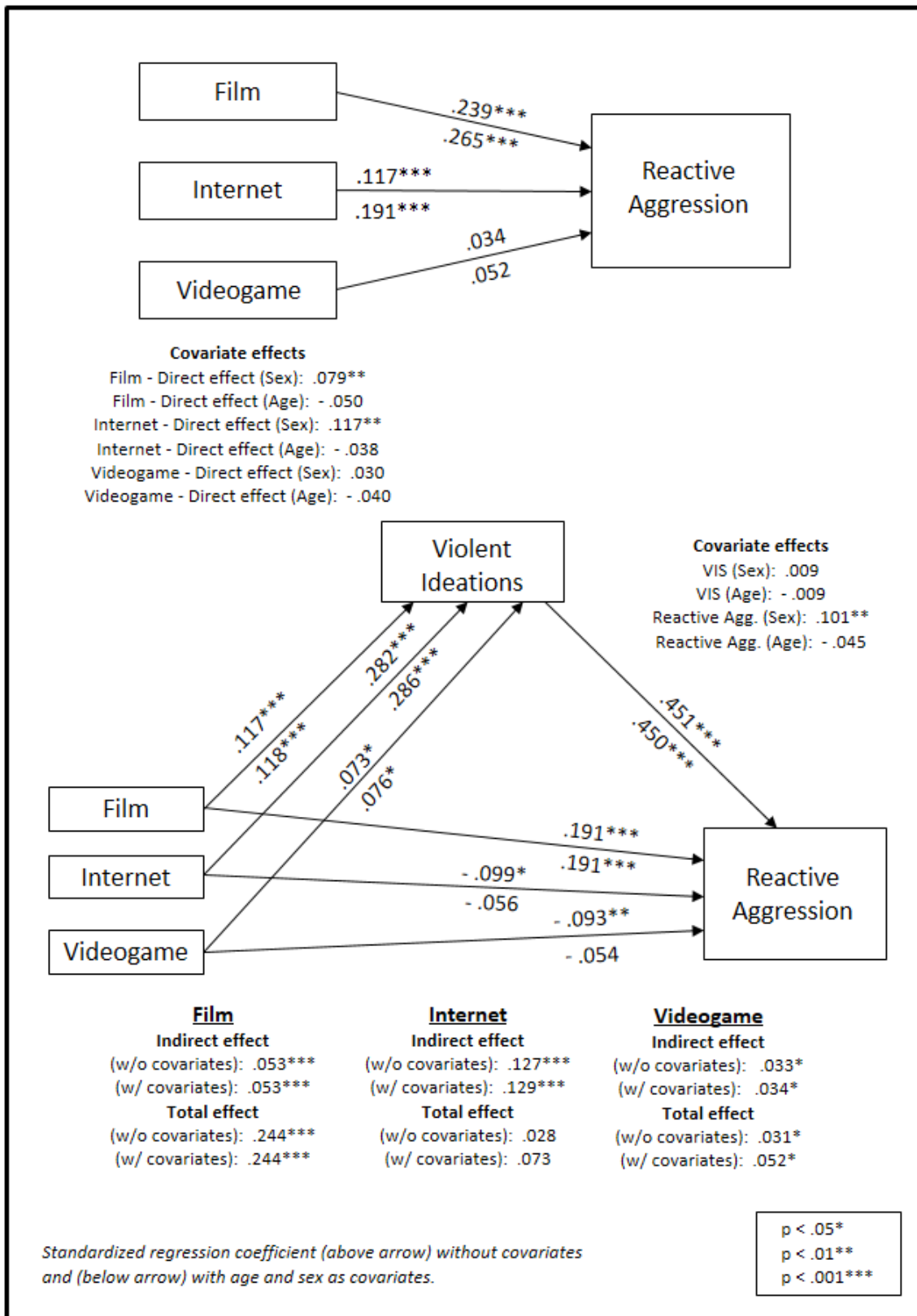
Reactive Aggression

The mediation models for Reactive Aggression, with standardised regression coefficients (*β*) for direct, indirect, and total effects as well as associated p-values, are shown in Fig 3 and Fig 4. Both the Total Media model and the Split-Media model show a significant positive effect of Violent Ideation (VIS) on Reactive Aggression. In the first mediation model (Fig 3.), Total Media has a significant positive effect on Violent Ideation, but a non-significant negative effect on Proactive Aggression. The positive indirect effect for this model is significant (*β*= .175) and stronger than the total effect of the model (*β*= .163) and the direct effect (*β*= .163). This would suggest that although the direct and total effects have an influence on Reactive Aggression, the indirect effect of violent ideation is the primary predictor in this relationship.

Figure 3. Total Media model for Reactive Aggression.
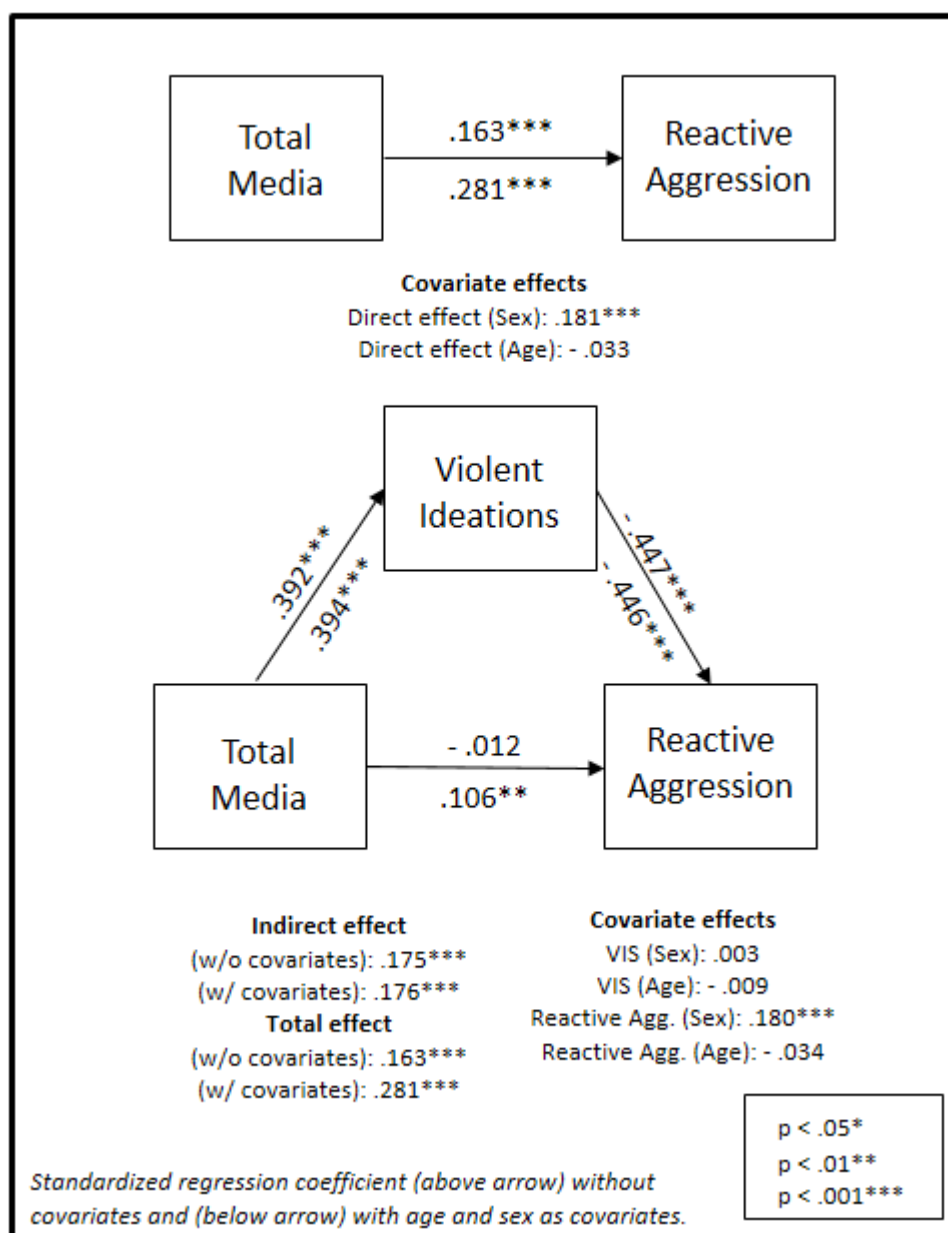
According to the Split-Media mediation model (Fig 4.), the exposure to violent content in Film shows a significant positive effect on Reactive Aggression, while Internet and Videogames show significant negative effects on Reactive Aggression. Just like in the Proactive Aggression model, Film, Internet and Videogame all show significant positive effects on Violent Ideation. For Film, the indirect effect (β= .053) shows a significant positive effect, however the significant positive effects of the total effect (β= .244) of the Split-Media model and the direct effect of exposure to violent content in film on Reactive Aggression are stronger (β= .239). This would suggest that although the total effect is strongest, and that the indirect effect was still significant, the indirect influence of violent ideations play a relatively small role in the relationship between exposure to violent content in film and Reactive Aggression. For Internet, the indirect effect (β= .127) shows a significant positive effect, which is stronger than the non-significant total effect of the model and the direct effect of exposure to violent content via internet on Reactive Aggression (β= .117). This would suggest that because the indirect effect is the strongest, this would be the primary predictor in the relationship between exposure to violent content via Internet and Reactive Aggression, however incongruence with the non-significant total effect and significant direct effect also mean that this is not simply a mediation interaction and more research is needed. Finally, for Videogame, both the indirect effect (β= .033) and the total effect (β= .031) show significant positive effects on Reactive Aggression, and the direct effect of exposure to violent content in Videogames on Reactive Aggression is comparable (β= .034). This would suggest that, although the effects are not as strong as for other media, the interaction of exposure to violent media in Videogames and Reactive Aggression appears to be equally split between direct and indirect effect influences. Overall, these results suggest that the indirect influence of Violent Ideations has an effect on the interaction between violent content in media and Reactive Aggression. However, the strength of the indirect influence and how it compares to the direct and total effects are highly dependant on the media type itself.

Figure 4. Split Media model for Reactive Aggression.

Delinquency

The mediation models for Delinquency, with standardised regression coefficients (β) for direct, indirect, and total effects as well as associated p-values, shown in Fig 5 and Fig 6. Both of these models show a significant negative effect of Violent Ideation (VIS) on Delinquency. In the first mediation model (Fig 5.), Total Media, like with the previous Total Media models, has a significant positive effect on Violent Ideation. Total Media also has a significant negative effect on Delinquency. The negative indirect effect for this model, although significant ($\beta = -.103$), is overall weaker than the significant negative effects for the total effect of the model ($\beta = -.313$) and the direct effect ($\beta = -.313$). Firstly, these results suggest that exposure to violent media in youths is negatively related to delinquency, as opposed to the aggression variables. Secondly, the results also suggest that although there is a indirect influence of violent ideation on the interaction between the total exposure to violent media and delinquency, with increased scores in Violent Ideation (VIS) denoting lower Delinquency, the direct effect is still the primary predictor in this relationship.

Figure 5. Total Media model for Delinquency.
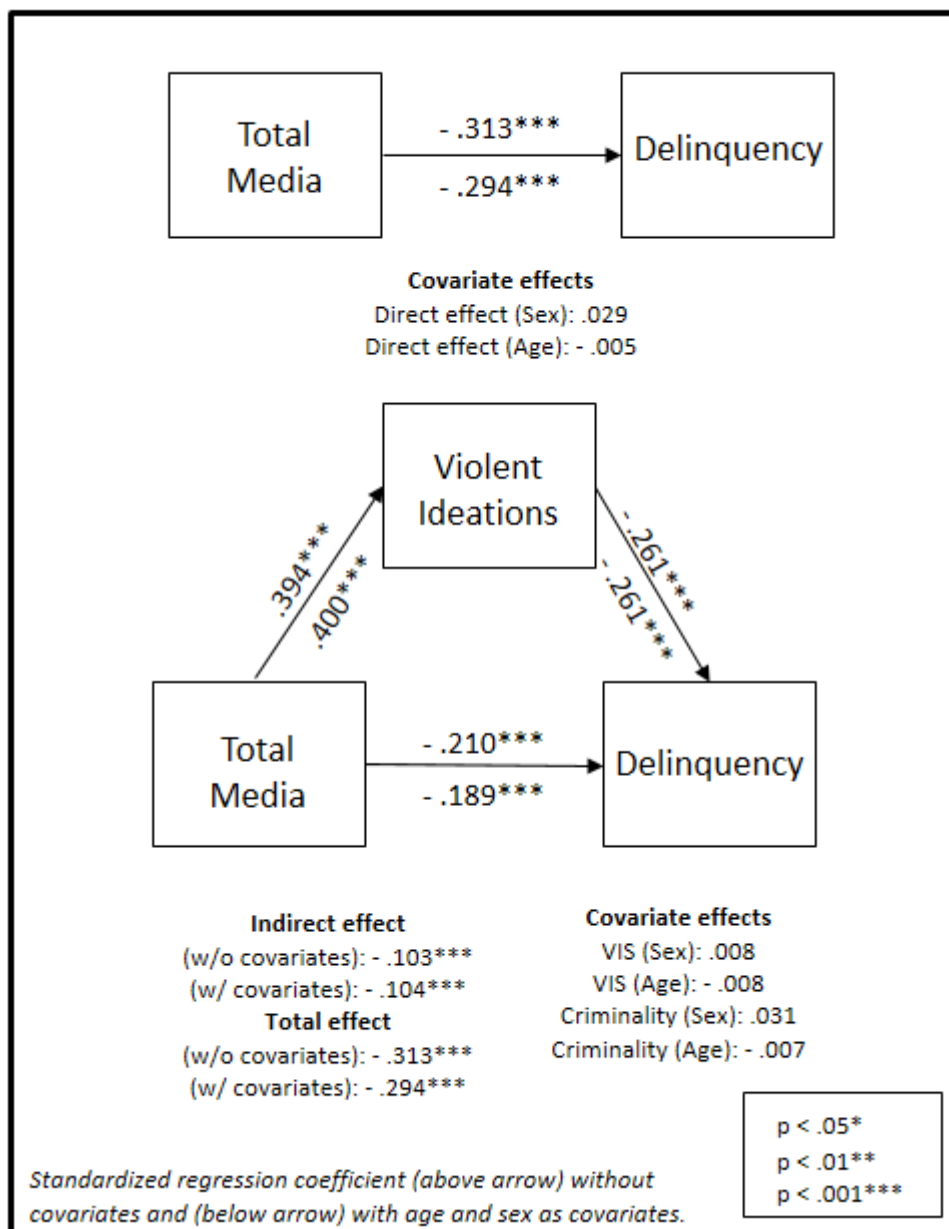
According to the Split-Media mediation model (Fig 6.), the exposure to violent content in Film and Internet show significant negative effects on Delinquency. Film and Internet show significant positive effects on Violent Ideation. For Film, both the indirect effect (β= - .030) and the total effect (β= - .132) show significant negative effects on Delinquency, however the direct effect of exposure to violent content in film on Delinquency is stronger (β= - .252). Like with the previous media type, for Internet, both the indirect effect (β= - .072) and the total effect (β= - .242) show significant negative effects on Delinquency, however the direct effect of exposure to violent content via internet on Delinquency is stronger (β= - .308). Finally, for Videogame, neither the indirect effect or the total effect show significant effects on Delinquency, however the direct effect of exposure to violent content in Videogames on Delinquency shows a significant negative effect (β= - .177). These results would suggest that although in part, Violent Ideation mediates the relationship between violent content in media and Delinquency, the direct effect still tends to be the primary predictor in the overall interaction.

Figure 6. Split Media model for Delinquency.
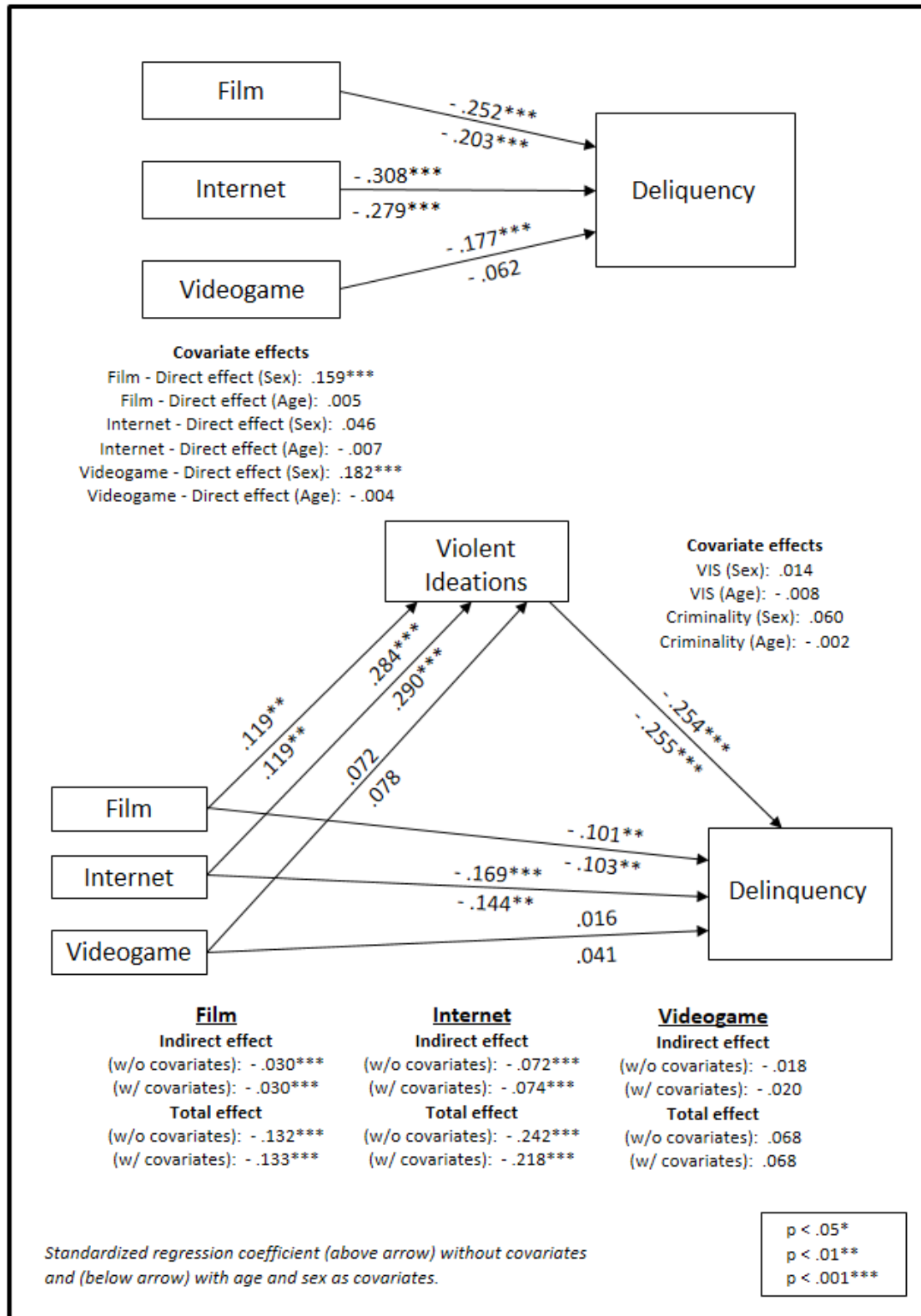
Covariates: Age & Sex

When adding the influence of respondent age and sex as covariates into the previously discussed models, primarily the direct effects and the effects of Total Media, Internet and Videogame on Proactive Aggression, Reactive Aggression and Delinquency were affected (refer to Fig 1-6). Sex associations on aggression (both proactive and reactive aggression) and delinquency ranged from - .172 to .180, and age associations ranged from - .050 to .005. While sex associations on violent ideations (VIS) ranged from .003 to .014, and age associations ranged from - .008 to - .009. When looking at the standardized regression coefficients and their respective p-values related to the covariates in both of the Proactive models (Fig 1. and Fig 2.), only the negative effect of sex on the three direct effects in the Split-Media model were significant. In the Total Media model for Reactive Aggression (Fig 3.) sex showed a significant positive effect on Reactive Aggression and on the direct effect. In the Split-Media model for Reactive Aggression (Fig 4.) sex also showed a significant positive effect on Reactive Aggression. Sex again significantly influenced the direct effect of Film on Reactive Aggression and Internet on Reactive Aggression. Finally, in both Delinquency models (Fig 5. and Fig 6.) sex only had a significant negative effect on the direct effect of Film on Delinquency and Videogame on Delinquency. None of the effects of age on the various models were significant. These results suggest that the effect of sex may play a role in this interaction. It is likely that the results can be explained by males being more aggressive and this overlapping with the consumption of violent media; especially in the form of Videogames and the internet since these were the individual media types that changed the most with the addition of sex.

Discussion

Present Findings

The aim of this study was to explore violent ideations as a mediating influence in the relationship between exposure to media violence and aggression/delinquency in the Zürich project on Social Development of Children and Youths (z-proso) cohort. The first of three research hypotheses, predicted that violent ideations would positively mediate the relationship between violent media exposure and aggression (Proactive and Reactive). As can be seen from the results, in the relationship between violent content in media Proactive Aggression, there is a significant positive indirect effect of Violent Ideation, however the primary predictor appears to still be the direct effect of media on aggression. However, in Reactive Aggression this is reversed, with the indirect positive influence of Violent Ideation being the primary predictor. Based on this, we can say that the findings support the hypothesis, both showing significant positive indirect influences by Violent Ideation. These results suggest that the development of Proactive Aggression is primarily derived from exposure to violent content in media, while in the case of Reactive Aggression the primary predictor is the indirect influence of Violent Ideation.

The second research hypothesis predicted that violent ideations would positively mediate the relationship between violent media exposure and Delinquency. Like with the Proactive Aggression

model, there is a significant indirect effect of Violent Ideation and a stronger direct effect of violent content in media on Delinquency. However, opposed to the research hypothesis both of these effects were negative, denoting that higher exposure to violent content in media and higher violent ideations would predict lower delinquency. These findings suggest that the development of Delinquency is primarily negatively associated with exposure to violent content in media.

Due to the lack of previous research in this area and the exploratory nature of this section of the study, two non-directional hypotheses were defined address different elements to be studied. Firstly, predicting that the different media types will have an effect on the model of violent ideation mediating the relationship between exposure to violent media and aggression/delinquency; and secondly, that the different media types (Film, Internet and Videogame) will influence the mediation model in different ways. The first of these hypotheses is supported, with only one of the indirect effects (Videogame and Delinquency) and one total effect (Internet and Reactive Aggression) not resulting in a significant effect, but with the rest of the models showing significant results. As we can see from the evidence provided the second hypothesis is in part supported by the results. In both the Proactive Aggression and Delinquency models all of the direct effects were stronger than the indirect effects; with a positive effect for Proactive Aggression and a negative effect for Delinquency. Overall, these findings suggest that like with the Total Media models, Proactive Aggression and Delinquency are primarily associated with the exposure to violent content in media, further supporting the previously discussed findings. On the other hand, Reactive Aggression showed a highly media-dependent pattern of results, with each of the media types showing a different effect on the mediation model, supporting the hypothesis. With findings showing a direct and total effect driven (Film), indirect effect driven (Internet) and even distribution of effects (Videogame), this would suggest that in the case of Reactive Aggression the type of media is highly influential in terms of the development of aggression and due to this should be further investigated.

Finally, observing the changes when sex of the respondent was added as a covariate, the results showed a pattern that can be likely explained by males being more aggressive and this overlapping with the consumption of violent media. This can be especially seen in the models of Videogames and internet violent content, since these were the individual media types that changed the most with the addition of sex, with standardized effects getting smaller, suggesting that some of the variance is associated to respondent sex.

In Relation to Previous Research

When looking at previous research, the findings in the present study seem to fit between the early consensus of the direct effect of violent media content on aggression, the modern theories on the development of aggression and the current move to investigate additional factors in this interaction. In early studies the majority of the findings in this field focused around the direct relationship of violent

media content on subsequent aggression (e.g. Coyne et al., 2008). Although the bidirectional nature of this interaction was known (Cantor, 2000) this was often sensationalized to the public as a direct cause and effect. The current research mirrors these findings, especially those of Gentile and colleagues (2004) showing that cognitions, attitudes and behaviours are inter-linked. Present findings suggest that the development of aggression does not happen in a vacuum, but is linked to other aspects, like violent ideations or aggressive cognitions and attitudes. Whether these other aspects build aggression as these findings suggest that violent ideation does, should be explored in further research. Moreover, because of the study focusing on one wave of data collection a directional effect cannot be determined, however exploring the notion of this relation being bidirectional in nature is a good next step for future studies to contemplate.

In terms of the theoretical approaches, the present research has no direct links to the theory of violent content media causing desensitization to violence leading to subsequent aggression or violent behaviors (e.g. Cantor, 2000), so cannot provide support for the idea. However, exploring the other theories underpinning the development of aggression previously discussed, Hostile Expectation Bias and General Aggression Model (e.g. Allen et al., 2017), the current research can be seen to give support for these ideas. Based on the research of Hasan and colleagues (2012; 2013) they argued that hostile expectations may act as a mediating influence on the interplay between exposure to videogame violence and increased levels of aggression. This in part mirrors the results of the current findings, suggesting that perhaps there is a link between violent ideations and the tendency to perceive hostile intent on the part of others. Moreover, the fact that in their research, Hasan and colleagues (2013) stated that increases in aggression could be partially explained by increased hostile expectations gives further support for this notion.

As Hostile Expectation Bias supports the theoretical predictions of the General Aggression Model (GAM) (Hasan et al., 2013), it is no surprise that current findings would also support this model. For instance, the research of Anderson and Carnagey (2009) showed evidence for a link between violent content and aggression-related variables (such as aggressive cognition and aggressive affect), which is supported by the current results, showing aggressive cognitions (Violent Ideation) linked to exposure to violent content in media. Moreover, Greitemeyer (2014) showed evidence for the notion that daily life acts of aggression could be made to seem inoffensive by exposure to intense acts of violence in videogames, subsequently evoking aggressive behavior in participants. The results of this study can especially be linked to the results of the current study pertaining to Reactive Aggression. In both instances exposure to violent content in media shows not only a direct effect to aggression that justifies aggressive responses to perceived slights, but Greitemeyer (2014) suggests that this is due to acts of violence seeming innocuous, while the current study explores the idea that Violent Ideations drive the aggressive impulses into actions.

Studies into possible mediators of the interplay of violent content in media and aggression also link up with the results presented in the current study. Wagar and Mandracchia's (2016) study focused

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on the interaction of violent media exposure and aggression with criminogenic thinking as a mediating influence also showed a significant influence of criminogenic thinking patterns on the overall interaction. While criminogenic thinking and violent ideation are not the same construct, this still adds support to the notion that underlying elements may be influencing the direction by enhancing or mitigating the effect. On the other hand, research by Matthews (2015) would suggest that repeated exposure to videogame violence as an individual becomes more and more skilled at the game would lead to players showing less hostility and lower aggression-related cognitions. However, this is likely from testing two separate things that simply appear similar. For instance, the direct relation of exposure to violent content in media and aggression has been shown to become inconsistent from teenage years onwards (e.g. Browne & Hamilton-Gianchritsis, 2005) and in the study of Matthews (2005) participants were university students. Matthews even suggests that the measures of hostility, aggression and flow are likely linked, wherein low skilled players were unable to achieve flow because of the high skill-level demanded from the game; 'Thus skill should determine flow and outcome variables related to aggression. This was precisely the pattern of results observed' (Matthews, 2005, pg. 223).

Specifically considering delinquency and violence in media, the current findings appear to go against those of Hopf, Huber and Weiß (2008). However, this may be due to the ages of the respondents and the age at which they began to consume violent media, or then the media consumption of the z-proso cohort simply did not reach the same levels as those tested by Hopf and colleagues (2008). This seems to be somewhat supported by Rydell (2016) that found no link between delinquency and consumption of violent media, however the results still do not show the same negative effect of the current study.

Limitations of Current Study

Even though the current study fits in with previous research, while providing interesting novel results, the use of the z-proso longitudinal cohort data presents some limitations that must be taken into account. Aside from the obvious issues of working with secondary data and the possibility of attrition of respondents introducing bias into the sample, there are two major limitations to take into account. Firstly, the difficulty in separating causes and effects; in effect, making assumptions on whether exposure to violent content caused subsequent aggression or individuals with pre-existing aggressive tendencies gravitated towards violent media is practically impossible to determine. In explaining the results for the current study arrows were used to denote the path of analysis and to simplify reporting of findings in an ordered manner, but these should not be taken as a unidirectional effect of simply 'violent content in media causes aggression'. Secondly, there's the limited span of Delinquency; while the self-reported nature of this data has issues on its own, these were yes/no responses on whether the respondent had had to deal with law enforcement due to different types of criminal activity, with no number of instances or criminal activity without police being involved discussed. This is due to the age

of the respondents and their criminal records not being open for researchers, but still limits this factor.

Future Directions

As has already been mentioned, future research should take account of the bidirectional nature of the effects underlying the link between aggression and violent content in media, and not simply look at this interaction as a simple unidirectional construct. In addition to this, the findings presented give ample room to research further. Due to the erratic nature of the results shown in the current study in the reactive aggression models, further research into this interaction, especially when it comes to the effect of different types of media on the development of reactive aggression, is needed to solidify a concrete pattern of interaction. Moreover, exploring the effect of violent content in media and violent ideation mitigating delinquency in youths should be considered. If this pattern is followed in subsequent research, then application into youth crime reduction programmes should be considered, as has been seen with sport and social inclusion (Utting, 1996; Coalter, 2005).

Conclusion

The present study takes into account the previous research in the field of the interaction of aggression and violence content in media, exploring possible outside influences to what was early on thought to be a direct causal link. Within this study different relationships between media, aggression and delinquency, with the influence of violent ideation have been considered and explored, opening the field for more research and potentially new programmes of crime reduction in youths.

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Appendices
Appendix 1: Descriptive Statistics

Table 1. Descriptive Statistics of media, aggression and ideation variables.

	N	Mean	SD	Skew
Proactive Aggression	1306	1.48	0.57	1.52
Reactive Aggression	1306	1.93	0.62	0.81
Total Ideation (VIS)	1306	16.16	6.46	2.58
Total Media	1304	10.88	5.37	1.20
Film	1304	2.06	1.06	1.70
Internet	1304	2.05	1.27	1.20
Videogame	1304	2.65	2.00	0.92

Table 2. Correlational Matrix of media, aggression and ideation variables.

	Total Media	Film	Internet	Videogame	Total Ideation	Proactive Aggression	Reactive Aggression
Total Media							
Film	.75						
Internet	.88	.50					
Videogame	.76	.32	.55				
Total Ideation	.39	.28	.38	.27			
Proactive Aggression	.31	.23	.28	.21	.46		
Reactive Aggression	.61	.24	.12	.03	.44	.45	