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Compensatory and Protective Factors against Violent Delinquency in Late Adolescence: Results from the
Montreal Longitudinal and Experimental Study

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Abstract

Purpose. To identify compensatory/protective factors in pre-adolescence and in mid-adolescence against late adolescence violent delinquency in a sample of kindergarten males from low socioeconomic environments. The selected factors concerned modifiable elements of their family (parental supervision), school (school engagement), and personal life (perceived legitimacy of legal authorities). **Methods.** Participants were from the Montreal Longitudinal and Experimental Study, a prospective longitudinal study of 1,037 kindergarten boys from disadvantaged neighborhoods. We used latent profile analysis to identify at-risk and non-at-risk behavioral profiles in kindergarten and regression analyses to test the putative compensatory/protective factors against late adolescence violent delinquency. **Results.** We identified three at-risk behavioral profiles in kindergarten (i.e., Low, Moderate, and High aggressive-disruptive). Perceived legitimacy of legal authorities, parental supervision and school engagement were identified as compensatory and/or protective factors in pre-adolescence and mid-adolescence against violent delinquency in late adolescence. The relative influence and the specific role of these factors depended, however, on the developmental period examined (pre-adolescence vs. mid-adolescence). **Conclusions.** Interventions for high risk kindergarten children that aim to foster positive social bonds with the community (including legal authorities), family and school probably need to start early in elementary school and continue until late adolescence to prevent violent delinquency during adolescence.

Introduction

Childhood physical aggression is the single most important personal risk factor for early-onset and persistent violent delinquency for boys (Nagin & Tremblay, 1999; Patterson et al., 1998; Pingault et al., 2013; Tremblay & LeMarquand, 2001). This is especially true for physically aggressive boys who are also hyperactive, oppositional and non-prosocial and who come from a disadvantaged neighborhood (Hawkins et al., 1998; Tremblay et al., 1994). However, not all aggressive-oppositional-non-prosocial poor males become violent delinquents, suggesting the presence of compensatory or protective factors that counter-balance or mitigate, respectively, the risk associated with their behavioral and socio-demographic profile. Some of these factors have been well documented but they may be difficult to influence (for example, IQ at the individual level or neighborhood composition at the community level). There are, however, other possible compensatory/protective factors that are amenable to change and thus interesting from a prevention perspective. These compensatory/protective factors need to be based on sound empirical or theoretical grounds. In this study, we focused on putative compensatory/protective factors that could be modified and that can trigger one or more of the processes identified by Rutter (1987) in regard to protective/compensatory factors: (1) reduce risk, (2) reduce negative chain reactions such as affiliation with deviant peers, (3) establish competence, and (4) open new opportunities.

With this in mind, we selected the three following factors reflecting the self, the family, and the school domains: perceived legitimacy of legal authorities, parental supervision, and school engagement. Ideally, we expected each of these factors to operate both as a compensatory factor and as a protective factor, in order to maximize their individual impact. Protective factors (also known as buffering or resiliency factors) moderate the link between risk factors and negative outcomes through an *interaction effect*. Compensatory factors (also known as resource factors, beneficial factors, or direct/risk-based protective factors) have *main effects* that are opposite to risk factors and they cancel out risk factors

through an additive mode (Fergusson et al., 2007; Rose et al., 2004; Ttofi et al., 2014). Importantly, the same factor can operate as a compensatory factor and a protective factor (Lösels & Farrington, 2012).

In addition to their possible protective (i.e., moderating) effect or compensatory (i.e., main) effect, the three factors selected in this study were also expected to have three additional qualities: (1) they have the potential to operate as protective/compensatory factors at different developmental periods (i.e., pre-adolescence and/or mid-adolescence), (2) they have the potential to operate additively and/or multiplicatively, and (3) they are relatively independent of the risk factor (i.e., they should not mediate the effect of the risk factor on the outcome) (Kraemer et al., 2001). These selection criteria were expected to increase the salience of the chosen protective/compensatory factors as relevant targets for prevention across different developmental periods as well as to help clarify their role at the theoretical level. Therefore, the *first goal* of the present study was to examine whether or not, controlling for socio-demographic characteristics, specific behavioral profiles identified during childhood would convey differing risks for violent delinquency during late adolescence. The *second goal* was to determine whether a series of self-related, family-related, and school-related factors could operate as compensatory or protective factors in this context. The *third goal* was to test whether these compensatory or protective factors operate cumulatively or multiplicatively, both during pre-adolescence and mid-adolescence. Each of the selected factors represents one important and modifiable element of their family, school, or personal life. These factors can indeed be improved through sustained interventions, as shown by a number of prevention programs, such as *Communities That Care* (Hawkins et al., 2008) to foster internalization of healthy values and norms and willingness to comply with them via bonding to prosocial groups and individuals, *Strengthening Family Ties* (Lee & Pyfer, 2000) to improve parental practices and attachment to parents, and *Check and Connect* (Sinclair et al., 2003) to build school engagement.

Selected Putative Protective and Compensatory Factors

Perceived legitimacy of legal authorities (which reflects an internalized obligation to defer to the rules and decisions of legal authorities; Fagan & Tyler, 2005), adequate family practices such as parental supervision, and school commitment (i.e., school engagement) are three facets that reflect or foster bonding with social institutions (Hirschi, 1969). Research suggests that perceived legitimacy of those who make and enforce rules, good parental supervision, and commitment to school could ‘protect’ adolescents from violent and nonviolent delinquency (Fagan & Tyler, 2005; Herrenkohl et al., 2012; Pardini et al., 2012). However, the tests often used to demonstrate the protective role of these factors do not match the current definition of a protective factor as a moderator, but rather that of a compensatory factor. In addition, most extant studies were based on a cross-sectional framework, which prevented the examination of the protective/compensatory role of the protection factors at different developmental periods, in addition to obscuring the directionality of effect between variables. Therefore, the evidence behind these factors as being true moderators or compensatory factors at different developmental periods for children who are at risk for violent delinquency remains scarce and mostly speculative.

Methods

Participants

Participants were drawn from the Montreal Longitudinal and Experimental Study (Tremblay et al., 2003), a sample of White French-speaking males from disadvantaged neighborhoods in Montreal, Quebec, Canada ($n = 1,037$). The participants were followed longitudinally from kindergarten (i.e., age 6) onwards. Informed consent was obtained from all of the families. The University of Montreal Ethics Committee approved this research.

Measures

Main Predictor: Grouping Variables Used to Identify the Behavioral Profiles

Teachers assessed physical aggression (3 items; e.g., ‘fights with other children’), opposition (5 items; e.g., ‘is disobedient’), hyperactivity (2 items; e.g., ‘squirmy, fidgety child’), inattention (4 items; e.g., ‘has poor concentration or short attention span’) and helpfulness (10 items; e.g., ‘will try to help someone who has been hurt’) with the Social Behavior Questionnaire (Tremblay et al., 1991) when the participants were in kindergarten (i.e., age 6). Each item was rated on a 3-point scale ranging from does not apply (0) to frequently applies (2). Cronbach’s α were .87, .84, .89, .81, and .92 for physical aggression, opposition, hyperactivity, inattention and helpfulness, respectively.

Compensatory/Protective Factors

We identified putative compensatory/protective factors reflecting the individual, family and school domain, respectively, that were assessed through participants’ self-reports in pre-adolescence (i.e., ages 11 and/or 12 years) and again in mid-adolescence (i.e., ages 14 and/or 15 years).

Individual Factor – Perceived legitimacy of legal authorities. Perceived legitimacy of legal authorities was assessed at ages 11 and 14 years using 9 true-false items adapted from the Jesness Inventory (Jesness, 1983; Le Blanc, 1997), an instrument designed to measure self-reported behaviors related to personal functioning (e.g., ‘policemen and judges will tell you one thing and do another’; ‘if the police don’t like you, they will try to get you for anything’). The negative items were reverse scored, such that higher scores reflected greater perceived legitimacy of legal authorities. Cronbach’s α were .64 and .75 at ages 11 and 14 years, respectively.

Family Factor – Parental Supervision. Parental supervision was assessed at ages 11, 12, 14 and 15 years using two items: ‘your parents know where you are when you are outside the house?’ and ‘your parents know with whom you are when you are outside the house?’. Items were rated from never (0) to always (3). Cronbach’s α were .72, .73, .82, and .81 at ages 11, 12, 14 and 15 years, respectively. The pre-

adolescence parental supervision scale was created using the mean of the scores at ages 11 and 12 years, and the mid-adolescence parental supervision scale was created using the mean of the scores at ages 14 and 15 years. The correlation between the scores at ages 11 and at 12 years was $r = .49$, and the correlation between the scores at ages 14 and 15 years was $r = .52$.

School Factor – School Engagement. School engagement was assessed at ages 11, 12, 14 and 15 years using 6 items, including ‘do you feel that you do your best at school?’, ‘have you replied to your teacher without being polite?’. Negative items were reverse scored. Items were rated on a 4-point scale ranging from never (0) to often or always (3). Cronbach’s α were .67, .66, .77, and .77 at ages 11, 12, 14, and 15 years, respectively. The pre-adolescence school engagement scale was created using the mean of the scores at ages 11 and 12 years, and the mid-adolescence school engagement was created using the mean of the scores at ages 14 and 15 years. The correlation between the scores at ages 11 and at 12 years was $r = .55$, and the correlation between the scores at ages 14 and 15 years was $r = .69$.

Compensatory/Protective Factor Indexes. In addition to the aforementioned compensatory/protective factors, we considered two cumulative indexes: a pre-adolescence factor index and a mid-adolescence factor index. To create the indexes, the Z-scores of each compensatory/protective factor were divided into three levels: low ‘0’ (scores of 1 SD below the mean or less), moderate ‘1’ (scores between 1 SD below the mean and 1 SD above the mean) and high ‘2’ (scores of 1 SD above the mean or more). For each time period (i.e., pre- and mid-adolescence), we created the index by summing the ternary compensatory/protective factors (i.e., perceived legitimacy of legal authorities, parental supervision, and school engagement), such that each index ranged between 0 (lowest level) and 6 (highest level). The correlation between the pre- and the mid-adolescence indexes was $r = .48$.

Outcome Measure: Self-reported Violent Delinquency in Late Adolescence

Questions on the participants’ delinquent behavior over the past 12 months at ages 16 and 17 years were used to create a violent delinquency scale (Nagin & Tremblay, 1999). Each item was rated from

never (0) to often (3). The scale included the following offenses: fist fighting, gang fighting, carrying a deadly weapon, using a deadly weapon, threatening someone to force him/her to do something, attacking someone, and throwing an object at someone. Cronbach's α for the scale was .81 and .78 at ages 16 and 17 years, respectively. The correlation between the scores at ages 16 and at 17 years was $r = .62$. We used the mean of the scores at ages 16 and 17 years as a measure of self-reported violent delinquency in late adolescence. To reduce skewness, the scale was square root transformed prior to conduct the analyses.

Control Variables

Intervention. A subsample of the boys participated in a prevention program when they were between 7 and 9 years old. Boys with high scores of disruptive behavior in kindergarten (based on teacher reports) were enrolled in the program, which targeted parental behavior (e.g., monitoring and positive reinforcement) and child social skills. A randomized control trial was conducted to assess the impact of the program (46 boys were in the intervention group and 126 were in the control/observational group). The analyses revealed a positive impact of the program on a variety of negative adolescent outcomes (e.g., gang involvement, substance use, delinquency) (Tremblay et al., 1996; Vitaro et al., 2001). However, recent findings suggest that the program did not have a significant effect on personal violence in adolescence (Vitaro et al., 2013). Program participation (i.e., whether participants were in the intervention group, the control/observational group or not involved in the experimental study) was thus controlled to take into account the potential impact of the program on the study variables.

Family Risk Index. A family risk index was created by averaging the following indices when the participants were in kindergarten: (1) family structure (intact or not intact), (2) parents' levels of education, (3) parents' occupational status, and (4) parents' age at the birth of their first child. Parental occupational status was based on a socioeconomic job index for Canadians (Blisshen et al., 1987). For family structure, a score of 1 was given if the boy was not living with his two biological parents at the time of assessment. For all other indices, marks in the lowest 30th percentile received a score of 1. The

accumulation of these different risks has been linked to an increase in the probability of behavioral disorders (Kolvin et al., 1988; Rutter, 1985). This family risk index was also predictive of stable physical aggression in childhood and early affiliation with youth gangs in this sample (Haapasalo & Tremblay, 1994; Lacourse et al., 2006; Nagin & Tremblay, 2001).

Analyses

Two series of analyses were performed. First, behavioral profiles were identified with latent profile analysis using the Mplus 7.1 statistical software (Muthén & Muthén, 2012). Latent profile analysis was performed with the five continuous indicators of physical aggression, opposition, hyperactivity, inattention, and helpfulness. A series of models were fitted beginning with a one-profile model and moving to a six-profile model. Model selection was based on the Bayesian information criterion (BIC), the entropy value and the Lo–Mendell–Rubin likelihood ratio test (LMR-LRT) (Muthén, 2004; Nylund et al., 2007). Occasional missing data were managed using full-information maximum likelihood estimation (Muthén & Muthén, 2012). In the second series of analyses, multiple linear regressions (with planned contrasts) using the SPSS 21 statistical software (IBM Corp., 2012) were performed to investigate whether the selected pre- and mid-adolescence factors would act as compensatory factors (via main effects) and/or protective factors (via interactive effects) against the predictive effect of the behavioral profiles on violent delinquency in late adolescence. These regressions were performed separately for the individual, family, and school domains, and for the cumulative protective factor indexes, while also considering the potential influence of the control variables. Participants with occasional missing data were included through the expectation-maximization (EM) imputation technique in SPSS 21 (IBM Corp., 2012).

Results

Identification of the Behavioral Profiles in Childhood

Six latent profile analysis models (i.e., one-profile model to six-profile model) were estimated to identify the optimal number of behavioral profiles. The five-profile model was identified as best fitting the data (see Figure 1). The five behavioral profiles were as follows: Normative (51.7%), Hyperactive-inattentive (11.6%), Low aggressive-disruptive (21.1%), Moderate aggressive-disruptive (8.1%), and High aggressive-disruptive (7.5%). The standardized scores (Z-scores) for each variable included in the latent profile analysis are depicted in Figure 1.¹

Investigation of the Putative Compensatory and Protective Factors

Table 1 presents the descriptive statistics of the study variables by each behavioral profile. As can be seen, violent delinquency increased from the Normative to the High Aggressive-disruptive behavioral profiles.² We performed an ANCOVA to test the predictive association between the behavioral profiles (i.e., at age 6) and violent delinquency (at ages 16-17), controlling for the family risk index and the prevention program group membership. Although the effect size was relatively small ($\eta^2_p = .014$), the association was significant ($p = .02$), suggesting that boys with specific childhood behavioral profiles were at risk for violent delinquency in late adolescence. Conversely, the means of the putative

¹ Mean differences ($p \leq .05$) were observed between the behavioral profiles for aggression (Normative < Hyperactive-inattentive < Low aggressive-disruptive < Moderate aggressive-disruptive < High aggressive-disruptive), for opposition (Normative < Hyperactive-inattentive < Low aggressive-disruptive < Moderate aggressive-disruptive < High aggressive-disruptive), for hyperactivity (Normative < Low aggressive-disruptive < Hyperactive-inattentive < Moderate aggressive-disruptive < High aggressive-disruptive), for inattention, (Normative < Low aggressive-disruptive < Hyperactive-inattentive, High aggressive-disruptive < Moderate aggressive-disruptive), and for helpfulness (Normative, Low aggressive-disruptive > Hyperactive-inattentive, Moderate aggressive-disruptive > High aggressive-disruptive).

² The scores of violent delinquency were available for 852 participants (from the original sample of 1,037 participants). We tested the extent to which the childhood behavioral profiles, the childhood family risk index and the prevention program group membership (i.e., if the participants were in the intervention group, the control/observational group or if they were not involved in the experimental study) predicted attrition, and therefore exclusion from the regression analyses. The tests revealed only one significant difference: participants excluded from the regression analyses had higher levels of family adversity (childhood family risk index) compared with the participants who were included ($t_{215.28} = 3.15, p < .01$; Cohen's $d = .28$).

compensatory/protective factors tended to decrease from the Normative to the High Aggressive-disruptive behavioral profiles, but the associations were weak and inconsistent.³

Table 2 presents the bivariate correlations of the family risk index, the putative compensatory/protective factors, and violent delinquency. All the putative compensatory/protective factors were negatively correlated with violent delinquency. The correlations were higher for the mid-adolescence factors than for the pre-adolescence factors. Similarly, the correlation between violent delinquency and the compensatory/protective factor index in pre-adolescence ($r = -.29, p < .001$) was smaller than the one between violent delinquency and the compensatory/protective factor index in mid-adolescence ($r = -.41, p < .001$).

The results from the regression analyses for each of the putative compensatory/protective factors and for the putative compensatory/protective factor indexes are presented in Table 3 and Table 4, respectively. Two main findings are noticeable from Table 3 and Table 4. First, perceived legitimacy of legal authorities, parental supervision, school engagement and the cumulative factor index in *pre-adolescence* had no significant main effects on violent delinquency, but had significant interaction effects ($p \leq .05$) with the Moderate Aggressive-disruptive group (see Models 1, 2, 3 and 4). Second, all putative compensatory factors in *mid-adolescence* had a significant main effect ($p \leq .001$) on violent delinquency in addition to interacting significantly ($p \leq .05$) with the hyperactive-inattentive profile (Models 1 and 3) and with the low aggressive-disruptive profile (Model 4). To interpret the nature of the significant ($p \leq .05$) interactions, we followed a procedure to break down interactions between categorical and continuous

³ We tested if the putative compensatory/protective factors were relatively independent of the risk factors (i.e., the childhood behavioral profiles) to avoid confusion with respect to their status (i.e., whether or not they could also be mediator variables). We performed a series of ANCOVA analyses to test the associations between the childhood behavioral profiles and each of the compensatory/protective factors or indexes. The analyses were controlled for family adversity (i.e., family risk index) and the prevention program group membership. Not all the associations between the behavioral profiles and the putative compensatory/protective factors were non significant at $p > .05$. Nevertheless, even when significant, the effect sizes were relatively small (η^2 's ranged between .005, $p = ns$, for the mid-adolescence compensatory/protective factor index, to .036, $p < .001$, for pre-adolescence school engagement).

variables (Holmbeck, 2002). Figure 2 depicts the significant interactions for each variable and developmental period (i.e., pre- and mid-adolescence).

For perceived legitimacy of legal authorities, two interaction terms were significant. Pre-adolescence perceived legitimacy interacted with membership in the Moderate aggressive-disruptive profile and mid-adolescence perceived legitimacy interacted with membership in the Hyperactive-inattentive profile. A breakdown of these interactions showed that being in the Moderate aggressive-disruptive profile was associated with higher levels of violent delinquency ($b = .40, p < .05$) when pre-adolescence perceived legitimacy was low (1 *SD* below the mean). In contrast, when pre-adolescence perceived legitimacy was average or high (1 *SD* above the mean), membership in the Moderate aggressive-disruptive profile was not related to violent delinquency ($b = .08, ns$, for average levels of perceived legitimacy and $b = -.24, ns$, for high levels of perceived legitimacy). In addition, being in the Hyperactive-inattentive profile was associated with lower levels of violent delinquency ($b = -.29, p < .05$) when mid-adolescence perceived legitimacy was high (1 *SD* above the mean). In contrast, when mid-adolescence perceived legitimacy was average or low (1 *SD* above the mean), membership in the Hyperactive-inattentive profile was not statistically associated with violent delinquency ($b = -.06, ns$, for average levels of perceived legitimacy and $b = .17, ns$, for low levels of perceived legitimacy).

For parental supervision, one interaction terms was significant. Pre-adolescence perceived parental supervision interacted with membership in the Moderate aggressive-disruptive profile. A breakdown of the interaction terms showed that being in the Moderate aggressive-disruptive profile was associated with higher levels of violent delinquency ($b = .55, p < .001$) when pre-adolescence parental supervision was low (1 *SD* below the mean). In contrast, when pre-adolescence parental supervision was average or high (1 *SD* above the mean), membership in the Moderate aggressive-disruptive profile was not related to violent delinquency ($b = .21, ns$, for average levels of parental supervision and $b = -.14, ns$, for high levels of parental supervision).

For school engagement, two interaction terms were significant. Pre-adolescence school engagement interacted with membership in the Moderate aggressive-disruptive profile and mid-adolescence school engagement interacted with membership in the Hyperactive-inattentive profile. A breakdown of the interaction terms showed that being in the Moderate aggressive-disruptive profile was associated with higher levels of violent delinquency ($b = .50, p < .01$) when pre-adolescence school engagement was low (1 *SD* below the mean). In contrast, when pre-adolescence school engagement was average or high (1 *SD* above the mean), membership in the Moderate aggressive-disruptive profile was not related to violent delinquency ($b = .14, ns$, for average levels of school engagement and $b = -.22, ns$, for high levels of school engagement). Finally, being in the Hyperactive-inattentive profile was associated with lower levels of violent delinquency ($b = -.43, p < .01$) when mid-adolescence school engagement was high (1 *SD* above the mean). In contrast, when mid-adolescence school engagement was average or low (1 *SD* above the mean), membership in the Hyperactive-inattentive profile was not statistically associated with violent delinquency ($b = -.12, ns$, for average levels of school engagement and $b = .18, ns$, for low levels of school engagement).

For the cumulative protective factor indexes, two interaction terms were significant. The pre-adolescence cumulative index interacted with membership in the Moderate aggressive-disruptive profile and the mid-adolescence cumulative index interacted with membership in the Low aggressive-disruptive profile. A breakdown of the interaction terms showed that being in the Moderate aggressive-disruptive profile was associated with higher levels of violent delinquency ($b = .59, p < .001$) when the cumulative index in pre-adolescence was low (1 *SD* below the mean). In contrast, when the cumulative index in pre-adolescence was average or high (1 *SD* above the mean), membership in the Moderate aggressive-disruptive profile was not related or was even negatively related to violent delinquency ($b = .08, ns$, for average levels of the cumulative index and $b = -.44, p < .05$, for high levels of the cumulative index). In addition, being in the Low aggressive-disruptive profile was associated with higher levels of violent

delinquency ($b = .35, p < .01$) when the cumulative index in mid-adolescence was low (1 *SD* below the mean). In contrast, when the cumulative index in mid-adolescence was average or high (1 *SD* above the mean), membership in the Low aggressive-disruptive profile was not related to violent delinquency ($b = .14, ns$, for average levels of the cumulative index and $b = -.06, ns$, for high levels of the cumulative index).

Discussion

In this study, we aimed to identify compensatory and/or protective factors against violent delinquency in late adolescence in a sample of males from disadvantaged neighborhoods. Each of the selected factors concerned one important and modifiable element of their family, school, or personal life. Significant original findings emerged from this study.

First, we found that only perceived legitimacy of legal authorities, parental supervision, school engagement, and the cumulative factor index in mid-adolescence (ages 14-15 years) – but not in pre-adolescence (ages 11-12 years) – had a compensatory effect against violent delinquency in late adolescence (16-17 years old). These compensatory effects are worth noting as they counterbalanced – via main effects – the effects of all the behavioral risk profiles in childhood, including the High aggressive-disruptive profile. Thus, these compensatory factors reduced or even canceled out the effects of childhood risks through an additive process. The compensatory effects appeared especially salient for the mid-adolescence factors, compared with the pre-adolescence factors, potentially because they were more proximal to the outcome (i.e., violent delinquency).

Second, perceived legitimacy of legal authorities, parental supervision, school engagement and the cumulative factor indexes in both pre- and mid-adolescence were also identified as having a protective effect. However, these protective effects only concerned a few specific risk profiles. In particular, average levels of perceived legitimacy of legal authorities, parental supervision, school engagement, and the

protective factor indexes seemed to be sufficient to prevent youths with low to moderate childhood risks from engaging in high levels of violent delinquency. These findings suggest that it is a lack of protective factors that increases the risks for violent behavior in these youths. Interestingly, whereas this lack seems to be particularly relevant for youths with a Moderate aggressive-disruptive profile when it occurs in pre-adolescence, youths with a Low aggressive-disruptive profile seem to benefit specifically from protective factors occurring in mid-adolescence. It is possible that boys with low aggressive-disruptive behavior in childhood may be at risk for engaging in delayed-onset delinquency (Fontaine et al., 2014), which may explain why accrued support may be especially important during mid-adolescence for these youths. Finally, it is noteworthy that a Hyperactive-inattentive profile did not, in and of itself, seem to convey increased risk of later violence delinquency, particularly if such youths hold strong social bonds with authorities and in school (Pingault et al., 2013).

A third important finding is that, in contrast to the findings for low and moderately aggressive-disruptive youths, average levels of protective effects did not seem to offset the risk of violent delinquency for high aggressive-disruptive youths. For them, only very high levels of perceived legitimacy of legal authorities, parental supervision, and school engagement seem to counterbalance (via a main effect) to some extent the risk of violent delinquency. Youths in the High aggressive-disruptive profile may be less sensitive to the effect of these compensatory/protective factors than their less aggressive-disruptive peers, in part because of their low levels of prosocial propensity, which relates to the limited prosocial emotions specifier for conduct disorder (American Psychiatric Association, 2013) or callous-unemotional traits (e.g., lack of empathy and guilt) (Fontaine et al., 2011). These traits could increase their likelihood of engaging in more severe and persistent aggressive behavior and decrease their sensitivity to attempts from the community/legal actors, family and school to establish positive social bonds with them (Frick & Viding, 2009). Nevertheless, despite its somewhat limited impact, the role played by the compensatory factors examined here for the high aggressive-disruptive participants should

not be overlooked. Without these factors, some of these individuals may become ensnared into even higher levels of violence and other social and personal problems (Moffitt, 1993).

This study has a number of important strengths, including the use of a large sample of participants from low socioeconomic neighborhoods, the application of a group-based approach (i.e., latent profile analysis) to identify childhood behavioral profiles, and the examination of putative compensatory/protective factors at different developmental periods (i.e., pre-adolescence and mid-adolescence) against violent delinquency in late adolescence. However, some limitations must be noted. First, we relied on a sample of males only. Replications are required to verify if the findings can be generalized to females (Fontaine et al., 2009). Second, given the small number of participants in some of the childhood behavioral profiles (e.g., the High aggressive-disruptive profile), our capacity to detect significant interactions was limited. Third, we did not examine patterns of associations based on frequency of official delinquency. The relatively small number of offenders, despite the use of an at-risk sample, limited our capacity to perform reliable and meaningful analyses using continuous scores for official offenses.

Implications for clinical practice should be noted. Interventions initiated during early elementary school that aim to improve positive social bonds with the community (including legal authorities), family and school by increasing perceived legitimacy of legal authorities, parental supervision and school engagement in youth could have a preventive effect on violent delinquency and other forms of deviant behavior for a significant number of adolescents from low socioeconomic environments (Boisjoli et al., 2007; Castellanos-Ryan et al., 2013). Such interventions should probably be maintained during adolescence, because beliefs that the law and legal authorities are legitimate may decline for some adolescents over time (Fagan & Tyler, 2005; Piquero et al., 2005), as well as parental supervision and school bonding (Laird et al., 2003; Oelsner et al., 2011). For instance, the effects of innovative programs such as *Police Athletic/Activity League* (Subhas & Chandra, 2004), which uses athletic, recreational and

educational strategies to foster positive interactions and mutual trust between police officers and youths, could be examined. Indeed, one source of adolescent values is social experience with legal actors throughout a range of contexts, including police (Fagan & Tyler, 2005). Further experimental and longitudinal studies are needed to test the effects of such interventions, which could vary depending on the child's behavior profile.

Highlights

- 1-** Three at-risk behavioral profiles in childhood (i.e., Low, Moderate, and High aggressive-disruptive) were associated with violent delinquency in late adolescence.
- 2-** Hyperactivity-inattention in childhood was not in itself associated with higher levels of violent delinquency in late adolescence.
- 3-** Perceived legitimacy of legal authorities, parental supervision and school engagement were identified as compensatory and/or protective factors.
- 4-** Especially in mid-adolescence, increased levels or accumulation of these protective factors seem to counter-act or mitigate the effects of childhood behavioral risks.
- 5-** Interventions that strengthen positive social bonds with the community (including legal authorities), family and school should be fostered from early elementary school to the end of high school.

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Figure Captions

Figure 1

Standardized Scores (Z-scores) for Each Variable Included in the Latent Profile Analysis to Identify the Behavioral Profiles.

Note.

$n = 1,037$.

Hyp-inatt = Hyperactive-inattentive; Low Agg-dis = Low aggressive-disruptive; Mod Agg-dis = Moderate aggressive-disruptive; High Agg-dis = High aggressive-disruptive

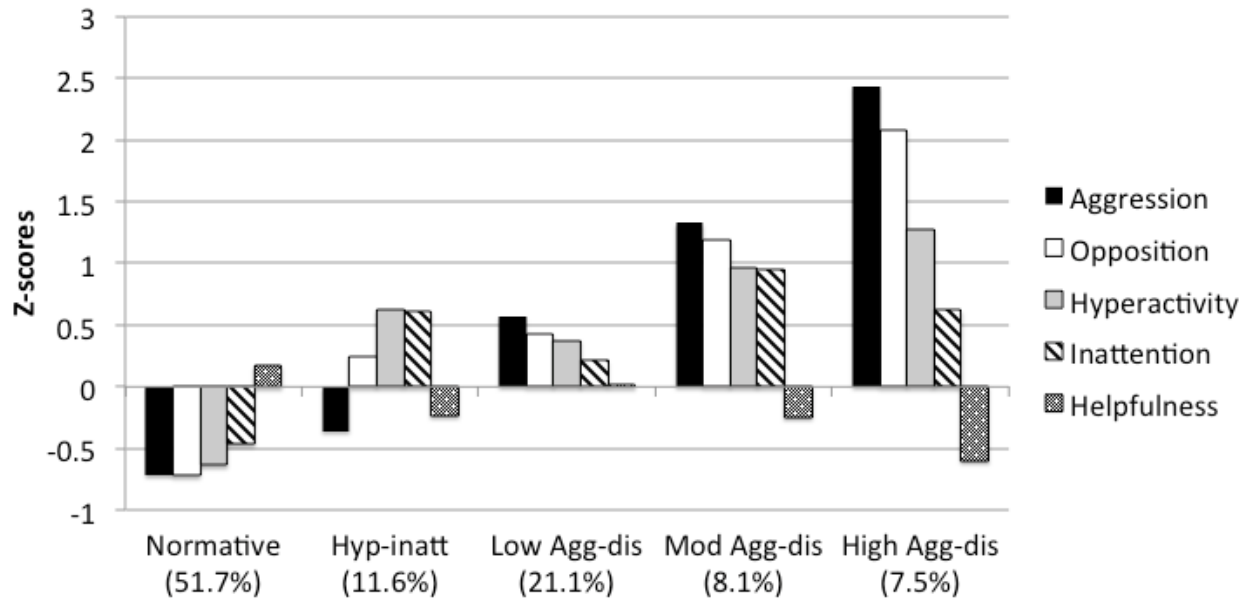
The fit indices for the two-profile model were: BIC, 25,383.83; LMR-LRT, $p < .001$; entropy, 0.89; the fit indices for the three-profile model were: BIC, 24,669.31; LMR-LRT, $p < .001$; entropy, 0.92; the fit indices for the four-profile model were: BIC, 24,416.96; LMR-LRT, $p < .001$; entropy, 0.94; the fit indices for the five-profile model (i.e., the selected model) were: BIC, 24,296.14; LMR-LRT, $p < .05$; entropy, 0.91; and the fit indices for the six-profile model were: BIC, 24,206.87; LMR-LRT, $p > .05$; entropy, 0.91.

Figure 2

Interaction Effects Between the Protective Factors and the Behavioral Profiles in Pre-adolescence and in Mid-adolescence.

Note.

Average = mean of the protective factor; Low = 1 *SD* below the mean of the protective factor; high level = 1 *SD* above the mean of the protective factor.



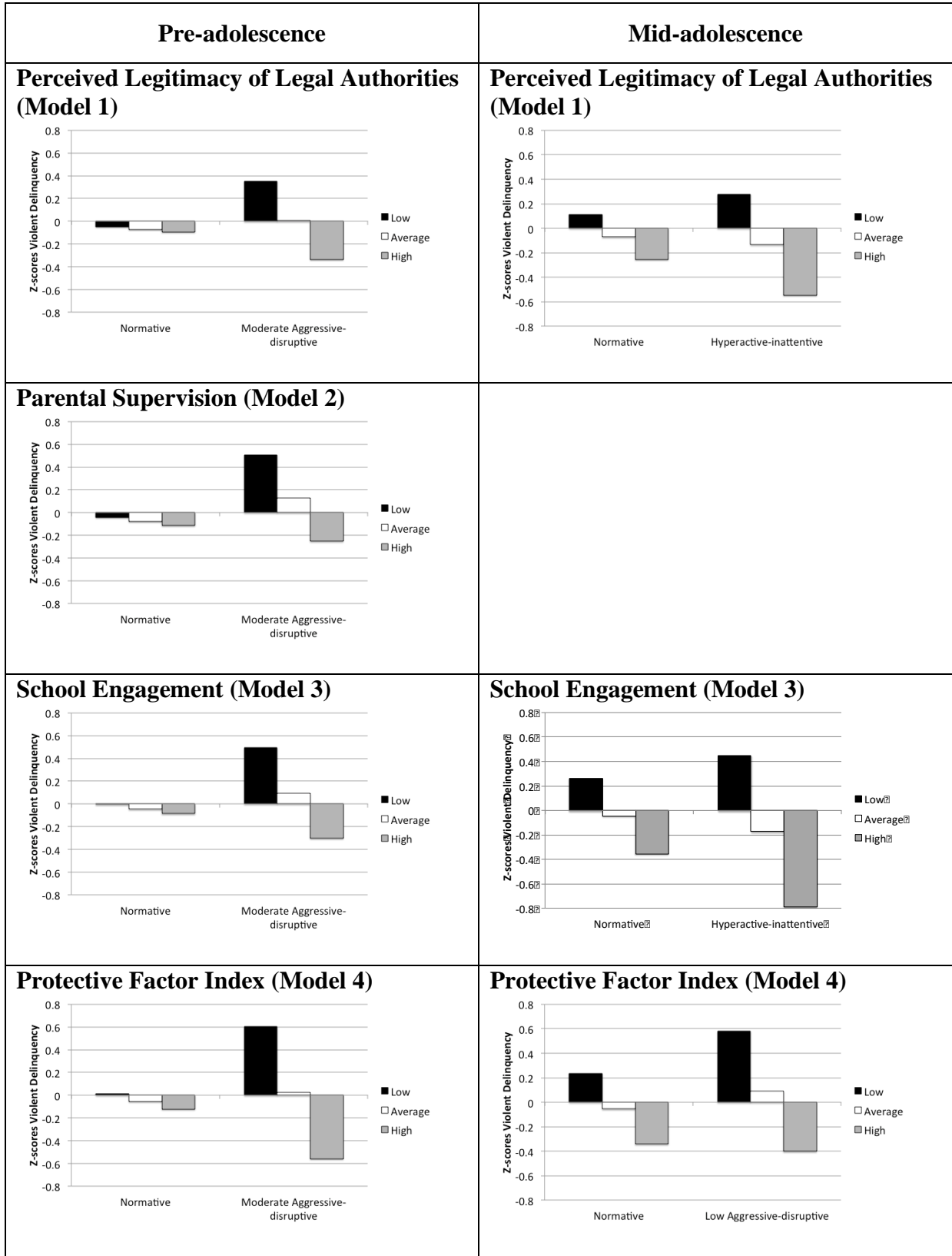


Table 1. Means and Standard Deviations of Family Risk Index, Putative Compensatory/Protective Factors, and Violent Delinquency for Each Behavioral Profile

	Normative (n = 450)		Hyperactive- inattentive (n = 98)		Low Aggressive- disruptive (n = 178)		Moderate Aggressive- disruptive (n = 66)		High Aggressive- disruptive (n = 60)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Family Risk Index	0.28	0.23	0.31	0.22	0.35	0.25	0.42	0.22	0.46	0.28
Pre-adolescence Compensatory/Protective Factor										
Perceived Legitimacy of Legal Authorities	7.04	1.63	6.84	1.61	6.74	1.79	6.06	2.10	6.65	1.68
Parental Supervision	4.77	1.16	4.65	1.25	4.40	1.34	4.28	1.50	4.28	1.38
School Engagement	15.37	1.99	15.01	1.90	14.40	2.32	14.37	2.50	13.34	2.76
Index of the Factors	3.20	1.12	2.98	1.05	2.79	1.32	2.61	1.29	2.55	1.19
Mid-adolescence Compensatory/Protective Factor										
Perceived Legitimacy of Legal Authorities	6.36	2.16	6.19	2.34	6.06	2.35	5.51	2.36	5.25	2.29
Parental Supervision	4.29	1.23	4.48	1.22	3.99	1.40	4.30	1.37	4.12	1.52
School Engagement	13.42	2.92	12.95	3.29	12.56	3.32	12.93	3.64	11.43	3.72
Index of the Factors	3.12	1.12	3.08	1.15	2.87	1.25	2.91	1.29	2.55	1.20
Violent Delinquency	1.22	1.70	1.24	2.04	1.73	2.24	2.15	3.03	2.43	3.04

Note.

N = 852.

Table 2. Correlations Among Family Risk Index, Putative Compensatory/Protective Factors, and Violent Delinquency

	1	2	3	4	5	6	7	8
1. Family Risk Index	-							
Pre-adolescence Compensatory/Protective Factor								
2. Perceived Legitimacy of Legal Authorities	-.16	-						
3. Parental Supervision	-.12	.24	-					
4. School Engagement	-.22	.33	.38	-				
Mid-adolescence Compensatory/Protective Factor								
5. Perceived Legitimacy of Legal Authorities	-.15	.40	.20	.34	-			
6. Parental Supervision	-.13	.13	.43	.26	.25	-		
7. School Engagement	-.15	.29	.31	.61	.46	.42	-	
8. Violent Delinquency	.15	-.21	-.24	-.30	-.32	-.37	-.44	-

Note.

$N = 852$.

All correlations were significant at $p \leq .001$.

Table 3. Regression Analyses Examining the Putative Compensatory/Protective Factors Against the Influence of the Behavioral Profiles on Violent Delinquency in Late Adolescence

	Outcome – Violent Delinquency					
	Model 1: Perceived Legitimacy of Legal Authorities ^a		Model 2: Parental Supervision ^a		Model 3: School Engagement ^a	
	<i>b</i>	95% CI	<i>b</i>	95% CI	<i>b</i>	95% CI
Part A						
Control Variables						
Intervention group ^b	-.30	-.64 – .06	-.25	-.59 – .10	-.15	-.50 – .21
Control/Observational group ^b	-.01	-.24 – .24	.05	-.19 – .30	.04	-.19 – .29
Family Risk Index	.08*	.02 – .15	.06	.00 – .13	.06*	.00 – .13
Behavioral Profiles (Contrasts)						
High Aggressive-disruptive ^c	.38*	.09 – .69	.44**	.13 – .76	.26	-.05 – .58
Moderate Aggressive-disruptive ^c	.08	-.23 – .39	.21	-.12 – .53	.14	-.15 – .42
Low Aggressive-disruptive ^c	.20*	.03 – .37	.12	-.05 – .28	.12	-.05 – .28
Hyperactive-inattentive ^c	-.06	-.26 – .14	-.01	-.23 – .22	-.12	-.30 – .05
Pre-adolescence Putative Compensatory Factor	-.02	-.12 – .08	-.04	-.14 – .07	-.04	-.16 – .08
Mid-adolescence Putative Compensatory Factor	-.18***	-.29 – -.08	-.31***	-.41 – -.21	-.31***	-.43 – -.19
Part B						
Pre-adolescence Putative Protective Factor X Behavioral Profiles (Contrasts)						
High Aggressive-disruptive ^c	-.09	-.41 – .27	-.06	-.43 – .23	.10	-.22 – .38
Moderate Aggressive-disruptive ^c	-.32**	-.57 – .02	-.34**	-.63 – -.09	-.36*	-.68 – -.04
Low Aggressive-disruptive ^c	-.11	-.30 – .08	-.01	-.20 – .17	.07	-.14 – .29
Hyperactive-inattentive ^c	.13	-.10 – .36	.04	-.19 – .28	.18	-.11 – .49
Mid-adolescence Putative Protective Factor X Behavioral Profiles (Contrasts)						
High Aggressive-disruptive ^c	-.08	-.41 – .21	.19	-.07 – .52	-.13	-.41 – .17
Moderate Aggressive-disruptive ^c	-.09	-.51 – .21	.10	-.31 – .48	.04	-.30 – .40
Low Aggressive-disruptive ^c	-.17	-.35 – .01	-.13	-.30 – .04	-.15	-.35 – .05
Hyperactive-inattentive ^c	-.23*	-.46 – .00	-.01	-.28 – .23	-.31*	-.55 – -.04
R²		.16		.18		.22

Note.

N = 852.

CI = confidence intervals (based on 5000 bootstrap samples).

^a The Z-scores of all continuous variables were used in the analyses. The unstandardized regression coefficients are reported.

^b Reference group: all other participants, i.e., participants who were not assigned to the intervention nor the control/observational groups.

^c Reference group: normative behavioral profile.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Table 4. Regression Analyses Examining the Putative Compensatory/Protective Factor Indexes Against the Influence of the Behavioral Profiles on Violent Delinquency in Late Adolescence

	Outcome – Violent Delinquency	
	Model 4: Compensatory/Protective Factor Indexes^a	
	<i>b</i>	95% CI
Part A		
Control Variables		
Intervention group ^b	-.20	-.55 – .14
Control/Observational group ^b	-.02	-.24 – .22
Family Risk Index	.07*	.00 – .13
Behavioral Profiles (Contrasts)		
High Aggressive-disruptive ^c	.30*	.00 – .61
Moderate Aggressive-disruptive ^c	.08	-.20 – .36
Low Aggressive-disruptive ^c	.14	-.02 – .31
Hyperactive-inattentive ^c	-.07	-.27 – .14
Pre-adolescence Putative Compensatory Factor Index	-.07	-.16 – .03
Mid-adolescence Putative Compensatory Factor Index	-.29***	-.38 – -.19
Part B		
Pre-adolescence Putative Protective Factor Index X Behavioral Profiles (Contrasts)		
High Aggressive-disruptive ^c	-.02	-.37 – .31
Moderate Aggressive-disruptive ^c	-.51***	-.76 – -.26
Low Aggressive-disruptive ^c	.09	-.08 – .26
Hyperactive-inattentive ^c	.02	-.22 – .26
Mid-adolescence Putative Protective Factor Index X Behavioral Profiles (Contrasts)		
High Aggressive-disruptive ^c	-.09	-.39 – .22
Moderate Aggressive-disruptive ^c	.11	-.20 – .37
Low Aggressive-disruptive ^c	-.20*	-.37 – -.04
Hyperactive-inattentive ^c	-.12	-.33 – .10
	R²	.22

Note.

N = 852.

CI = confidence intervals (based on 5000 bootstrap samples).

^a The Z-scores of all continuous variables were used in the analyses. The unstandardized regression coefficients are reported.

^b Reference group: all other participants, i.e., participants who were not assigned to the intervention nor the control/observational groups.

^c Reference group: normative behavioral profile.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.