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Towards an Improved Understanding of the Heterogeneity of Violence: A Test of the Clinical Utility of the Reactive-Instrumental Distinction Among Adult Male Inmates

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Psychology

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TOWARDS AN IMPROVED UNDERSTANDING OF THE HETEROGENEITY OF
VIOLENCE: A TEST OF THE CLINICAL UTILITY OF THE REACTIVE-
INSTRUMENTAL DISTINCTION AMONG ADULT MALE INMATES

(Thesis format: Monograph)

by

Jennifer L. Tapscott

Graduate Program in Psychology

A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

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Abstract

Purpose: Interpersonal violence exacts a high cost on society, both in terms of its impact on victims and its associated financial burden. To better understand the heterogeneity of violence, forensic researchers often distinguish between reactive violence, which occurs in response to provocation, and instrumental violence, which is goal-oriented. Although these subtypes of aggression have been associated with unique psychosocial vulnerabilities in samples of children or community adults, the current study examined whether this pattern of divergence generalized to an adult correctional sample. **Method:** Participants were 151 adult male federal inmates. Inmates completed self-report measures of childhood maltreatment, social-cognitive processing, and impulsivity, and their files were reviewed to determine their levels of psychopathy and alcohol problems, as well as their frequency of each type of violent offending. **Results:** The divergent validity of the reactive-instrumental distinction was evaluated through negative binomial regression and hierarchical linear modeling, which tested whether the hypothesized risk factors were related to the rates and odds of different types of violence. Across these analytic approaches and while controlling for potential confounds, reactive and instrumental violence were associated with distinct psychosocial profiles: Whereas reactive violence was related to anger, hostility-related cognitions, and alcohol problems, instrumental violence was associated with childhood maltreatment and positive outcome expectancies regarding crime. The only variables that were significantly related to the rates of both types of violence reflected schemas of entitlement and the affective deficits of psychopathy. In contrast, the impulsivity-related traits were unrelated to the rates or odds of either type of violence. **Discussion:** The observed divergence between subtypes

of violence was generally consistent with hypotheses, providing strong support for the clinical utility of the reactive-instrumental distinction in adulthood. These findings have implications for refining theories of subtypes of violence, as well as for developing more specialized rehabilitation programs that better match the varying motives and needs of different types of violent offenders. Future research with a longitudinal design would help to clarify whether a causal interpretation of the current findings is warranted.

KEYWORDS: aggression, reactive violence, instrumental violence, criminal offending, general theory of crime, social learning theory, frustration-aggression hypothesis, childhood maltreatment, social information processing, impulsivity, psychopathy, alcohol

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It's been said that a good dissertation is a done dissertation. When I was in the throes of things though, it was not always clear to me what would make for a done dissertation. Looking back, I see that a done dissertation—in my case at least—is the product of the contributions and support of many people. I would like to acknowledge all of these people who helped me to cross the finish line, for whom I am exceedingly grateful.

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List of Abbreviations

ADS	Alcohol Dependence Scale
BPAQ-SF	Short-Form Buss-Perry Aggression Questionnaire
CFA	Confirmatory factor analysis
CTQ	Childhood Trauma Questionnaire
HLM	Hierarchical linear modeling
ICC	Intraclass correlation coefficient
IRR	Incidence rate ratio
OEC	Outcome Expectancies for Crime
OLS	Ordinary least squares
OMS	Offender Management System
PCL-R	Psychopathy Checklist-Revised
PRD	Problems Related to Drinking scale
UPPS-P	UPPS-P Impulsive Behaviour Scale
YSQ	Young Schema Questionnaire

**Towards an Improved Understanding of the Heterogeneity of Violence: A Test of
the Clinical Utility of the Reactive-Instrumental Distinction
Among Adult Male Inmates**

The human and economic costs associated with interpersonal violence are profound. Each year, interpersonal violence claims the lives of over half a million people and leaves millions of others injured (World Health Organization [WHO], 2002). In 2009 in Canada alone, 1.6 million people aged 15 or over, or 6% of the population, reported being the victim of a violent crime (Perreault & Brennan, 2010). Such victimization is associated with a wide variety of adverse effects on well-being, including depression, substance use problems, and posttraumatic stress (Hedtke et al., 2008; Weaver & Clum, 1995). In addition to these costs to human life, violence-related lost productivity, health care expenditures, and legal costs create an annual financial burden of billions of dollars worldwide (WHO, 2002). To curb these costs, correctional programs have been designed expressly for violent offenders. However, the effectiveness of providing a single treatment to all violent offenders may be limited given the heterogeneity of violence. That is, although two individuals may have committed the same violent act, these offenders may have differed in their motivation for using violence and, therefore, could benefit from differing courses of treatment.

To acknowledge the heterogeneity of violence, forensic psychologists often distinguish between reactive and instrumental violence, which differ from each other in terms of their ultimate goals. Whereas the ultimate goal of reactive violence is to harm the victim after perceived provocation, the ultimate goal of instrumental violence is to obtain some identifiable goal other than inflicting injury (e.g., money or drugs; Bushman

& Anderson, 2001). Hart and Dempster (1997) captured this difference well, stating that “instrumental violence is a means to an end, and reactive violence is an end in itself” (p. 224).

The reactive-instrumental distinction has been very influential in the development of more refined etiological theories of aggression, and these etiological differences, in turn, have potential implications for decisions about criminal culpability and offender punishment, management, and treatment (Fontaine, 2007; Merk, Orobio de Castro, Koops, & Matthys, 2005). However, Bushman and Anderson (2001) have argued that the practice of dichotomizing instrumental and reactive aggression oversimplifies a complex behaviour, ignores the many contributing factors to real-world cases of aggression, and impedes further advances in understanding and controlling aggression. Rather, they have contended that real-world acts of aggression are committed with mixed motives, and they have declared it “time to pull the plug” (p. 273) on the reactive-instrumental dichotomy in favour of a more general and integrative model of aggression (see also Anderson & Bushman, 2002). The overall objective of the current dissertation was to evaluate the merits of such criticism by conducting a comprehensive test of the clinical utility of the reactive-instrumental distinction.

This Introduction begins by defining the constructs of aggression and violence and by providing a theoretical context for understanding aggression as part of a more general pattern of criminal and deviant behaviour. Next, the conceptual and theoretical differences between reactive and instrumental subtypes of aggression are outlined, and the evidence that these subtypes of aggression can be distinguished from one another empirically is examined. The review then turns to the previous research supporting the

utility of the reactive-instrumental distinction, thereby establishing that subtypes of aggression have been associated with different psychosocial vulnerabilities, including childhood maltreatment, social-cognitive processing, problematic alcohol use, impulsivity, and psychopathy. However, the large majority of this evidence-base comes from research done with children and adolescents, who have committed relatively less severe acts of aggression; much less is known about the differential correlates of subtypes of adult violence. Therefore, the current research was undertaken to test whether the pattern of divergence between subtypes of childhood aggression, on the one hand, and etiologically- and treatment-relevant variables, on the other hand, generalizes to a sample of adult offenders.

Definitions of Aggression and Violence

Aggression is a complex, multifaceted construct that has eluded a universally accepted definition. The problem of arriving at an acceptable definition stems, in large part, from the frequency and imprecision with which the term is used by the general public. For example, such dissimilar events as a murder, gossiping, military combat, and assertiveness can be viewed as falling under the umbrella of aggression. Nevertheless, Geen (2001) contended that it is possible to identify common features of all forms of aggression and arrive at a unifying definition that can promote the systematic study of aggression as a whole.

Amalgamating the shared components of modern definitions, aggression may be thought of as any behaviour that is executed with the proximate goal of causing physical or psychological harm to another individual who is motivated to avoid said behaviour (Bandura, 1973; Baron & Richardson, 1994; Berkowitz, 1993; Bushman & Anderson,

2001; Geen, 2001; Kingsbury, Lambert, & Hendrickse, 1997). Given this definition of aggression as a behaviour, it follows that cognitive processes with aggressive content, such as thoughts or dreams, are not instances of aggression (Kingsbury et al., 1997). Similarly, aggression is distinct from both anger (a set of emotions that is not aimed at achieving a particular goal) and hostility (a negative attitude toward another person; Berkowitz, 1993). The above definition also highlights that for behaviour to be deemed aggressive, it must have been executed with the intent to cause harm, irrespective of the outcome. That is, injurious behaviour that is accidental or due to negligence (e.g., vehicular manslaughter) would not be considered aggressive, whereas a failed attempt to injure another person would be (e.g., firing a gun at someone but missing). Although a proximate goal of harming the victim is a defining feature of aggression, this intent to harm could either be the only goal behind an aggressive act, or it could be secondary to some other ultimate goal such as obtaining money, power, or sex (Bushman & Anderson, 2001). However, harmful behaviours are not considered to be aggressive if the recipient is a willing participant, as in the cases of dental or medical patients, sexual masochists, or individuals who engage in self-harming behaviours. Finally, according to the above definition, the harm intended by the aggressor need not be physical; behaviour intending to cause psychological distress to another individual (e.g., spreading rumours) would also qualify as aggression.

The construct of violence is closely related to that of aggression, but it can be more narrowly defined as “an intentional act of aggression against another human being that results in, or is likely to result in, physical injury” (Meloy, 2002, p. 105). Therefore, whereas all violent acts are considered aggressive (and meet all of the criteria for

aggression outlined above), the opposite is not true. For example, most instances of verbal aggression that cause psychological harm (e.g., gossiping, name calling, threats to reputation) would not qualify as violent. Although violence has been described as severe physical aggression (Anderson & Huesmann, 2003), the point at which physical aggression becomes violence is unclear. Accordingly, the terminology employed in the literature often corresponds to the legality of the behaviour in question (Megargee, 1982; Patrick & Zempolich, 1998). That is, studies involving harmful behaviours that are punishable by law tend to refer to violence, whereas studies involving harmful behaviours that are not punishable by law tend to refer to aggression. Given this distinction, when presenting empirical results throughout this dissertation, I use the same terminology as the cited authors, so as to convey the nature of the behaviour studied. However, given Anderson and Huesmann's (2003) argument that this legal distinction is irrelevant to understanding the processes underlying harmful behaviour, I tend to use the more inclusive term of aggression in the theoretical discussions that follow.

The General Theory of Crime

In light of the high societal costs associated with aggression and violence, considerable effort has been directed at understanding the biopsychosocial factors that contribute to its occurrence. Some of the diverse causal mechanisms incorporated in existing theories of aggression include the experience of negative affect after unpleasant events, observational learning from aggressive role models, the acquisition of aggressive scripts through exposure to mass media, the misattribution of physiological arousal to anger, and the expectation of rewards (for a review, see Anderson & Bushman, 2002). Some of these aggression-specific theories are elaborated upon in a subsequent section,

but first, in recognizing that a good theory is one that is parsimonious and wide in scope (i.e., uses very few concepts to explain a wide range of behaviour; Vito & Maahs, 2012), a discussion of Gottfredson and Hirschi's (1990) general theory of crime is warranted.

According to the general theory of crime, individual differences in a single latent trait, self-control, can explain individual differences in engagement in all types of crime (Gottfredson & Hirschi, 1990). Self-control is thought to be established early in life during socialization and to remain relatively stable across the lifespan, and it is conceptualized as “the tendency to avoid acts whose long-term costs exceed their momentary advantages” (Hirschi & Gottfredson, 1994, p. 3). Therefore, individuals with low self-control are more likely than individuals with high self-control to seize the opportunities for immediate gratification that are afforded by participating in crime or other “analogous acts” (i.e., other behaviours that have immediate benefits but long-term costs, such as smoking, consuming alcohol, cheating on tests, or risk-taking behaviour). Extending their position that low self-control is the general cause of all deviant behaviour, Gottfredson and Hirschi (1990) further argued that the specific deviant behaviours that an individual participates in are random and unpredictable. In other words, Hirschi and Gottfredson (1994) argued that offenders are versatile in their criminal behaviour, a position which they supported by pointing to the well-established correlations between diverse criminal, deviant, and reckless acts.

An implication of the general theory of crime is that the risk factors for violence should be no different than the risk factors for other crime. The Cambridge Study in Delinquent Development, a prospective longitudinal survey of 411 males, provides some of the most frequently cited support for this position (Farrington, 1991). The data

collection in this study was extensive, involving the assessment of biological, psychological, family, and social factors when the boys were between the ages of 8 and 32. Sources of information included repeated face-to-face interviews, psychological testing, and questionnaires that were completed by the boys' and their parents, as well as behavioural ratings that were completed by the boys' teachers and peers. In all, 106 variables were considered as potential predictors of officially-documented and self-reported criminal behaviour. Results indicated that although individuals with a history of violence were the most frequent and serious offenders, these violent offenders were virtually indistinguishable from frequent nonviolent offenders in their childhood, adolescent, and adult characteristics. From these findings, Farrington (1991) concluded that that "the causes of aggression and violence must be essentially the same as the causes of persistent and extreme antisocial, delinquent, and criminal behavior" (p. 25).

More recent research has substantiated Farrington's (1991) conclusions that violent offenders are, in effect, those who commit the most frequent offences. For example, using a prospective design, Piquero (2000) found that the best predictor of whether someone would have committed a violent offence by age 18 was their number of police contacts by the same age. Further, low intelligence was the only one of the 15 biological, psychological, or sociological correlates of criminal behaviour that was found to predict the occurrence of violence over and above frequency of offending, and this effect size was relatively small. In yet another study, Capaldi and Patterson (1996) matched violent and nonviolent adolescent arrestees for arrest frequency, and they too found that both groups presented with the same background characteristics. Taken together, these studies provide support for the general theory of crime and raise questions

about the utility of alternative theories of crime that are specific to a particular type of offending, such as violence. However, as will be established in the next section, violence is a heterogeneous construct, and the ability of researchers to identify unique risk factors may depend on the extent to which they can delineate meaningful subtypes of violence.

Subtypes of Aggression and Violence

Attempts at parsing the heterogeneity of aggression have led to typologies based on both the form and function of aggression (Ramirez, 2009). Typologies based on the form of aggression abound and highlight topographical distinctions, meaning differences in what the aggressive behaviour looks like to an objective observer. For example, form-based subtypes may distinguish between aggression that is (a) physical, verbal, or postural (i.e., expressed through physical contact with the victim, language, or facial expressions/body postures, respectively); (b) active or passive (i.e., harm that is caused by the aggressor's active behaviour vs. by the aggressor's intentional lack of responding); or (c) direct or indirect (i.e., face-to-face aggression with an identifiable aggressor vs. aggression in which the aggressor is unidentifiable to the victim; for reviews and relevant citations, see Parrott & Giancola, 2007 and Ramirez & Andreu, 2003). Considering these form-based typologies, acts of criminal violence could be described as aggression that is physical, active, and either direct or indirect. However, knowing the form of a particular act of aggression does not promote an understanding of why it occurs. To address the questions about the underlying causes of criminal violence, functional typologies of aggression will be elaborated upon and serve as the focus of the current dissertation.

Typologies based on the function of aggression address the motivational heterogeneity—or the various underlying goals—of aggressive behaviour. Such

typologies have consistently distinguished between two types of aggression: (a) aggression that is an impulsive response to a perceived threat, accompanied by high level of arousal, and intended to harm the source of the threat and (b) aggression that is unprovoked, associated with low autonomic arousal, and premeditated with the objective of obtaining some identifiable goal beyond causing victim harm (e.g., money, drugs, sex, power). Respectively, these two functional subtypes of aggression have been variously referred to as affective and predatory (Meloy, 2006; Vitiello & Stoff, 1997), impulsive and premeditated (Barratt, Stanford, Dowdy, Liebman, & Kent, 1999; Stanford et al., 2003), reactive and proactive (K. Brown, Atkins, Osborne, & Milnamow, 1996; Dodge, 1991; Raine et al., 2006), or reactive and instrumental (Cornell et al., 1996; Woodworth & Porter, 2002). Although these terms have been described as synonymous in reviews of the aggression literature (e.g., Vitaro, Brendgen, & Barker, 2006), researchers' selection among the alternative terminology tends to correspond to slight differences in their conceptual and operational definitions of aggression subtypes, as well as to differences in the population under study. These differences are now highlighted to provide the context for interpreting and integrating previous research in this area, as well as to establish the limits to the generalizability of existing findings.

The terms of affective and predatory aggression originated in the animal literature, where subtypes of aggression were distinguished from one another on the basis of the animal's level of physiological activation (Vitiello & Stoff, 1997). These terms—along with their corresponding conceptual definitions that emphasize high versus low physiological arousal—have since been applied in samples of adolescent (Vitiello, Behar, Hunt, Stoff, & Ricciuti, 1990) and adult psychiatric inpatients (Raine et al., 1998). In

these samples, individual differences in propensity towards affective and predatory violence have been operationalized by coding the characteristics of violent incidents recorded in various official sources (e.g., medical charts, incident reports from clinical staff).

In contrast, impulsive and premeditated aggression have been differentiated in terms of the amount of behavioural control shown during the incident (e.g., spontaneous, impulsive response to provocation vs. planned or conscious act), and these subtypes have been assessed among college students (Barratt et al., 1999; Haden, Scarpa, & Stanford, 2008) and adolescent and adult clinical samples (Kockler, Stanford, Nelson, Meloy, & Sanford, 2006; Mathias et al., 2007; Stanford et al., 2003). However, the self-report measure employed in these studies, the Impulsive/Premeditated Aggression Scale (Barratt et al., 1999), is predicated on asking respondents to think of specific aggressive acts involving “hitting and or verbally insulting another person or breaking objects because you are angry or frustrated” (p. 165). By restricting respondents’ reports to instances of aggression involving anger, the construct of premeditated aggression would be expected to diverge from that of the previously discussed predatory aggression, which was defined as aggression committed in states of low physiological arousal. Another difference between the impulsive-premeditated and affective-predatory dichotomies is that whereas the former terms have been applied to describe acts of verbal aggression, the latter terms have been applied exclusively to describe acts of physical aggression.

Finally, the conceptual definitions of reactive and proactive aggression and of reactive and instrumental violence have tended to emphasize both the instigation of behaviour (i.e., presence or absence of a perceived provocation) and the incentives

behind the behaviour (Dodge, 1991). However, whereas the reactive-proactive distinction has been applied to describe the broad-spectrum of verbally and physically aggressive-like behaviours of children and community adults (K. Brown et al., 1996; Dodge & Coie, 1987; Miller & Lynam, 2006; Raine et al., 2006), the reactive-instrumental distinction has been applied to describe the criminally violent behaviour of adolescents and adults in correctional settings (Murrie, Cornell, Kaplan, McConville, & Levy-Elkon, 2004; Woodworth & Porter, 2002). For example, the former reactive aggression is broadly operationally defined so as to include trait anger, property destruction, yelling, and blaming others in disputes, whereas the latter reactive violence specifically captures severe physical aggression occurring after provocation. Similarly, proactive aggression is a relatively broad construct that not only includes aggression for object acquisition, but that also has a strong emphasis on bullying behaviour (e.g., getting peers to gang up on someone, picking on peers, using force to get peers to do what is wanted). This conceptualization contrasts with that of instrumental violence, which places more emphasis on violence to obtain a tangible goal (e.g., robbery) than on violence to achieve power or status in interpersonal relationships (e.g., gang activities). Another difference in the operationalization of reactive and proactive aggression versus reactive and instrumental violence pertains to the method of assessment: the former tends to involve questionnaires (e.g., teacher-, parent-, and self-reports), but the latter typically involves a review of official documentation of violent crimes.

Despite the above-noted similarities and differences in the existing functional dichotomies of aggression, there is a dearth of empirical research directly testing the degree of correspondence between these classification systems. Indeed, the only two

studies of this sort both failed to support the equivalency of the reactive-proactive and the impulsive-premeditated distinctions, as the reported convergent correlations in samples of university students (r s from .21 to .34) were no larger than the divergent correlations (r s from .20 to .29; Ostrov & Houston, 2008; Tharp et al., 2011). Although preliminary, these findings are in contrast to arguments that the various functional dichotomies reflect “basically redundant categories” (Ramirez, 2009, p. 95). Nonetheless, the literatures surrounding the affective-predatory, impulsive-premeditated, reactive-proactive, and reactive-instrumental dichotomies will be reviewed in an integrated fashion throughout this Introduction, on the grounds that they are all based on the same theoretical distinction, reviewed next. When providing this theoretical background, as well as when summarizing the empirical data from methodologically diverse studies, I will use the reactive-instrumental terminology to be consistent with the previous research on the subtypes of criminal violence that are the focus of the current research. However, when discussing the results of individual studies, an effort will be made to retain the original authors’ terminology in order to most accurately reflect the constructs studied.

Theoretical Distinction Between Reactive and Instrumental Aggression

Initial support for the utility of the reactive-instrumental distinction comes from the unique theoretical models that have been offered to explain these subtypes of aggression. Instrumental aggression can be understood from the framework of Bandura's (1973, 1977, 1978) social learning theory. Bandura argued that most aggressive acts require extensive learning of intricate skills, which can be learned vicariously by observing the consequences associated with the aggressive behaviour of others. When an individual observes that the consequences of aggression are rewarding, an incentive is

established for the observer to engage in similar behaviour in the future. Such behaviour will then occur to the extent that the individual expects his or her own aggressive behaviour to produce similar rewards. However, if an individual observes that aggression results in punishment, future aggression will be avoided to the extent that the individual is able to develop alternative strategies for securing his or her desired goals. In summary, social learning theory proposes that instrumental aggression is an acquired behavioural response that is regulated by contingencies and driven by outcome expectancies and perceived self-efficacy.

Reactive aggression can be understood from the framework of the frustration-aggression hypothesis (Berkowitz, 1989; Dollard, Doob, Miller, Mowrer, & Sears, 1939). According to this theory, a “frustration” (i.e., any unpleasant event) produces aggressive inclinations to the extent that the event is experienced as aversive and generates negative affect. However, frustration and aggressive inclinations do not inevitably lead to aggressive behaviour. Rather, the negative affect experienced in response to frustration will automatically stimulate a variety of thoughts, feelings, memories, and expressive-motor reactions that are associated not only with aggressive tendencies, but also with escape and avoidance tendencies. The preferred response on a particular occasion (i.e., fight or flight) is determined by factors including genetic background, prior learning, and situational influences. For example, an aggressive response is inhibited in individuals who have expectations of punishment, who have self-imposed rules of conduct, or who have low self-efficacy for aggression. Conversely, aggression is more likely if the provocation is perceived to be intentional, if aggression-associated cues are present in the

environment, or if the individual has weak self-restraints (see Berkowitz, 1989, for a review).

To summarize the differential theoretical underpinnings of reactive and instrumental aggression, reactive aggression can be thought of as driven largely by events occurring before the aggressive act, whereas instrumental aggression can be thought of as contingent on events occurring after the aggressive act. This theoretical difference has provided the rationale for much research, reviewed next, on the validity of empirically distinguishing between functional subtypes of aggression.

Empirical Distinction Between Reactive and Instrumental Aggression

The theoretical distinction between reactive and instrumental aggression is only important to the extent that these subtypes can be distinguished from each other empirically (Merk et al., 2005). Although questions have been raised about the divergent validity of reactive and instrumental aggression, most pointedly by Bushman and Anderson (2001), the research reviewed below supports that these subtypes can be distinguished from one another, regardless of whether aggressive acts or aggressive individuals serve as the unit of analysis.

Distinguishability of reactive and instrumental acts. Cornell and colleagues (Cornell, 1996; Cornell et al., 1996) conducted pioneering research on the distinguishability of reactive and instrumental acts by examining the characteristics of individual violent offences committed by adult male offenders. Although their global rating scale could be used to reliably dichotomize violence as either reactive or instrumental (i.e., intraclass correlation coefficients for interrater reliability was as high as .93 and .98), none of the eight more specific characteristics examined were

synonymous with the reactive-instrumental distinction (Cornell, 1996). For example, although reactive violence was defined to involve provocation, this provocation was sometimes only perceived by the offender and not necessarily by an objective bystander or researcher. In contrast, although instrumental violence was usually unprovoked, Cornell observed that some instrumental violent acts escalated in response to provocation by the victim (e.g., violence committed in anger against a victim who resisted a robbery). Likewise, although instrumental violence was often cold-blooded, arousal in the form of anxiety was occasionally experienced while committing instrumental offences. That said, any arousal that was experienced while committing instrumental violence was secondary to the primary objective of achieving external goals. In comparison, reactive violent offences were primarily motivated by arousal (e.g., anger directed at the source of provocation), but they at times had the secondary effect of producing a desired outcome such as revenge or increased social status. Finally, instrumental violence was sometimes as unplanned as reactive violence, as in the case of an opportunistic individual who assaults and robs an unexpected passerby.

In the absence of a clear boundary between instrumental or reactive violence, Bushman and Anderson (2001) concluded that these subtypes are not discrete categories. Similarly, Woodworth and Porter (2002) conceptualized violent incidents as lying along a continuum, ranging from purely reactive to purely instrumental, with violence with mixed motives lying between these extremes. In support of this continuous view, Woodworth and Porter found that 43% of homicides were committed with mixed motives. However, Kendell and Jablensky (2003) argued that the mere presence of such “interforms” between two theoretical categories does not, in itself, establish that the

distinction is continuous rather than categorical. For example, the interforms between the two biological sexes (e.g., Klinefelter's and Turner's syndromes) and between trisomy 21 and normal chromosomal architecture (e.g., mosaics and partial trisomies) are extremely rare, and as such, their existence does not threaten the validity of the categorical constructs of biological sex or trisomy 21 (Kendell & Jablensky, 2003).

In comparison, Woodworth and Porter's (2002) data indicate that the interform between reactive and instrumental violence can be quite common (i.e., 43%). In the case of psychological constructs though, frequent interforms may be observed between two discrete categories as a result of imprecise indicators of group membership. For example, if the categorical construct of biological sex was assessed using an imprecise indicator such as height, the overall frequency distribution may appear to be continuous and unimodal, despite the fact that it contains two discrete distributions that are each characterized by measurement error (Beauchaine, 2007; Ruscio & Ruscio, 2004).

Given that the latent structure of a construct cannot be determined from the observed unimodality or bimodality of indicator scores, taxometric analyses have recently been conducted to test the validity of the reactive-instrumental dichotomy. Specifically, Tapscott, Hancock, and Hoaken (2014) examined whether the observed relations among a set of four primary indicators of type of violence—amount of provocation, planning, arousal, and goal-directedness—were better accounted for by conceptualizing instrumental and reactive violence as opposite ends of a single continuum or as discrete categories of offences. Taxometric analyses of the characteristics of 240 violent offences provided strong support for a dichotomous view of violence over a continuous view. That is, although no single indicator could be used to

distinguish subtypes of violence from one another, reactive and instrumental violence could be reliably dichotomized on the basis of their constellation of offence characteristics. Tapscott et al. provided further evidence of the validity of this dichotomy, demonstrating that reactive and instrumental violent offences differed significantly from each other on a number of secondary offence characteristics that were not used in the taxometric analyses. Specifically, compared to reactive offences, instrumental offences were more likely to be committed with an accomplice, against a stranger, with a firearm, and by an older offender. These recent findings support the validity of distinguishing between reactive and instrumental aggressive acts, but these distinct subtypes of aggression may nonetheless co-occur across an individual's lifespan. Therefore, the validity of distinguishing between propensities towards reactive and instrumental aggression must also be examined.

Distinguishability of reactive and instrumental propensities. Evidence regarding the distinguishability of individual propensities towards reactive versus instrumental aggression comes from two lines of study: factor analyses of aggression measures and the correlations between subtypes of aggression. Factor analyses involve examining the covariance among scale items to identify whether separable dimensions exist within the measured domain (Floyd & Widaman, 1995). In factor analyses of questionnaires tapping motivational differences in aggression, exploratory and confirmatory approaches have consistently demonstrated that a two-factor solution fits the data better than does a one-factor solution, both in tests of the reactive-proactive (K. Brown et al., 1996; Poulin & Boivin, 2000a; Raine et al., 2006; Vitaro, Barker, Boivin, Brendgen, & Tremblay, 2006; Xu, Farver, & Zhang, 2009) and the impulsive-

premeditated dichotomies (Barratt et al., 1999; Chen, Yang, & Qian, 2013; Haden et al., 2008; Kockler et al., 2006; Mathias et al., 2007; Stanford et al., 2003).

Although factor analyses support the distinguishability of functional subtypes of aggression, a recent meta-analysis has indicated that propensities towards reactive and proactive aggression are highly correlated among children and adolescents (Polman, Orobio de Castro, Koops, van Boxtel, & Merk, 2007). Across the 51 studies reviewed, the average correlation was strong ($r = .64$), although the effect sizes varied considerably from $-.10$ to $.89$. Most of this variance was explained by the type of aggression measure used, with questionnaire-based studies ($r = .70$) finding larger effects than observational studies ($r = .20$). Addressing this disparity, Polman et al. (2007) hypothesized that the smaller correlations reported in observational studies may reflect the use of trained observers, who judged discrete behaviours and used coding systems that specifically emphasized the function of aggression. In comparison, the questionnaire-based effects may have been artificially inflated as a result of most questionnaires failing to differentiate between the form (e.g., verbal vs. physical) and function (e.g., reactive vs. proactive) of aggression. Polman et al. suggested that because many questionnaire respondents are uninformed about the reactive-proactive distinction, respondents may unwittingly attend only to the form of aggression assessed in the items. Thus, parents or teachers may rate a child high on both proactive items (e.g., “uses physical force to dominate”) and reactive items (e.g., “when teased, strikes back”), not because the child uses aggression to serve both functions, but simply because the child uses physical aggression. In line with this view, Polman et al. found that questionnaire-based studies that disentangled the form and function of aggression were associated with significantly

smaller effects ($r = .42$) than questionnaire-based studies that did not disentangle form and function ($r = .72$).

Much less research has examined the co-occurrence of reactive and instrumental aggression in adults. The few effect sizes reported in questionnaire-based studies of adults from community and forensic populations have been similar in magnitude to those reported in the child literature (Bailey & Ostrov, 2007; Kockler et al., 2006). However, a divergence between the subtypes of violence is evident from the few observational studies conducted in adult correctional samples. For example, although most offenders with a history of instrumental violence also have a history of reactive violence (Cornell et al., 1996), the frequencies of instrumental and reactive violent offending have been found to be unrelated (Walters, Frederick, & Schlauch, 2007) or inversely related (Tapscott, Hancock, & Hoaken, 2012).

Taken together, the available literature supports the validity of the empirical distinction between reactive and instrumental aggression. This distinction is evident both when categorizing subtypes of violent offences, as well as when assessing propensities towards subtypes of aggression through observation or through questionnaires that disentangle form and function. Having established this validity, the following section reviews the evidence for the clinical utility of the reactive-instrumental distinction.

Unique Psychosocial Correlates of Reactive and Instrumental Aggression

Clinical constructs are said to have utility if the defined categories provide nontrivial information about differences in etiology, psychobiosocial correlates, or treatment outcome (Kendell & Jablensky, 2003). More specifically, Kendell and Jablensky (2003) asserted that this clinical utility depends on (a) the quantity and quality

of information about the constructs that is available in the literature and (b) whether the implications of that information differ sufficiently from the implications of comparable information about related constructs. In other words, is there a sufficient body of research on reactive and instrumental aggression such that clinical decision-making can be improved by knowing the type of aggression that someone has committed?

The potential for the clinical utility of the reactive-instrumental distinction is highlighted by recent multivariate behaviour genetic studies, which have demonstrated that there are unique genetic and environmental influences acting on reactive versus proactive aggression (Baker, Raine, Liu, & Jacobson, 2008; Brendgen et al., 2006). Furthermore, as will be reviewed in the following subsections, functional subtypes of aggression have indeed been associated with different life experiences (e.g., childhood maltreatment, substance abuse), social-cognitions (e.g., positive outcome expectancies, hostile attribution biases, and schemas of entitlement), and personality traits (e.g., impulsivity, psychopathy). Accordingly, many researchers have postulated that subgroups of reactive and instrumental violent offenders may have different treatment needs (Crick & Dodge, 1996; Fontaine, 2007; Merk et al., 2005; Vitiello & Stoff, 1997). Despite the regularity with which these potential implications are discussed, the heterogeneity of violence is not yet recognized in the programs currently available to violent offenders (Cortoni, Nunes, & Latendresse, 2006; Polaschek, 2006, 2011).

The delay in the development of specialized rehabilitation programs for adult offenders is arguably because, as will be established, the large majority of what is known about the differential correlates of subtypes of aggression comes from research with children or community adults. The extent to which this literature generalizes to the

prediction of more severe forms of physical aggression (i.e., violence), particularly in adult correctional populations, has yet to be demonstrated. Therefore, the current dissertation addresses this gap by providing a comprehensive test of the clinical utility of differentiating between reactive and instrumental violence in adulthood. Before elaborating on this objective and outlining my hypotheses, I provide a review of the various psychosocial factors that have been theoretically and empirically linked to functional subtypes of aggression in other populations.

Childhood maltreatment. Across Canada in 2008, there were 56,181 substantiated cases of child maltreatment involving neglect, physical abuse, emotional maltreatment, or sexual abuse (9.33 per 1,000 children under the age of 16; Public Health Agency of Canada, 2010); similar rates have also been reported in the United States (U.S. Department of Health and Human Services, 2012). To consider only substantiated cases, though, would underestimate the incidence of childhood maltreatment, as community studies based on the self-reports of victims or perpetrators indicate that ten times as many cases go unreported to child welfare agencies (Gilbert et al., 2009). Further magnifying this public health concern is that victims of maltreatment have long been posited to be at increased risk of becoming perpetrators of violence themselves (Curtis, 1963; Silver, Dublin, & Lourie, 1969; Widom, 1989a). The extent to which this apparent cycle of violence represents a causal process continues to be debated due to methodological problems in individual studies (e.g., poor sampling techniques, inadequate control groups, or overreliance on correlational or retrospective data; Maas, Herrenkohl, & Sousa, 2008; Widom, 1989b). Moreover, preliminary behaviour genetic evidence suggests that an evocative gene-environment correlation may be at play (i.e., parents may

be responding to their children's genetically-influenced conduct problems by maltreating them; Schulz-Heik et al., 2010). These limitations to a causal interpretation notwithstanding, a number of comprehensive reviews and meta-analyses on the subject support the notion that there is, in the least, an association between childhood maltreatment and later aggressive and violent behaviour (Dee, 2012; Gershoff, 2002; Lee & Hoaken, 2007; Maas et al., 2008; Malinosky-Rummell & Hansen, 1993; Widom, 1989b). The extent to which this association persists into adulthood and holds across different types of maltreatment and violence serves as the focus of the review that follows.

Effects of childhood maltreatment into adulthood. Existing reviews of the antisocial consequences of childhood maltreatment have predominantly focused on outcomes in adolescence, but converging evidence from studies using a variety of methodologies indicates that the effects of childhood maltreatment extend into adulthood. For example, young adults' retrospective reports of childhood physical punishment and maltreatment are associated with greater self-reported prevalence and frequency of violent and nonviolent behaviour (Grotevant et al., 2006; Teague, Mazerolle, Legosz, & Sanderson, 2008), including physical aggression in dating relationships (Riggs, O'Leary, & Breslin, 1990). Prospective longitudinal studies, which have spanned 15 to 24 years, have also indicated that youth- and parent-reported physical abuse predict both violent and nonviolent criminal behaviour in adulthood, as measured through self-reports and official crime data (Fagan, 2003, 2005; Farrington, 1989; Lansford et al., 2007). In other longitudinal research comparing young adults with and without substantiated records of maltreatment, a history of abuse or neglect has been found to predict greater risk of

antisocial personality disorder (Johnson, Cohen, Brown, Smailes, & Bernstein, 1999; Luntz & Widom, 1994), as well as higher prevalence and frequency of (a) violent and nonviolent arrests (English, Widom, & Brandford, 2002; Maxfield & Widom, 1996; Widom & White, 1997; Widom, 1989a, 1989c), (b) violent convictions (Mersky & Reynolds, 2007; Topitzes, Mersky, & Reynolds, 2012), and (c) self-reported violent and general offending (C. A. Smith, Ireland, & Thornberry, 2005; Thornberry, Henry, Ireland, & Smith, 2010). The majority of these effects have remained significant when controlling for prior antisocial behaviour and various sociodemographic variables, thereby strengthening the causal interpretation.

Childhood maltreatment has been associated with both violent and nonviolent outcomes, but in the only meta-analysis comparing the relative magnitude of these effects, the average effect size for violent offending ($d = .61$) was larger than for nonviolent offending ($d = .35$; Wilson, Stover, & Berkowitz, 2009). However, as this meta-analysis only included studies that assessed antisocial behaviour in adolescence, more research is needed to determine the extent to which the relatively larger effect of maltreatment on violence holds into adulthood. In one prospective study, English et al. (2002) found that abused and neglected youth, relative to controls, were 4.8 times more likely to be arrested for any juvenile crime and 11.0 times more likely to be arrested for a violent juvenile crime. However, these relative risks dropped to 2.0 for any adult crime and to 2.7 for adult violent crime, suggesting that over time, the overall effect of maltreatment weakens and the specific effects of maltreatment on general and violent offending converge in magnitude. In comparison, a meta-analysis of the effects of corporal punishment—which can be viewed as on a continuum with physical abuse—

provides evidence of a shift in the opposite direction (Gershoff, 2002). Specifically, corporal punishment had a marginally significant larger effect on general antisocial behaviour than on aggression in childhood, but a marginally significant larger effect on aggression than on general antisocial behaviour in adulthood.

Differential effects of subtypes of maltreatment. The extent to which the effect of maltreatment on violent outcomes changes from adolescence to adulthood may vary as a function of the type of maltreatment considered. When C. A. Smith et al. (2005) distinguished between types of maltreatment, they found that the effect of physical abuse on violent offending remained the same from adolescence to adulthood, whereas the effect of neglect disappeared over this timeframe. Further, although sexual abuse did not increase risk for problem behaviours in adolescence, it was associated with greater general offending and drug use and nonsignificantly more violent offending by adulthood. C. A. Smith et al. interpreted these delayed effects as consistent with previous evidence of “sleeper effects” among sexual abuse victims, some of whom appear to “deteriorate with time” (Putnam, 2003, p. 274).

Although the relative magnitude of the effects of different types of maltreatment vary across the lifespan, the absolute magnitude of the effects of neglect, physical abuse, and emotional abuse on violent outcomes have been demonstrated to be equivalent in adulthood (English et al., 2002; Maxfield & Widom, 1996; Mersky & Reynolds, 2007; Widom, 1989a). The evidence regarding the effects of sexual abuse is mixed though, with some research suggesting that victims of sexual abuse are at no greater risk than controls for becoming violent (Maxfield & Widom, 1996; Widom, 1989a), and other research

suggesting that they are at similarly elevated risk as other types of maltreatment victims (English et al., 2002).

Differential pathways from maltreatment to reactive and instrumental aggression. Some of the inconsistent findings in the cycle of violence literature may be due to the fact that relatively few studies have distinguished between reactive and instrumental outcomes. This oversight is problematic given the theoretically distinct etiologies of reactive and instrumental aggression, which implicate different types of maltreatment and different intermediary processes. For example, Dodge (1991) theorized that early childhood experiences, such as physical abuse, that elicit anger, anxiety, or fear may lead to hypervigilance to cues of threat and to increased vulnerability for reactive aggression. This argument is in line with Agnew's (1985, 1992) general strain theory, whereby chronic negative treatment from others (i.e., strain) leads to hostility, a general dislike of others, and a tendency to respond aggressively. In addition, forms of neglect involving isolation from early intimate relationships are thought to interfere with the attachment relationship and the development of empathy, making it more difficult for children to learn to refrain from reactive aggression (Dodge, 1991).

Using a social learning theory framework, Dodge (1991) reasoned that physical abuse may also increase children's vulnerability for proactive aggression by exposing them to aggressive role models. These role models may serve to expand children's repertoire of aggressive behaviours, limit their repertoire of nonaggressive behaviours, and foster the development of positive expectations about the use of aggression. As well, parental neglect in the form of failing to provide adequate supervision may permit children to build friendships with deviant peers, who may further reinforce their use of

proactive aggression (Brendgen, Vitaro, Tremblay, & Lavoie, 2001; Poulin & Boivin, 2000b).

In line with this theoretical discussion, a number of investigators have demonstrated that physical abuse and harsh discipline are related to both subtypes of aggression. These shared risk factors for reactive and proactive aggression have been found in community-based cross-sectional and longitudinal studies using parent-reported measures of maltreatment (Conaty, 2006; Vitaro, Barker, et al., 2006; Xu et al., 2009), as well as in studies comparing psychiatrically-referred youth with and without a documented abuse history (Connor, Steingard, Cunningham, Anderson, & Melloni, 2004; Dodge, Lochman, Harnish, Bates, & Pettit, 1997, Study 2). However, other research has suggested that physical abuse may be uniquely associated with reactive aggression. For example, Dodge et al. (1997, Study 1) found that third grade children rated high on reactive aggression, relative to those rated high on proactive aggression or to those rated low on both types of aggression, were more likely to have been physically abused before kindergarten. Similarly, in two samples of clinically-referred youth, a documented history of physical abuse was associated with higher clinician-rated reactive aggression, but not proactive aggression (Connor, Doerfler, Volungis, Steingard, & Melloni, 2003; Ford, Fraleigh, & Connor, 2010). Recent results from an experimental intervention for high-risk families provided further support for a specific effect of abuse on reactive aggression, as an intervention-based reduction in physically and verbally coercive parenting increased the likelihood that boys would follow a trajectory of low reactive aggression during adolescence (Barker et al., 2010). There were no similar intervention effects on boys' trajectories for proactive aggression.

Research also supports the notion that childhood neglect differentially affects the development of reactive and proactive aggression. For example, reactive and proactive aggression at age 13 were both found to correlate with two types of neglect, a lack of parental supervision and a lack of emotional caregiving, but the trajectories of each type of aggression were moderated by different forms of neglect (Brendgen et al., 2001). Specifically, reactive aggression predicted later violence against a dating partner, but only for individuals who experienced low levels of emotional caregiving. In comparison, proactive aggression predicted later delinquency-related violence, but only for individuals who experienced low parental supervision. If Brendgen et al. (2001) are correct in assuming that intimate partner violence and delinquency-related violence typically reflect reactive versus proactive motives, respectively, then their results indicate that the neglect of children's emotional needs contributes to the continuity of reactive aggression, whereas neglect of their physical needs contributes to the continuity of proactive aggression. This interpretation is consistent with recent findings that college students' impulsive (reactive-like) aggression was associated specifically with self-reports of emotional neglect, whereas their premeditated (instrumental-like) aggression was associated specifically with self-reports of physical neglect (Chen, Yang, Lin, & Qian, 2011).

Finally, less is known about the effect of sexual abuse on subtypes of aggression. In two samples of psychiatrically-referred youth, sexual abuse history was unrelated to either reactive or proactive aggression (Connor et al., 2004; Ford et al., 2010). However, in a retrospective study of college students' aggressive behaviour and childhood abuse experiences, Haden, Scarpa, and Stanford (2008) found that sexual abuse was associated

with impulsive aggression for males but with premeditated aggression for females. Although this sex difference has not been replicated, the more general finding of an association between childhood sexual abuse and subtypes of adult aggression is again consistent with Putnam's (2003) notion of a sleeper effect of sexual abuse, whereby its adverse effects are not realized until later in life.

In summary, a large evidence-base supports a link between childhood maltreatment and later delinquent and aggressive behaviour. In child and community-based samples, physical and sexual abuse and emotional neglect have been linked to reactive aggression, whereas physical abuse and physical neglect have been linked to proactive aggression. However, further research is needed to determine whether any specific relationships exist between subtypes of maltreatment and reactive and instrumental violent offending in adulthood.

Social-cognitive processing. Although various early life experiences, including childhood maltreatment, may predispose individuals towards violence, a number of researchers have focused on the more proximal role that cognitive variables may serve in promoting a violent lifestyle. Many of these investigations have centered around Dodge's (1986) model of social information processing, reformulated by Crick and Dodge (1994). According to this model, competent social behaviour is conceptualized as dependent on an individual's appropriate progression through the following sequence of steps: (a) perception and encoding of cues, (b) interpretation of cues, (c) clarification of the goals for the social situation, (d) retrieval of potential responses from memory or generation of new responses for the situation, (e) evaluation and selection of responses, and (f) behavioural enactment. Dodge contended that biases in any of these steps may lead to

aggressive behaviour, and indeed, a meta-analysis of the extensive research generated to test his model has confirmed that aggressive children selectively attend to aggressive cues, overestimate hostile intent in the behaviour of others, generate more aggressive response options to social problems, and have more positive outcome expectancies for aggression (Yoon, Hughes, Gaur, & Thompson, 1999). These biases are thought to reflect a number of underlying maladaptive schemas—relatively stable cognitive structures of organized prior knowledge about the self, others, and the world (Kovacs & Beck, 1978)—that provide input at each of the stages of social information processing. For example, aggressive individuals have been found to be guided by enduring belief systems whereby they view the world as hostile, themselves as entitled, and aggression as normative and acceptable (Calvete & Orue, 2010; Huesmann & Guerra, 1997; Tremblay & Dozois, 2009). However, as is established in the following literature review, reactive and proactive subtypes of aggression have been associated with different cognitive schemas and, as a result, with biases at different stages of social information processing.

Positive outcome expectancies. Dodge (1991) hypothesized that instrumental aggressors would be characterized by problems in the later stages of social information processing, when their positive outcome expectancies for aggression would influence their selection between potential response options. Outcome expectancies refer to what an individual anticipates would occur in a social interaction following the implementation of a specific response option, including whether the behavioural response would help to attain some instrumental goal, how it might impact one's social relationships, and whether it might incur some societal punishment (Crick & Ladd, 1990). Consistent with the social learning perspective that people are more likely to engage in behaviours that

they expect to produce positive outcomes (Bandura, 1978, 2001), previous research has established that aggressive children and adolescents expect more positive outcomes and fewer negative outcomes from aggression than do their non-aggressive peers (Crane-Ross, Tisak, & Tisak, 1998; Perry, Perry, & Rasmussen, 1986). However, when functional subtypes of aggression are disaggregated, positive outcome expectancies have been found to be specific to the use of proactive aggression across diverse samples, such as community children (Crick & Dodge, 1996; Hubbard, Dodge, Cillessen, & Coie, 2001; Schwartz et al., 1998), university students (Miller & Lynam, 2006), and adolescent offenders (Marsee & Frick, 2007; Smithmyer, Hubbard, & Simons, 2000).

Hostile attribution bias, hostility, and anger. Dodge (1991) hypothesized that reactive aggression would be associated with problems in the early stages of social information processing, which involve the encoding and interpretation of cues. To test this hypothesis, researchers have typically presented participants with hypothetical social situations involving interpersonal provocation, asking them to make hypotheses about the provocateur's intentions. If ambiguous actions are interpreted as intentionally antagonistic, the interpreter is theoretically more likely to feel justified in responding aggressively in turn (Hubbard, McAuliffe, Morrow, & Romano, 2010).

A meta-analysis of studies employing hypothetical vignettes has supported a robust relationship between children's hostile attributions of intent and their overall aggression (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). This relationship is particularly evident when the hypothetical situations are ambiguous, rather than clearly hostile or clearly accidental (Crick & Dodge, 1994; Dodge, 2006). Moreover, mounting community and clinical research has indicated that a hostile

attribution bias is specifically related to children and adolescents' use of reactive aggression, rather than proactive aggression, regardless of whether aggression is observed directly by researchers or rated by teachers, parents, peers, or clinical or correctional staff (Crick & Dodge, 1996; Dodge & Coie, 1987; Hubbard et al., 2001; Kempes, Matthys, Maassen, van Goozen, & van Engeland, 2006; Nas, Orobio de Castro, & Koops, 2005; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005; Peets, Hodges, & Salmivalli, 2011; Schwartz et al., 1998). This unique association with reactive aggression remains when controlling for potentially confounding variables, including socioeconomic status, ethnicity, intelligence, internalizing symptoms, and inattention-hyperactivity (Dodge, Price, Bachorowski, & Newman, 1990; Schippell, Vasey, Cravens-Brown, & Bretveld, 2003).

Dodge (2006) argued that individual differences in tendencies towards hostile attributions are a function of hostile schemas stored in memory, which develop from such early experiences as being the victim of physical abuse, being around others who model hostile attributions, or being exposed to a culture where self-defense and personal honour are highly valued. Such experiences, it is argued, lead to readily available schemas of a social environment that is intentionally dangerous, which over time, become repeatedly accessed, reinforced, and automatically activated, thereby further restricting or biasing an individual's social information processing (Fontaine, 2008). It follows that individuals with hostile schemas may be at increased risk for reactive violence, as their hypervigilance to personal threats may lead them to react quickly to provocation without taking the time to evaluate the other person's intent (Dodge, 2006). Indeed, schemas involving the expectation of being intentionally hurt, humiliated, or taken advantage of

by others have been directly linked to adolescents' self-reported use of reactive aggression, but not proactive aggression (Calvete & Orue, 2010).

Lemerise and Arsenio (2000) have argued that social information processing models have greater explanatory power when emotional functioning is incorporated, as emotional experiences may affect what is noticed about a social encounter, which memories are reflected on during interpretation, and which goals are prioritized. This argument is in line with the well-established and robust congruency between an individual's mood and his or her thoughts, whereby an individual judges mood-congruent thoughts about causes, attributes, and outcomes as more likely or relevant than non-mood-congruent thoughts (Mayer, Gaschke, Braverman, & Evans, 1992). More specifically, trait-based anger and laboratory-induced anger have been associated with a bias towards interpreting anger in ambiguous social stimuli (Barazzone & Davey, 2009; Schultz, Izard, & Bear, 2004; Wenzel & Lystad, 2005); therefore, individuals who are prone to experiencing anger more readily or intensely than others may be more prone to reactive aggression. The evidence to date supports this view, as anger has been consistently associated with reactive aggression, but not proactive or instrumental aggression, in several studies involving both children (Hubbard et al., 2010; Little, Brauner, Jones, Nock, & Hawley, 2003; Little, Jones, Henrich, & Hawley, 2003; McAuliffe, Hubbard, Rubin, Morrow, & Dearing, 2007; Orobio de Castro et al., 2005; Price & Dodge, 1989) and adults (Bettencourt, Talley, Benjamin, & Valentine, 2006; Levi, Nussbaum, & Rich, 2010; Miller & Lynam, 2006).

These various hostility-related cognitions and emotions, along with the positive outcome expectancies discussed above, represent the two areas of social cognition that

have most consistently supported the utility of the reactive-instrumental distinction. However, a third area of social cognition will now be discussed that, although theoretically relevant to overall aggression, has yielded a less consistent pattern of correlations with subtypes of aggression.

Schemas of entitlement. Schemas of entitlement, egocentricity, and grandiosity reflect the underlying beliefs of being superior to others, of being entitled to special rights and privileges, and of being free from normal rules of reciprocity (Young, Klosko, & Weishaar, 2003). These schemas have been widely implicated in discussions of the social-cognitions underlying antisocial and aggressive behaviour (Beck, 1999; Gibbs, 2003; Palmer, 2003, 2005; Tremblay & Dozois, 2009). However, unlike the hostile attribution biases and positive outcome expectancies that have been specifically associated with reactive and proactive aggression, respectively, the extent to which schemas of entitlement can differentially predict subtypes of aggression is less clear.

Schemas of entitlement have been most commonly argued to facilitate instrumental violence. That is, individuals with grandiose belief systems are thought to be prone to select selfish goals during social information processing and to feel justified in pursuing these goals through instrumental aggression. This argument has been supported by several studies, where schemas related to personal superiority and entitlement have shown stronger, more direct relationships to community children's proactive aggression than to their reactive aggression (Calvete & Orue, 2010; Seah & Ang, 2008; Washburn, McMahon, King, Reinecke, & Silver, 2004). Similarly, in a single study of adult male inmates, a broad measure of criminal attitudes, which included feelings of entitlement, was significantly related to the frequency of prior arrests for

robbery and burglary (conceptualized as instrumental violence), but not to the frequency of arrests for assault and domestic violence (conceptualized as reactive violence; Walters, Frederick, & Schlauch, 2007).

Despite some evidence of a unique relation between schemas of entitlement and proactive and instrumental aggression, these schemas have also been hypothesized to increase risk for aggression in response to provocation. According to the threatened egotism hypothesis (Baumeister, Smart, & Boden, 1996), when someone with an inflated view of the self receives negative evaluations from others, the discrepancy between the internal and external appraisals causes negative affect. This negative affect is theoretically likely, then, to be directed at the source of the ego threat in order to maintain the inflated self-appraisal. Testing this hypothesis, Bushman and Baumeister (1998) gave participants negative feedback on an unrelated laboratory task prior to having them complete an aggression paradigm. Participants with an inflated, grandiose sense of self were observed to engage in more aggression towards the source of the negative evaluation, and this relationship was fully mediated by participants' perceived threat. Similarly, in their meta-analysis, Bettencourt et al. (2006) demonstrated that a sense of superiority predicted laboratory aggression only in conditions involving provocation and not in neutral conditions. Such findings suggest that individuals who are motivated to maintain a grandiose self-image may find minor provocations highly aversive, and they may, therefore, be at increased risk for reactive aggression. Consistent with this interpretation, but in contrast to those findings reported above, some community-based studies have found that entitlement is more strongly related to reactive aggression than to

proactive aggression (Archer & Thanzami, 2009; Bukowski, Schwartzman, Santo, Bagwell, & Adams, 2009; Fossati, Borroni, Eisenberg, & Maffei, 2010).

In summarizing the social cognition literature as it pertains to aggression, there is strong evidence from studies of children and community adults that the social information processing factors involved in subtypes of aggression differ. Specifically, although more information is needed to clarify the relationship between subtypes of aggression and entitlement, reactive aggression has been uniquely related to hostility-related cognitions (i.e., hostile attribution biases, schemas of hostility and mistrust, and trait anger), and proactive aggression has been uniquely related to positive outcome expectancies. As is reviewed in the following subsection, the functional subtypes of aggression also seem to have unique relationships with the problematic use of alcohol.

Problematic alcohol use. Alcohol use disorders represent the second leading risk to public health among high income countries, and some of this health burden is attributable to the link between alcohol use and interpersonal violence (World Health Organization, 2011). These health concerns are particularly high among prison inmates, where the lifetime prevalence of alcohol abuse or dependence has been estimated at over 50 percent (Peters, Greenbaum, Edens, Carter, & Ortiz, 1998), which is more than double the prevalence for men of a similar age in the general population (Latvala et al., 2009; National Comorbidity Survey Replication, 2007). Furthermore, retrospective reports from federal inmates indicate that approximately a third of them were under the influence of alcohol at the time of their index offence, with a relatively greater proportion of violent offenders than nonviolent offenders reporting intoxication (Brochu et al., 2001; Pernanen, Cousineau, Brochu, & Sun, 2002). The status of problem alcohol use as a risk factor for

crime has been further supported in a meta-analysis of prospective data, where alcohol abuse was found to be a significant predictor of both general and violent recidivism (Dowden & Brown, 2002).

Causal effect of intoxication on aggression. The relationship between problematic alcohol use and violence has been described as spurious by some researchers. For example, Cherek (2000) argued that heavy alcohol consumption and violence co-occur as a result of the many shared risk factors that are found in low socioeconomic environments (e.g., poor nutrition, greater risks for head injury, poor or absent health care, troubled schools, higher incidences of child abuse, etc.). Although such third variables may account for some of the observed relationship, a considerable body of research provides evidence for causal effects of intoxication on aggression as well. For example, dozens of experimental studies have been conducted in which participants were randomly assigned to drink an alcoholic or non-alcoholic beverage prior to completing a laboratory aggression paradigm. Although the validity of these experimental paradigms has been questioned (Ritter & Eslea, 2005; Tedeschi & Quigley, 1996), meta-analyses have long established that alcohol consumption increases aggression in the laboratory (Bushman & Cooper, 1990; Bushman, 1997; Ito, Miller, & Pollock, 1996).

Additional support for a causal effect of intoxication on aggression comes from a number of event-based studies, where the alcohol consumption prior to real-life violent and nonviolent events has been examined. For example, when individuals entering treatment for substance use disorder were surveyed about their interpersonal conflicts over the past year, Chermack et al. (2010) found that those conflicts occurring on days of

heavy drinking were six times more likely to involve violence with injury than conflicts occurring on days of no drinking. Similarly, in a prospective study involving men entering treatment for alcohol use or domestic violence, the odds of engaging in any or severe physical aggression were 8 to 11 times higher on days that they were drinking than on days that they were not drinking (Fals-Stewart, 2003). Further substantiating the causal interpretation of these results, on days that drinking and physical aggression co-occurred, aggression was more likely to occur during or shortly after the drinking episodes, rather than at a more temporally distant time when the acute effects of alcohol would have abated.

Although the causal relationship between alcohol intoxication and violence is no longer disputed (Hoaken et al., 2012), there is less consensus among researchers on the mechanism underlying this relationship. Early theorists postulated that alcohol causes aggression because people hold expectations that drinking alcohol will cause aggression (MacAndrew & Edgerton, 1969), or alternatively, because alcohol has direct pharmacological effects on areas of the brain responsible for inhibiting socially unacceptable behaviour (Pernanen, 1976). However, Steele and Josephs (1990) argued against these models, citing evidence that the effects of alcohol on aggression (a) remain when controlling for expectancies and (b) are highly variable (i.e., alcohol can increase or decrease aggression, depending on the individual and the situation). Alternatively, they advanced the alcohol myopia hypothesis (Giancola, Josephs, Parrott, & Duke, 2010; Steele & Josephs, 1990), arguing that alcohol exerts its effect on aggression by narrowing attention so that only the most salient and immediate cues from the environment can be perceived and processed. In hostile situations, this restriction in attention and processing

(i.e., myopia) is thought to cause aggression because the immediate provocative cues are more salient than the inhibitory cues (e.g., cues of the consequences of retaliating).

Differential effect of alcohol on subtypes of aggression. From the alcohol myopia hypothesis, it follows that problematic alcohol use may be a risk factor for reactive aggression in particular. That is, alcohol myopia reflects difficulties encoding and interpreting environmental cues, which are the very stages from Crick and Dodge's (1994) social information processing model that have been implicated in reactive aggression (Crick & Dodge, 1996; Dodge, 1991). Indirect support for the influence of intoxication on reactive aggression comes from a review of the various laboratory studies of the alcohol-aggression relationship. For example, Bushman's (1997) meta-analysis demonstrated that the effect of intoxication was larger in experimental conditions involving provocation and frustration than in experimental conditions without these manipulations. Furthermore, many of the individual difference variables that have been found to increase the effect of alcohol intoxication on aggression—such as irritability, trait anger, hostility, and poor anger management (for relevant citations, see Giancola et al., 2010)—are the same variables that were previously discussed herein as relevant to reactive aggression.

Despite the theoretical and indirect support for a unique relationship between alcohol use and reactive aggression, a different picture has emerged from a number of cross-sectional and longitudinal studies involving children and adolescents. For example, alcohol abuse was found to correlate with proactive but not reactive aggression in a sample of clinically-referred youth (Connor et al., 2004). Similarly, among violent juvenile offenders, substance abuse (reflecting abuse of both alcohol and drugs) was

related to index offences with instrumental, but not reactive characteristics (Cornell, Benedek, & Benedek, 1987; Loper, Hoffschmidt, & Ash, 2001). Converging evidence also comes from longitudinal research, which has demonstrated that early proactive aggression predicts both alcohol initiation in adolescence (Fite, Colder, Lochman, & Wells, 2008) and problem drinking ten to twenty years later in adulthood (Fite, Raine, Stouthamer-Loeber, Loeber, & Pardini, 2010; Pulkkinen, 1996). In reviewing this collection of studies, Fite, Schwartz, and Hendrickson (2012) argued that the apparent link between proactive aggression and later alcohol abuse may reflect the more general pattern whereby proactive aggression, more so than reactive aggression, is a risk factor for continued problem behaviour throughout the lifespan. For example, children high in proactive aggression, but not those high in reactive aggression, are at greater risk of socializing with delinquent peers (Fite, Colder, Lochman, & Wells, 2007) and of engaging in delinquency as an adult (Fite et al., 2010). Given this developmental perspective, the co-occurrence of alcohol abuse and proactive aggression in childhood and adolescence does not inform the extent to which alcohol intoxication might have a unique effect on subtypes of aggression in adulthood.

The relationships between problematic alcohol use and subtypes of adult aggression have only recently begun to be examined. In one study, civil psychiatric patients with and without an alcohol abuse diagnosis were followed for one year after release from hospital (Hodges & Heilbrun, 2009). Although diagnostic status did not predict the risk of committing an instrumental violent offence in this timeframe, reactive violence was not assessed to provide a point of comparison. In a second study though, Swogger et al. (2010) found that among individuals charged but not yet tried for an

offence, symptoms of alcohol use disorder were correlated with self-reported impulsive aggression, but not with premeditated aggression. Finally, Levi et al. (2010) conducted the only known study of the alcohol-violence relationship in which official file information was used to categorize violent offenders as primarily reactive or primarily instrumental. Although reactive offenders tended to self-report more problematic alcohol use than instrumental offenders, this trend did not reach significance, perhaps as a result of a small sample size. Considering these limited and inconclusive findings, more research is warranted to explore whether problem alcohol use is uniquely related to adult reactive violence, as might be expected based on the alcohol myopia hypothesis. Before discussing how this need has been addressed in the current study, the evidence for the differential relationship between subtypes of violence and several personality traits is discussed.

Impulsivity. The importance of the construct of impulsivity to psychology research is evident from its inclusion in every major theory of personality (Buss & Plomin, 1975; Cloninger, Przybeck, & Svrakic, 1991; Eysenck & Eysenck, 1985; McCrae & Costa, 1990; Tellegen, 1982; see Whiteside & Lynam, 2001 for a review). For example, Whiteside and Lynam (2001) argued that within the five-factor model of personality, impulsivity-related traits are thoroughly reflected across four different facets, corresponding to three different domains (i.e., neuroticism, extraversion, and conscientiousness). More to the point for the current dissertation, meta-analytic findings indicate that across these various structural models of personality, impulsivity-related domains are consistently related to a broad spectrum of indicators of antisocial behaviour (Miller & Lynam, 2001). Perhaps accordingly, a recent survey of criminologists

identified impulsivity as the second most important psychological cause of serious offending, behind only a lack of empathy (Ellis, Cooper, & Walsh, 2008).

The multifaceted nature of impulsivity. Impulsivity can be broadly defined as “the tendency to act on immediate urges, either before consideration of possible negative consequences or despite consideration of likely negative consequences” (DeYoung, 2011, pp. 487-488). However, synthesizing the psychological, psychiatric, and animal behaviour literatures, Evenden (1999) rejected the adoption of such unitary definitions of impulsivity, arguing instead for a multifactorial approach to understanding the construct. Similarly, Whiteside and Lynam (2001) suggested that impulsivity is an “artificial umbrella term” (p. 687) that is used to refer to any of several distinct psychological processes underlying impulsive-like behaviour. This position stemmed from their exploratory factor analysis of 21 commonly-used self-report measures of impulsivity, where four factors emerged. Specifically, existing measures of “impulsivity” assessed such discrete facets of personality as a lack of premeditation (i.e., the tendency to act on the spur of the moment without thinking about potential consequences), a sense of urgency (i.e., the tendency to act rashly as a result of strong affect), a propensity towards sensation seeking (i.e., a preference for risk taking and for engaging in exciting and novel activities), and a lack of perseverance (i.e., the inability to remain focused on boring or difficult tasks). Although confirmatory factor analysis has since supported this four-factor structure of impulsivity (Lynam & Miller, 2004; Magid & Colder, 2007), other research has indicated that the urgency facet may be further broken down into positive and negative urgency (i.e., acting rashly while in positive vs. negative moods; Cyders & Smith, 2007; Cyders, 2013; Lynam, Smith, Cyders, Fischer, & Whiteside, 2007).

An implication of the multifaceted nature of impulsivity is that the construct's various facets may be differentially related to antisocial behaviour. For example, Whiteside and Lynam (2001) hypothesized that a lack of premeditation may be particularly relevant, as a failure to think about future negative consequences may make crime more appealing. Indeed, measures of impulsivity reflecting a lack of premeditation have been associated with such diverse indicators of violence as self-reported frequency of fighting (Seager, 2005), aggressive responses to hypothetical vignettes (Lynam & Miller, 2004), violent infractions in the prison system (Gordon & Egan, 2011; Komarovskaya, Loper, & Warren, 2007), and official reports of violent offending (Gordon & Egan, 2011; James & Seager, 2006; Seager, 2005; P. Smith, Waterman, & Ward, 2006).

Divergent relations between impulsivity and subtypes of offending. Despite the apparent association between a lack of premeditation and violent behaviour, impulsivity may have stronger ties to nonviolent delinquency. Using a meta-analytic approach, Jones, Miller, and Lynam (2011) compared how the facets of the five-factor model of personality differentially related to antisocial behaviour, in general, and to aggressive behaviour, more specifically. Although the pattern and magnitude of results was quite similar across outcomes, the notable exception was that the impulsivity-related facets of personality—which map onto the four types of impulsivity identified by Whiteside and Lynam (2001)—were observed to have weaker relationships with aggression than with antisocial behaviour. Further, Burt and colleagues (Burt, Donnellan, & Tackett, 2011; Burt & Donnellan, 2008; Burt, 2012) have consistently found that when the shared

variance between aggressive and non-aggressive antisocial behaviour is removed, aggression is no longer associated with impulsivity-related traits.

Despite previous indications that individual differences in impulsivity are relatively unimportant to understanding aggressive behaviour, as compared to nonaggressive antisocial behaviour, such findings may reflect the fact that many researchers have not differentiated between subtypes of aggression. The conclusions from such research, therefore, may be misleading if impulsivity is more relevant to one type of aggression than the other. Indeed, in a meta-analysis of the effect of personality on laboratory aggression, impulsivity was associated with greater aggression only in conditions involving provocation, but not in neutral conditions (Bettencourt et al., 2006). If a parallel is drawn between the presence and absence of provocation, on the one hand, and reactive and instrumental aggression, on the other hand, then Bettencourt et al.'s (2006) work suggests that impulsivity, broadly defined, may be uniquely related to reactive aggression. Moreover, there is theoretical and empirical evidence to suggest that this differential relationship is specific to some facets of impulsivity and not others. This evidence, reviewed next, has accumulated from research employing a variety of impulsivity questionnaires. However, to facilitate the reader's interpretation of the review that follows, the various questionnaires employed in past studies will be referred to using the name of the factor on which they loaded in Whiteside and Lynam's (2001, Table 3) factor analysis (i.e., urgency, lack of premeditation, lack of perseverance, or sensation seeking).

Dodge (1991) characterized reactive aggression as a "hot-blooded" anger or fear response and instrumental aggression as a "cold-blooded" behaviour involving little

autonomic activation (p. 203). This distinction implies that individual differences in the urgency facet of impulsivity may be more relevant for reactive than instrumental violence. Indeed, Derefinko et al. (2011) demonstrated that urgency correlated with male undergraduates' reports of intimate partner violence, which is predominantly reactive (Chase, O'Leary, & Heyman, 2001; Gottman et al., 1995; Stanford, Houston, & Baldrige, 2008; Tweed & Dutton, 1998), but not with their reports of general violence, which included instrumental acts such as armed robbery. Other research involving undergraduate samples has indicated that although urgency is correlated with reports of both reactive and proactive aggression, the significantly smaller effect for proactive aggression disappeared when controlling for reactive aggression (Miller & Lynam, 2006; Miller, Zeichner, & Wilson, 2012). Conversely though, the only known study to compare groups of impulsive and non-impulsive violent offenders, who were categorized based on their type of institutional violence, found no group differences in urgency (Barratt, Stanford, Kent, & Felthous, 1997).

Reactive and instrumental violence are also distinguished from one another in terms of the amount of planning that goes into each: Whereas reactive violence is necessarily committed in the spur of the moment as an immediate response to provocation, instrumental violence may be anywhere from spontaneous and opportunistic to highly premeditated (Woodworth & Porter, 2002). This distinction implies that whereas reactive violence may be associated with the lack of premeditation facet of impulsivity, instrumental violence may be unrelated or perhaps inversely related to this facet. The evidence to support this view is mixed. Though some researchers have found that reactive offenders report higher levels of acting without thinking than instrumental

offenders (Dolan & Fullam, 2004; Stafford & Cornell, 2003), others have found no such group differences (Barratt et al., 1997; Levi et al., 2010). Conflicting findings also come from research involving college students' self-reported aggression, where a lack of premeditation has been found to be uniquely related to reactive aggression in some studies (Barratt et al., 1999; Raine et al., 2006), but uniquely related to proactive aggression in others (Miller & Lynam, 2006; Miller, Zeichner, et al., 2012). Finally, using a prospective design, Hodges and Heilbrun (2009) found an inverse relationship between impulsivity and instrumental offending, such that psychiatric inpatients with fewer self-reported difficulties thinking ahead were more likely to commit an instrumental violent act within one year of discharge (Hodges & Heilbrun, 2009).

While the evidence concerning the relationships between subtypes of violence and both urgency and a lack of premeditation is conflicting, the evidence regarding the relationships between violence and the other two facets of impulsivity is scarce. Individuals with a propensity towards sensation seeking may be more prone to instrumental violence due to a perceived thrill associated with evading apprehension, but alternatively, their pursuit of dangerous activities may increase their likelihood of being in a provocative situation where reactive violence could occur. Although there is some evidence that sensation seeking is similarly associated with both reactive and proactive aggression (Raine et al., 2006), meta-analytic findings indicate that sensation seeking is unrelated to global measures of aggression (Jones et al., 2011). In comparison, whereas a lack of perseverance seems to have a small effect on global measures of aggression (Jones et al., 2011), this facet of impulsivity was found to be uncorrelated with either reactive or proactive aggression (Miller & Lynam, 2006).

From the evidence to date, it is clear that the construct of impulsivity is relevant for understanding individual differences in aggressive behaviour. However, the nature of this relationship can be clarified in the current study by simultaneously recognizing both the heterogeneity of aggression and the multifaceted nature of impulsivity when examining how these constructs interrelate. Furthermore, although impulsivity is itself a multifaceted construct, it is also just one part of an even broader constellation of traits known as psychopathy, which is discussed in the following subsection as it relates to subtypes of violence.

Psychopathy. Psychopathy is a higher-order construct marked by a constellation of covarying affective, interpersonal, and behavioural characteristics (Hare, 1996). Reviewing the various descriptions of psychopathy that have been offered over the last two centuries, Hervé (2007) contended that the psychopath has consistently been depicted as “a manipulative, grandiose, and superficial parasite who, devoid of emotional connections to the world, irresponsibly and selfishly drifts through life, only stopping long enough to callously, impulsively, and aggressively satisfy the urge of the moment” (p. 45). Individuals with clinical levels of psychopathic traits constitute approximately only 1 percent of the general population, but they are overrepresented in forensic populations at 15 to 25 percent, and they are responsible for a disproportionate amount of crime (Hare, 1996). For example, retrospective comparisons of the criminal careers of psychopathic and nonpsychopathic offenders indicate that psychopaths tend to commit approximately twice as many crimes throughout adulthood (Porter, Birt, & Boer, 2001), including a greater frequency and variety of both violent and nonviolent offences (Kosson, Smith, & Newman, 1990). Several meta-analyses have further indicated that

psychopathy is associated with greater risk of violent and general recidivism and institutional misconduct (Campbell, French, & Gendreau, 2009; Hemphill, Hare, & Wong, 1998; Leistico, Salekin, Decoster, & Rogers, 2008; Salekin, Rogers, & Sewell, 1996; Singh, Grann, & Fazel, 2011; Yang, Wong, & Coid, 2010), with small to medium weighted mean effect sizes having been reported ($r = .23$ to $.30$; as reviewed by Skeem, Polaschek, Patrick, & Lilienfeld, 2011). This association between crime and psychopathy is to be expected given that both constructs are associated with the same lower-order personality traits of the five-factor model. Specifically, meta-analytic findings indicate that the facets of personality most strongly related to psychopathy are the same as those most strongly related to antisocial behaviour and aggression (Jones et al., 2011, Figure 1).

Assessment of psychopathy. Although psychopathy can be assessed through self-reports of the lower-order traits of the five-factor model of personality (Tapscott, Vernon, & Veselka, 2012; Widiger & Lynam, 1998), the “measure of choice” (Cooke & Michie, 2001, p. 171) for the assessment of psychopathy is the Psychopathy Checklist–Revised (PCL–R; Hare, 1991, 2003). The PCL–R is a 20-item rating scale that is scored by a clinician, typically on the basis of a semi-structured interview and a review of case history information. Total scores reflect the individual’s similarity to the prototypical psychopath. The PCL–R items adhere to a hierarchical two-factor, four-facet structure, in which items load on one of four narrow facets, which in turn load on one of two higher order factors (Hare, 2003). Factor 1 subsumes the facets that reflect psychopaths’ interpersonal features (e.g., superficial charm, grandiosity, manipulateness) and affective deficits (e.g., lack of remorse and empathy, shallow affect), and Factor 2

subsumes the facets that reflect psychopaths' unstable lifestyle (e.g., need for stimulation, irresponsibility) and antisocial behaviour (e.g., poor behavioural controls, juvenile delinquency, criminal versatility). The PCL–R was designed to assess psychopathy in adult offenders, but its factor structure has been replicated with other versions of the Psychopathy Checklist that were developed for use in young offender populations (i.e., Psychopathy Checklist–Youth Version; Neumann, Kosson, Forth, & Hare, 2006) and to screen for psychopathy in forensic and community populations (i.e., Psychopathy Checklist–Screening Version; Vitacco, Neumann, & Jackson, 2005).¹

Multifaceted nature of psychopathy and subtypes of violence. Given the multifaceted nature of psychopathy, researchers have attempted to clarify which psychopathic traits account for the construct's observed relationship with crime and violence. Despite previous arguments that the Interpersonal-Affective (Factor 1) and Social Deviance (Factor 2) features of psychopathy may interact to predict relevant outcomes (Hare, 1996; Lilienfeld & Fowler, 2006; Lilienfeld, 1998), a recent meta-analysis supports the view that the factors have additive rather than interactive effects (Kennealy, Skeem, Walters, & Camp, 2010). However, meta-analyses have consistently demonstrated that the effects of Factor 2 on general and violent recidivism are significantly larger than those for Factor 1 (Gendreau, Goggin, & Smith, 2002; Kennealy

¹This two-factor-four-facet structure is the most common factor structure applied in the psychopathy literature, but it has not gone undisputed. Cooke and Michie (2001) used structural equation modeling to support a three-factor model of psychopathy that includes only those items from the Interpersonal, Affective, and Lifestyle facets. Cooke, Michie, Hart, and Clark (2004) have since demonstrated that the items from the Antisocial Behaviour facet, which were excluded from their three-factor model, are better conceptualized as consequences, rather than symptoms, of psychopathy. Whereas a symptom is a direct manifestation of a disorder, and so plays an important role in the assessment of the disorder, a consequence (i.e., a sequela) is only indirectly associated with the disorder and so tends to have low sensitivity and specificity in diagnosing the disorder. This issue of whether antisocial behaviour is a core feature of psychopathy is the focus of ongoing debate (Hare & Neumann, 2010; Skeem & Cooke, 2010).

et al., 2010; Leistico et al., 2008; Walters, 2003). Further, in a meta-analytic comparison of 16 scales from nine risk assessment tools, PCL–R Factor 1 was the only scale that failed to predict violence at an above-chance level (Yang et al., 2010). This apparent superiority of Factor 2 over Factor 1 in the prediction of violence appears to be attributable more specifically to Facet 4 (Antisocial; Walters, Knight, Grann, & Dahle, 2008; Walters, Wilson, & Glover, 2011). Thus, although psychopathy has been heralded as “the most important psychological construct relevant to the criminal justice system” (Harris, Skilling, & Rice, 2001, p. 247), the psychopathy-crime relationship may simply be a function of the fact that, as is found in other areas of psychology research, the best predictor of future behaviour is often past behaviour (Ouellette & Wood, 1998).

Although the interpersonal, affective, and lifestyle features of psychopathy do not seem to have incremental validity over the construct’s antisocial features for predicting whether or not violence occurs, these traits may be relatively more important for understanding qualitative differences in the type of violence committed. Specifically, total scores from the Psychopathy Checklist family of instruments have been associated with relatively greater likelihood of instrumental than reactive violence, regardless of whether researchers examined (a) offenders’ entire offence history (Cornell et al., 1996; Laurell, Belfrage, & Hellström, 2010; Murrie et al., 2004; Serin, 1991), most recent offence (Williamson, Hare, & Wong, 1987), or most serious offence (Porter & Woodworth, 2007; Woodworth & Porter, 2002); (b) civil psychiatric patients’ acts of violence after being discharged from the hospital (Hodges & Heilbrun, 2009); or (c) community members’ aggression in a laboratory paradigm (Nouvion, Cherek, Lane, Tcheremissine, & Lieving, 2007; Reidy, Zeichner, Miller, & Martinez, 2007). In each of

these studies though, reactive and instrumental violence were treated as a dichotomy or as opposite ends of single continuum, thereby preventing a test of whether psychopathy might increase risk for both types of violence.

When reactive and instrumental propensities have been treated as two separate variables, either by quantifying both types of violence from official reports (Flight & Forth, 2007; McDermott, Quanbeck, Busse, Yastro, & Scott, 2008) or by using self-reports of aggression (Lehmann & Ittel, 2012; Raine et al., 2006; Seals, Sharp, Ha, & Michonski, 2012; Stafford & Cornell, 2003), both propensities have been found to have bivariate associations with psychopathy. However, when the shared variance between reactive and proactive aggression has been accounted for, only the residualized proactive scores have been associated with higher total psychopathy (Marsee & Frick, 2007; Raine et al., 2006; Reidy, Zeichner, & Seibert, 2011; Seals et al., 2012; van Baardewijk, Vermeiren, Stegge, & Doreleijers, 2011). Said another way, this research supports the notion that psychopathy may be a risk factor for instrumental violence in particular.

Increased risk for instrumental or proactive aggression may be tied specifically to the Factor 1 (Interpersonal-Affective) traits of psychopathy. Factor 1 traits include a callous lack of concern for others and a lack of remorse, and known correlates of Factor 1 include excessive reward sensitivity (Hughes, Moore, Morris, & Corr, 2012), decreased fear and anxiety (Fowles & Dindo, 2006; Hughes et al., 2012), and sadistic traits (i.e., tendency to derive pleasure from inflicting harm on another person; Porter, Woodworth, Earle, Drugge, & Boer, 2003). Within the framework of social learning theory (Bandura, 1973), individuals with this constellation of traits would experience contingencies that would favor the use of instrumental violence; not only would they expect positive

outcomes, but their lack of emotional deterrents would leave them uninhibited from using violence to serve their personal goals. Indeed, although instrumental violence has been associated with both factors of psychopathy at the bivariate level (Cornell et al., 1996, Study 2; Flight & Forth, 2007; Stanford et al., 2008; Woodworth & Porter, 2002), when the shared variance between the factors has been controlled, only Factor 1 has remained significantly related to instrumental violent offending (Flight & Forth, 2007; Laurell et al., 2010; Porter & Woodworth, 2007; Woodworth & Porter, 2002) or to instrumental aggression in the laboratory (Reidy et al., 2007, 2011). This relative importance of Factor 1 traits is in contrast to the previously discussed meta-analytic findings that Factor 2 is a better predictor of violent recidivism than Factor 1 (Kennealy et al., 2010). However, given that reactive violence occurs more frequently than instrumental violence (Cornell et al., 1996), previous findings that Factor 2 outperforms Factor 1 in the prediction of violence may be indicative of a unique relationship between Factor 2 and reactive violence.

Factor 2 psychopathic traits include those very facets of impulsivity previously hypothesized to be linked to reactive violence, namely, a tendency to act without considering potential consequences and poor behavioural control in the face of frustration. Thus, although psychopaths have been found to experience more anger than nonpsychopaths in response to provocative interpersonal vignettes (Serin, 1991), this response has been found to be uniquely related to their Factor 2 traits (Cale & Lilienfeld, 2006; Reidy et al., 2013). More generally, Factor 2 scores are associated with greater negative emotionality, including anxiety (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999; Hicks & Patrick, 2006), which may lower the threshold for responding to

provocation (see Bubier & Drabick, 2009 for a review). In line with this theoretical risk, Factor 2 traits have been shown to be associated with reactive violence, but not instrumental violence, both at the bivariate level (Swogger et al., 2010) and when controlling for Factor 1 traits (Flight & Forth, 2007; Vitacco, Neumann, Caldwell, Leistico, & Van Rybroek, 2006).

Taken together, existing evidence suggests that instrumental and reactive violence are uniquely related to Factor 1 and Factor 2 psychopathic traits, respectively. However, the limited research examining the facet-level relationships with subtypes of violence in correctional settings has yielded unexpected findings. For example, two recent studies have found that the instrumentality of previous violence is positively related to Facets 1 (Interpersonal), 3 (Lifestyle), and 4 (Antisocial), but not to Facet 2 (Affective; Camp, Skeem, Barchard, Lilienfeld, & Poythress, 2013; Walsh, Swogger, & Kosson, 2009). These discrepancies are difficult to integrate with previous factor-level findings and, therefore, reflect a need for additional investigation of the facet-level relationships between psychopathy and reactive and instrumental violence.

The Current Study

The literature reviewed above provides strong theoretical and empirical grounds to support the clinical utility of the reactive-instrumental distinction. However, this research has yet to inform the development of specialized rehabilitation programs for subtypes of violent offenders, perhaps because much of the existing evidence comes from studies of the subtypes of aggression committed by children and adolescents. In particular, the only known studies to comprehensively examine the unique risk factors for subtypes of aggression across multiple domains were conducted in child and adolescent

samples (Dodge et al., 1997). However, it is normative for youth to temporarily experiment with illegal behaviour and to desist from it as they move into adulthood (Moffitt, 1993), and there is at least preliminary evidence that proactive and reactive aggression have converging developmental courses (Barker, Tremblay, Nagin, Vitaro, & Lacourse, 2006). Therefore, the predictors of subtypes of aggression committed by children and adolescents cannot be assumed to predict the subtypes of more severe acts of violence committed by adults. In the absence of an empirical demonstration that functional subtypes of adult violence are associated with different risk factors across a variety of domains of psychosocial functioning, specialized rehabilitation programs are unlikely to be developed.

Overview of methodological and statistical approach. The overarching objective of the current dissertation was to conduct a comprehensive test of the clinical utility of the reactive-instrumental distinction in a sample of adult male inmates from a medium-security federal prison. Federal inmates are those who are currently serving prison sentences of at least two years. Therefore, in comparison to inmates who are serving sentences of less than two years in provincial institutions, federal inmates are more likely to have criminal histories characterized by more violent, versatile, and frequent offending (Trevethan et al., 1999). Relative to inmates serving time in maximum-security institutions, inmates in medium-security institutions are at lower risk of escape and at lower risk to the safety of the public in the event of an escape (Correctional Service of Canada, 2010); however, they are no less likely to be incarcerated for a violent offence (74% vs. 78%, respectively; Trevethan et al., 1999). The current sample was restricted to male inmates, in part due to logistical reasons, but

also because men commit more frequent and more severe violent offences than women (Greenfeld & Snell, 1999; Shaw & Dubois, 1995).

Inmates' propensities towards reactive and instrumental violence were operationalized by reviewing the descriptions of all previous violent convictions available in their official criminal files. In light of recent findings that the latent structure of subtype of violence is taxonic (Tapscott et al., 2014), violent offences were dichotomized as reactive or instrumental, thereby allowing a count of each type of offence. History of violence was assessed through official crime data, rather than through self-report measures, for three reasons: (a) to maximize the likelihood of finding a divergent pattern of correlates for subtypes of violence, given that observational measures have been previously demonstrated to be better than questionnaires at disentangling the unique functions of aggression (Polman et al., 2007); (b) to eliminate the risk that shared method variance might explain any observed effects between violence and psychosocial risk factors, which were themselves assessed through self-reports in the current study; and (c) to be able to assess and statistically control for the severity of violence, which tends to be higher for reactive offences than instrumental offences (Tapscott, Hancock, et al., 2012).

The psychosocial variables assessed through self-report included childhood maltreatment, positive outcome expectancies for crime, hostile attribution biases, hostility, mistrust, anger, schemas of entitlement, problematic use of alcohol, and impulsivity. However, psychopathy was assessed using the clinician-administered Psychopathy Checklist-Revised (Hare, 2003). Scores on this measure were available in the files of approximately half of the sample, but the lengthy administration time of the

Psychopathy Checklist-Revised made it unfeasible to collect psychopathy scores for the remaining participants.

To determine whether reactive and instrumental violence were differentially related to any of the psychosocial risk factors, two parallel sets of analyses were conducted: Negative binomial regression was used to determine whether the risk factors were related to inmates' frequencies of each type of violent offending, and hierarchical linear modeling was used to determine whether the risk factors were related to the odds that a previous violent offence was reactive versus instrumental. In other words, the correlates of both the rates and the proportions of each type of violence were considered. This complementary analytic approach was selected to help integrate discrepant findings from previous research that has conceptualized subtypes of violence either as two separate continuums or as opposite ends of a single continuum, but not as both. Both of these statistical approaches also offered an advantage over prior research in that they allowed for inmates' entire history of violence to be considered. These lifetime rates and proportions may provide more reliable estimates of propensities towards violence than has been available in past research, where individual differences in subtypes of violence were determined from a single most recent (e.g., Broomhall, 2005) or most severe offence (e.g., Woodworth & Porter, 2002).

Given that frequent violent offenders cannot be distinguished from frequent nonviolent offenders on the basis of a variety of psychosocial variables (Capaldi & Patterson, 1996; Farrington, 1991; Piquero, 2000), an important contribution of the current study was the inclusion of frequency of nonviolent offending as a potential covariate. If subtypes of violence can be demonstrated to have unique correlates, even

when controlling for general criminal propensity, then the results would provide stronger evidence both against the general theory of crime and in favour of the utility of the reactive-instrumental distinction. Finally, to further test whether any risk factors were unique to violent offending, all psychosocial risk factors were examined in an additional series of negative binomial regressions as potential predictors of the rates of nonviolent offending.

Hypotheses. Under the assumption that the findings outlined in the above literature review would generalize to a sample of adult male inmates, a number of psychosocial risk factors were hypothesized to be differentially related to reactive and instrumental subtypes of violence:

1. Reactive violence was hypothesized to be associated with a history of physical and sexual abuse and emotional neglect, whereas instrumental violence was hypothesized to be associated with a history of physical abuse and physical neglect (Dodge, 1991).
2. Instrumental violent offending was hypothesized to be associated with positive outcome expectancies (Miller & Lynam, 2006; Smithmyer et al., 2000). Reactive violence, in contrast, was hypothesized to have unique relationships with hostile attribution biases, schemas of mistrust and hostility, and proneness to anger (Dodge & Coie, 1987; Schwartz et al., 1998). The relationship between schemas of entitlement and subtypes of violence was examined for exploratory purposes, to help clarify the existing mixed evidence in this area of study.
3. Consistent with the alcohol myopia hypothesis (Steele & Josephs, 1990), which attributes the alcohol-aggression relationship to problems in the early stages of

social information processing, problematic alcohol use was hypothesized to be related to reactive violence, but not instrumental violence.

4. In line with the conceptual differences between subtypes of aggression (Dodge, 1991), reactive violent offending was hypothesized to be associated with impulsivity-related facets reflecting both urgency and a lack of premeditation, whereas instrumental violent offending was hypothesized to be unrelated to all of the impulsivity-related traits.
5. Existing evidence suggests that instrumental and reactive violence are uniquely related to Factor 1 and Factor 2 psychopathic traits, respectively (Flight & Forth, 2007; Swogger et al., 2010). The pairs of facets contributing to these factors were hypothesized to show similar divergence, with instrumental violence hypothesized to be associated with Facets 1 and 2 and reactive violence hypothesized to be associated with Facets 3 and 4.

Method

Participants

Participants were recruited from Fenbrook Institution, a medium-security prison for adult male federal inmates that is located in Ontario, Canada. Potential participants were selected at random from the inmate roster and contacted to determine their willingness and eligibility to participate. Given the resources available for data collection, 303 of the 448 inmates at Fenbrook (68%) could be contacted, of whom 15 did not meet the criteria of having a proficiency in English, and 122 declined to participate after hearing a brief description of the study. Reasons for not participating included skepticism about the research process ($n = 16$); scheduling conflicts with work,

rehabilitation programming, or school ($n = 23$); medical reasons (e.g., upcoming surgery; $n = 3$); unwillingness to commit the amount of time required for the testing battery ($n = 7$); release to the community before a testing session could be scheduled ($n = 5$); and undisclosed reasons ($n = 68$). The 166 remaining inmates agreed to participate and were given an appointment time, although 11 did not show up to their appointment after having been given a reminder.

Of the 155 inmates who attended their appointment and participated in the study, 4 were excluded from all analyses due to a criminal history that was unrepresentative of the intended population. Specifically, two inmates were excluded because their only offences were committed before the age of 18, and two inmates were excluded because they had plead not criminally responsible for their only convictions on record, all of which were violent. Although these latter two inmates were indeed found to be criminally responsible in court, the severe mental illness that was present at the time of their offences introduced unacceptable error into the coding of their offence characteristics.

The demographic information of the 151 participants included in the analyses is provided in Table 1, and as a point of comparison, the percentage of Canadian federal inmates falling in each of the categories is also presented (Trevethan & Rastin, 2004; Trevethan et al., 1999). Information on participants' age, marital status at time of intake, and ethnicity was determined from the Offender Management System (OMS), which is the computerized database used by the Correctional Service of Canada to manage information on federal offenders. Although the current sample was representative of federally incarcerated offenders in terms of age and marital status, the current sample

Table 1

Demographic, Offence, and Incarceration Information

Characteristic	<i>M</i> (<i>SD</i>)	Range	% of current sample	% of federal inmates ^a
Age at participation	35.25 (11.08)	20.81 – 70.48		
18-24			12.6	13
25-34			42.4	38
35-44			26.5	29
45-54			12.5	13
55+			6.0	6
Marital status at admission				
Single			49.0	47
Married/cohabitating			42.4	41
Separated/divorced			8.6	11
Widowed			0.0	1
Ethnicity				
White			49.0	71
Black			16.6	6
Aboriginal			23.8	18
Asian			4.6	2
Other visible minority			6.0	3
Employment status at arrest				
Unemployed			51.0	43
Employed			27.2	57
Unknown			21.9	
Grade completed	11.47 (2.00)	5 – 20		
9 or less			11.3	46
10 or 11			35.8	29
12 or higher			53.0	25
Most serious index offence				
Homicide/ attempted murder			22.5	24
Sexual assault			3.3	14
Serious assault			8.6	4
Minor assault			18.5	0
Robbery			9.3	24
Other violent			0.7	7
Crime against property			19.2	15
Weapons			6.0	0
Illegal vehicle operation			4.0	1
Drug-related			7.9	8
Other			0.0	2
Number of sentences	1.38 (0.80)	1 – 5		
Number of terms	2.17 (2.18)	1 – 13		
Years served of current term	2.78 (4.58)	0.05 – 30.28		
Total years federal incarceration	4.57 (5.70)	0.32 – 31.24		

Note. *N* = 151.

^aThe distributions for age, marital status, employment, grade completed, and most serious index offence were obtained from a snapshot of all inmates who were on-register in adult federal correctional facilities in Canada on October 5, 1996 (*N* = 12921, 98% male; Trevethan et al., 1999). The distribution for ethnicity was obtained from a similar snapshot taken on November 4, 2002 (*N* = 12492, 97% male; Trevethan & Rastin, 2004).

consisted of a relatively large proportion of ethnic minorities ($\chi^2 = 50.85, p < .0001$). However, the current sample was representative of the population of Ontario inmates that it was sampled from, as the federal institutions in Ontario are known to have a disproportionately large representation of ethnic minorities (i.e., 47%; Trevethan & Rastin, 2004).

Information on whether the offender was employed at the time of his most recent arrest was determined from the Revised Statistical Information on Recidivism (SIR-R1; Nafekh & Motiuk, 2002), which is a risk assessment tool administered at the time of offender intake. However, the SIR-R1 is typically not administered to Aboriginal offenders because evidence of its predictive validity is lacking in this subpopulation. As such, data on employment was missing for 33 participants.

Information on the highest grade completed was self-reported by participants. The current sample appears to be more educated than the population of federal inmates ($\chi^2 = 89.29, p < .0001$), which may reflect a true difference between those who accepted and those who declined to participate. Alternatively, this difference may reflect the fact that the sample data included the continuing education that participants' had received while incarcerated, whereas the population data was based on the highest grade completed by inmates at admission.

Information on participants' most serious index offence is also provided in Table 1. An index offence is the offence for which an inmate is currently incarcerated, and although many inmates have multiple index offences, they are categorized by their most serious index offence. Seriousness of the index offence is based on the Revised Uniform Crime Reporting Survey Violation Coding Structure, where more serious offences are

those involving greater injury or threat of injury to the victim and longer maximum sentences (Trevethan et al., 1999). The 11 categories of offences listed in Table 1 are ordered from most serious to least serious.

Finally, data are provided regarding participants' number of sentences and terms and their time incarcerated. The number of sentences reflects the number of times an offender has been sentenced to a federal institution, but each sentence may involve multiple terms if an offender was returned to prison after violating the conditions of his parole. Across all federal terms, participants had spent an average of 4.57 years incarcerated, although only an average of 2.78 of those years was served in the current term.

Measures

Childhood Trauma Questionnaire. The Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) is a 28-item self-report inventory that is used to screen for five types of childhood maltreatment: emotional, physical, and sexual abuse and emotional and physical neglect. The CTQ also contains a three-item validity scale that can be used to identify respondents with a tendency to provide socially desirable responses. Respondents use a 5-point Likert-type scale to indicate the frequency of occurrence of possible childhood events (*Never True, Rarely True, Sometimes True, Often True, and Very Often True*).

The proposed factor structure of the CTQ has been cross-validated in both community and clinical samples, including adolescent inpatients and adult substance abusers (Bernstein & Fink, 1998; Bernstein et al., 2003). This factor structure was also validated in the current offender sample (see Appendix A). Across seven validation

samples, the internal consistency of the CTQ subscales ranged from satisfactory for the Physical Neglect scale (median $\alpha = .66$) to excellent for the Sexual Abuse scale (median $\alpha = .92$; Bernstein & Fink, 1998), and in an offender sample, the internal consistency of the full CTQ was excellent ($\alpha = .93$; Cima, Smeets, & Jelicic, 2008). Evidence of the convergent and divergent validity of the CTQ is available from correlational research using other self-reports of trauma, therapists' ratings of trauma, and measures of psychological disturbance (Bernstein & Fink, 1998).

Outcome Expectancies for Crime. The Outcome Expectancies for Crime (OEC; Walters, 2003) measure asks respondents to think about any previous crime that they have committed and to indicate the likelihood that each of 16 possible outcomes would occur if the same offence were committed again. Ratings are made using a 7-point Likert-type scale (1 = *outcome would never be achieved*, 7 = *outcome would always be achieved*). The possible outcomes for crime that are rated include 4 possible negative outcomes (death, incarceration, loss of family, loss of job) and 12 possible positive outcomes (acceptance, approval, control, excitement, freedom, love, power, prestige, purpose, respect, security, and status). Only the positive items contribute to the total score, which has been demonstrated to have excellent internal consistency ($\alpha = .91$) and to correlate with attitudes of entitlement, rationalizations of crime, and a tendency to disregard the potential negative consequence of crime (Walters, 2007a).

Given that the instructions for the OEC were to think of any previous crime, after completion of this measure, participants were asked several follow-up questions regarding the nature of the crime that were thinking about. Specifically, they were asked whether they had received a conviction as a result of committing the crime, whether the

crime was physically aggressive or violent, and whether the crime was (a) provoked by a victim, (b) planned, (c) committed in anger, and/or (d) committed to achieve a specific goal. Responses to these follow-up questions did not contribute to the OEC total score, but were collected solely to aid in the interpretation of the results.

Hypothetical vignettes. Hostile attribution biases were assessed using the six short vignettes previously used by Serin (1991) and Vitale et al. (2005). Each vignette described a hypothetical scenario involving a negative outcome for the main character, which occurred as a result of the actions of another individual, whose intentions were ambiguous (see Appendix B). Participants were read each vignette aloud, and to determine the salience of the vignette, they were then asked whether anything like the scenario described had ever happened to them, or if not, whether they could relate to the scenario. Regardless of participants' responses, they were then asked to imagine themselves as the main character and to respond to four questions about the intent of the provocateur. Specifically, participants were asked if they thought the provocateur's actions were (a) deliberate, (b) done out of disrespect, (c) done to "piss him off," and (d) done to get back at him for something. A response of "no" to these questions was coded as a 1, a response of "yes" was coded as a 3, and a response indicating uncertainty (e.g., "maybe," "it depends") was coded as a 2. Only the two vignettes that were most frequently endorsed by the sample as salient were scored: one described a situation in which a friend breaks a promise to do the participant a favour, and the other described a situation in which the participant and a friend are waiting to use a pool table that is occupied by someone who is using the table just to bounce balls. With only two

vignettes being scored, total scores could range from 8 to 24, with higher scores reflecting greater hostile attribution biases.

Short-Form Buss-Perry Aggression Questionnaire. The constructs of anger and hostility were assessed using the subscales of the same names from the Short-Form Buss-Perry Aggression Questionnaire (BPAQ-SF; Diamond, 2005). Each subscale consists of three items, each of which is scored on a 5-point scale that ranges from 1 (*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*). Although Diamond et al. (2005) reported internal consistency estimates for the BPAQ-SF scales that were somewhat lower than those reported for the full length BPAQ (Buss & Perry, 1992), their factor analyses demonstrated superior model fit for the shortened scales over the originals. Further, the convergent and discriminant validity of BPAQ-SF scales was recently supported in a large offender sample (Diamond & Magaletta, 2006).

Young Schema Questionnaire – Short Form. The 3rd Edition of the Young Schema Questionnaire – Short Form (YSQ; Young, 2005) assesses 15 early maladaptive schemas. However, only the two subscales reflecting those schemas hypothesized to have unique relationships with subtypes of violence were administered: the Mistrust/Abuse scale, which assesses the belief that others will hurt, abuse, humiliate, cheat, lie, manipulate, or take advantage of others, and the Entitlement/Grandiosity scale, which assesses the beliefs that one is superior to others, entitled to special rights and privileges, and not bound by social rules of reciprocity. Each of these subscales consists of five items that are rated on a 6-point scale, ranging from 1 (*completely untrue of me*) to 6 (*describes me perfectly*). Previous research has demonstrated that the YSQ Short Form has strong psychometric properties that are comparable to those of the YSQ Long Form

(Hoffart et al., 2005; Stopa, Thome, Waters, & Preston, 2001; Waller, Meyer, & Ohanian, 2001).

Standardized alcohol screening. Within the first 90 days of admission to federal custody, Canadian inmates complete a computerized self-assessment of the nature and seriousness of specific substance abuse problem areas, which serves as the basis for program referrals. As a part of this assessment, inmates are asked to complete two standardized questionnaires about their alcohol use over the 12-month period prior to their arrest:

1. The Alcohol Dependence Scale (ADS; Skinner & Horn, 1984) consists of 25 items that assess the degree of physiological dependence on alcohol. Items are rated on a 2-, 3-, or 4-point scales, and total scores range from 0 to 47. Sample items include: “Did you have the shakes when sobering up (hands tremble, shake inside)?” and “Do you drink throughout the day?”
2. The Problems Related to Drinking Scale (PRD; Kunic & Grant, 2006) was condensed from the Michigan Alcoholism Screening Test (Selzer, 1971), from 25 to 15 dichotomous items. Total scores range from 0 to 15 and reflect the number of problems related to alcohol use. Sample items include: “Were there major arguments in your family because of your drinking?” and “Did your drinking result in your getting hurt in an accident?”

Both the ADS and the PRD have demonstrated high internal consistency, strong convergence with other measures of alcohol-related problems, and utility in a correctional context (Boland, Henderson, & Baker, 1998; Hodgins & Lightfoot, 1989; Kunic & Grant, 2006; Saxon, Kivlahan, Doyle, & Donovan, 2007).

UPPS-P Impulsive Behaviour Scale. The UPPS-P Impulsive Behaviour Scale (UPPS-P; Lynam et al., 2007) gets its acronym name from the first letter of the five types of impulsivity it assesses: negative Urgency, lack of Premeditation, lack of Perseverance, Sensation seeking, and Positive urgency. The UPPS-P includes 59 items, and participants indicate how much they agree with each item along a 4-point scale ranging from 1 (*agree strongly*) to 4 (*disagree strongly*). Strong internal consistency has been reported (i.e., Cronbach's alpha ranges from .80 to .94), and the five subscales have been found to have discriminant validity from each other and to converge with several other self-report and interview measures of the corresponding impulsivity-related trait (Cyders & Smith, 2007; G. T. Smith et al., 2007). Validity has also been supported by the observed differential relations among the UPPS-P subscales and various indices of risky behaviour (Cyders & Smith, 2008; Magid & Colder, 2007). Finally, the proposed five-factor structure of the UPPS-P was validated in the current offender sample (see Appendix A).

Psychopathy Checklist-Revised. The Psychopathy Checklist-Revised (PCL-R; Hare, 2003) is a 20-item rating scale that is widely considered to be the gold standard for the assessment of psychopathy (Acheson, 2005). On the basis of a semi-structured interview and a comprehensive review of case history information, clinicians use a 3-point scale to indicate the extent to which the item descriptions apply to the individual being assessed. Total scores range from 0 to 40 and reflect the individual's similarity to the prototypical psychopath. Items load on one of four lower-order facets, reflecting psychopaths' interpersonal features (e.g., superficial charm, grandiosity, manipulateness), affective deficits (e.g., lack of remorse and empathy, shallow affect),

unstable lifestyle (i.e., need for stimulation, irresponsibility), and antisocial behaviour (i.e., poor behavioural controls, juvenile delinquency). Further, the interpersonal and affective facet scores can be summed to form Factor 1 scores, and the lifestyle and antisocial facet scores can be summed to form Factor 2 scores. These facet and factor scores have acceptable to good interrater reliability, with the intraclass correlation coefficients for a single rating among male offenders ranging from .67 to .85 (Hare, 2003).

Procedure

This study was approved by the Research Ethics Board for Non-Medical Research Involving Human Subjects at the University of Western Ontario (Appendix C) and by the Research Branch at the Correctional Service of Canada (Appendix D). Participants completed the study, one at a time, in a quiet office within the institution. Prior to completing the battery, participants read a letter of information (Appendix E), discussed all key aspects of the study with one of two researchers, and provided informed consent (Appendix F).² The researchers emphasized to the participants that they were free to withdraw at any time and that their responses would have no bearing on subsequent correctional decisions.

Participants completed the questionnaires on a laptop computer, which allowed items to be presented one at a time, with or without audio accompaniment. The exception to this computer administration was the hypothetical vignettes, which were administered orally. Participants were encouraged to answer the questions honestly and

² This study was conducted alongside another study, and this larger battery is reflected in the letter of information and the consent form.

to ask for clarification if needed. To maintain participants' interest, the self-report measures were interspersed with performance-based measures of executive functioning, which were administered as part of another study. Completion time for this battery was approximately 2.5 hours, but participants were offered breaks as needed. Although the size of the battery prevented complete counterbalancing, the measures were instead administered in one of four randomized orders. In keeping with the policies of the Correctional Service of Canada, inmates were not compensated for their participation.

File Review

After the participants had completed the battery, two researchers reviewed all pertinent information available in the Offender Management System (OMS). The OMS was reviewed to determine demographic information (i.e., date of birth, marital status at admission, employment at arrest, and ethnicity), federal sentencing information (i.e., number of sentences, number of terms, years served of current term, and total years incarcerated), and scores on the two standardized alcohol screening measures (i.e., the Alcohol Dependence Scale and the Problems Related to Drinking Scale). Scores on the Psychopathy Checklist-Revised (PCL-R) were also sometimes available from the psychology reports on the OMS, but the paper psychology files were also examined in attempt to locate the PCL-R scores for as many participants as possible.

The OMS also provides details on inmates' complete criminal records, including a list of all previous adult convictions that is compiled by the Canadian Police Information Centre, as well as specific documentation concerning more serious offences. For example, after an offender is convicted of a serious crime, his case management officer writes a Criminal Profile Report, which is a detailed description of the offence that is

based on a review of all official documentation (e.g., police reports, crime scene information, eyewitness reports, court transcripts, autopsy reports). These original official documents were also reviewed when available. Finally, offenders' OMS files include Psychological Assessment Reports, which are written by psychologists and include additional information surrounding offenders' crimes. From this various information, inmates' frequency of violent and nonviolent offending, type of violent offending, and severity of violent offending were determined, as described below.

Frequency of offending. To determine an inmate's frequency of offending, all convictions for offences that occurred after the age of 18 were considered. However, charges resulting in a dismissal, a reversal of a conviction, or findings of Not Guilty or Not Criminally Responsible were excluded. A conviction was counted as a violent offence if it involved behaviour that was intended to inflict physical harm on another person. Therefore, an offence was coded as violent if there was an attempt to cause death or bodily harm, regardless of whether or not this goal was achieved (e.g., firing a gun at someone but missing, trying to punch someone but falling before any contact is made). Examples of offences meeting this definition of violence included, among others, the following: first or second degree murder, attempted murder, manslaughter, assault, kidnapping, and robbery.

Some offences that are considered to be violent according to the Criminal Code of Canada (e.g., arson, causing death or bodily harm by criminal negligence, dangerous operation of a motor vehicle causing bodily harm or death) were coded as nonviolent offences in the current study because, although harmful and reckless, these offences are not committed with violent intent. Similarly, convictions for uttering threats were also

coded as nonviolent because, although violent according to the Criminal Code, they do not result in actual physical harm to the victim. Finally, more conventional examples of convictions that were coded as nonviolent offences included those for fraud, disorderly conduct, possession or trafficking of a controlled substance, mischief, theft, and breaking and entering.³

Convictions for offences against the administration of justice (e.g., escape from lawful custody, failure to comply with conditions of undertaking or recognizance, failure to comply with summons to appear in court) were excluded from the count of nonviolent offences. This exclusion was made to avoid artificially increasing the gap between high frequency offenders and low frequency offenders. That is, individuals who have committed more offences will have had greater opportunity than individuals who have committed fewer offences to escape or to fail to comply or appear. Consequently, including these convictions in the count of nonviolent offending could introduce bias and artificially inflate the estimate of frequency of nonviolent offending for some offenders more so than for others.

Multiple convictions that occurred on the same date were counted as a single offence unless there was evidence in the files to indicate that there was a discernible gap in either time or location between the offences. When multiple violent and nonviolent offences occurred within the same time frame and location, only the violent offence was

³ The reader should note the difference between the nonviolent crimes of breaking and entering and theft and the (sometimes) violent crime of robbery. Breaking and entering occurs when someone unlawfully enters a structure with the intent of committing an indictable offence. Theft involves taking the property of another person with the intent of permanently depriving the other person of said property. Finally, robbery is theft that occurs in the presence of a victim and that involves the use of violence or the threat of violence. However, again, robbery was coded as nonviolent if there was no physical contact made with the victim (e.g., waving a gun during a bank robbery).

coded. However, if two or more offences occurred on the same date and there was sufficient information to indicate that the offences were unrelated to one another, multiple offences were coded. For example, if the police arrived at a domestic dispute and discovered that the home owner had assaulted his girlfriend and was in possession of cocaine, a violent offence and a nonviolent offence were coded. If a criminal record listed multiple offences on the same conviction date and there was insufficient information to determine whether the offences were independent of one another, the offences were assumed to be related and only a single offence was coded.

Type of violence. Type of violence was rated independently by two researchers using the dichotomized version of Woodworth and Porter's (2002) scale, albeit with one modification, described below:

1. Reactive violence was coded if the violence occurred immediately following a provocation or an interpersonal conflict. There must not have been an apparent goal other than to harm the victim (e.g., if someone started a fist-fight in response to having a drink spilled on him), or there might have been an external gain that was secondary to causing harm (e.g., if an offender started a fist-fight in response to having a drink spilled on him, but then proceeded to steal his victim's wallet). Although a strong emotional reaction often occurs during reactive violence, documentation of such arousal was not needed for an offence to be coded in this category. Reactive violence is necessarily impulsive and spontaneous; therefore, any evidence of planning precluded an offence from being coded as reactive.
2. *Instrumental violence* was coded if the violence was clearly goal-oriented (e.g., to obtain money, drugs or alcohol, or non-consensual sex) and there was no evidence

of any immediate situational provocation. However, provocation may have preceded instrumental violence if the provocation was distal and there was a discernible “cooling off” period, as in the case of planned revenge. Furthermore, an offence was considered instrumental if the violence was initiated to achieve an instrumental goal, but escalated in response to some unplanned events that occurred during the crime (e.g., if an offender was robbing a convenience store, but during the process, stabbed a victim who insulted him). The current definition of instrumental violence differed from that used by Woodworth and Porter (2002) in that premeditation was not a necessary criteria. This change was consistent with Cornell's (1996) finding that instrumental violence can, at times, be opportunistic.

When there was insufficient information in an offender's file to code the type of a violent offence, type of violence was coded as unknown. Both researchers agreed that the type of violence was unknown for four of the violent offences reviewed, and one researcher coded an additional nine violent offences as being of unknown type. For these nine offences, the rating of the second researcher was used in subsequent analyses. However, the four offences that both researchers rated as having an unknown type of violence were excluded from future analyses involving comparisons of subtypes of violence.

Given that type of violence was rated using a nominal scale, inter-rater agreement was determined by calculating raw agreement and Cohen's unweighted kappa. All estimates of inter-rater agreement were excellent: Overall agreement was 96%, specific agreement for reactive and instrumental offences was 96% and 95%, respectively, and

kappa was .91. When the researchers disagreed on whether the offence was reactive or instrumental ($n = 10$), the offence was coded as instrumental, which is consistent with past research where a history of instrumental violence has been given precedence over a history of reactive violence (e.g., Cornell et al., 1996).

Severity of violent offences. The severity of violent offences was coded by two researchers using a truncated version of Cornell's (1996) 7-point coding scheme. Specifically, the point on Cornell's scale associated with threats of violence was removed, leaving the following 6 points: 1 (*assault without injury*), 2 (*minor injury*; e.g., bruises, minor medical treatment), 3 (*serious injury requiring substantial hospital treatment*; e.g., broken limb, gunshot), 4 (*severe injury*; e.g., lasting impairment, life-threatening injury), 5 (*homicide*), and 6 (*extreme homicide*; e.g., multiple killing, mutilation).

Severity of violence was rated using a conservative approach, whereby the researchers were instructed to assign severity rating by selecting the lowest of the possible ratings that they were considering. Given this approach, any discrepancies between the two researchers' ratings were thought to be more likely due to a false negative (i.e., when one researcher did not find all of the relevant information in a file that was found by the other researcher) than due to a false positive (i.e., when one researcher mistakenly indicated that more injury occurred than was indicated in the file). Therefore, disagreements between the researchers were resolved by assuming the higher of the two ratings. However, the researchers never differed in their ratings by more than 1 point on the scale. To provide a measure of inter-rater reliability, the intraclass correlation coefficient (ICC) was calculated using the two-way random effects model and

an absolute agreement definition, both for single ratings (ICC_1) and averaged ratings (ICC_2). The ICC_1 and ICC_2 values for the severity of violence ratings were .97 and .99, respectively, which are considered excellent (Cicchetti & Sparrow, 1981).

Results

Overview of Analytic Plan

Prior to testing any hypotheses, the psychometric properties of the predictor and outcome variables were examined. Specifically, all variables were examined for any problems with missing data, distributional properties, or internal consistency. As well, because the Psychopathy Checklist-Revised scores were only available in the files of a subset of participants, tests were conducted to determine whether individuals with and without these scores differed from each other on any demographic or offending variables. To reduce error variance associated with invalid self-report profiles, participants with elevations on the validity scale from the Childhood Trauma Questionnaire were identified and considered, as is explained below, for possible exclusion from future analyses.

With the data cleaning complete, the test of the utility of the reactive-instrumental distinction proceeded by determining whether reactive and instrumental violence were differentially related to any of the psychosocial risk factors. The hypothesized divergence was tested through two primary types of analyses: Negative binomial regression was used to determine whether the risk factors were related to how often participants had been convicted of each type of crime (nonviolent, reactive, and instrumental), and hierarchical linear modeling was used to determine whether the risk factors were related to the odds that a violent offence was reactive versus instrumental. As well, to summarize the extent to which the rates of reactive and instrumental violence

showed a similar pattern of relationships with the various psychosocial risk factors, a similarity index was computed by correlating the two profiles of negative binomial regression coefficients with one another. The rationales for these specific analyses are provided in the relevant sections below.

Preparation of Outcome and Predictor Variables for Subsequent Analyses

Frequency and severity of offending. On the basis of the file review described above, participants' frequencies of nonviolent, reactive violent, and instrumental violent offending were determined. As well, reactive and instrumental offending counts were summed to determine the frequency of violent offending, which was then summed with the nonviolent offending count to determine the total frequency of offending. The descriptive statistics for these frequency variables are presented in Table 2.

Table 2

Descriptive Statistics for Frequency of Offending Variables

Type of offence	<i>M (SD)</i>	Median	Range	Skewness	Kurtosis
Total	9.40 (9.23)	6	1 – 49	9.19	10.71
Nonviolent	7.81 (9.01)	5	0 – 47	9.61	11.35
Violent	1.59 (1.70)	1	0 – 12	12.17	24.64
Reactive	0.83 (1.43)	0	0 – 12	20.09	63.05
Instrumental	0.73 (1.01)	0	0 – 6	10.96	17.35

Note. $N = 151$. Skewness and kurtosis are reported in z -scores (i.e., statistic/ standard error), all of which are greater than 3.29, indicating that the distributions deviate significantly from normality at $p < .001$

On average, participants had been convicted of over nine offences, of which fewer than two were violent. These frequencies were highly variable though, and all distributions were significantly positively skewed and leptokurtic. Given these deviations from normality, a nonparametric Wilcoxon signed-rank test was conducted to

determine whether participants had committed more instrumental violent offences than reactive violent offences, but the results were nonsignificant, $z = 0.21$, $p < .83$. Across all violent offences, the mean severity of violence was 2.46 ($SD = 1.34$), which corresponds to a level of violence causing somewhere between minor injury and serious injury requiring substantial hospital treatment.

Missing data. Very little data were missing from the self-report measures: one participant skipped 3 items on the YSQ, one participant skipped 1 item on the UPPS-P, three participants declined to complete the OEC, one participant declined to complete the hypothetical vignettes, five participants could not complete the BPAQ-SF due to time constraints, and the files of 8 participants were missing scores on the alcohol screening measures. The missing data on the YSQ and UPPS-P were addressed by prorating the affected scales, and the missing data on the OEC, hypothetical vignettes, BPAQ-SF, and alcohol screening measures were addressed through mean substitution. Although alternative methods are available for estimating missing data, such methods produce similar results as mean substitution when the amount of missing data is no greater than 5% (Tabachnick & Fidell, 2007).

Approximately half of the participants ($n = 74$) had PCL-R scores available in their files. Given this large amount of missing data, analyses were conducted to determine whether the participants with PCL-R scores were representative of the larger sample in terms of their demographics and frequency of subtypes of offending. Specifically, chi-square tests of independence were conducted to determine whether participants with and without PCL-R scores differed in their distribution of employment status (employed vs. unemployed/unknown), marital status (single/separated/divorced vs.

married/cohabitating), or ethnicity (White vs. non-White, and *t*-tests were used to determine whether there were group differences in mean age, years of education, years of federal incarceration, or frequencies of nonviolent, reactive violent, or instrumental violent offending. As can be seen in Table 3, only two group differences were found: Compared to individuals without PCL–R scores, those who had these scores available in their files had been incarcerated longer and had been convicted of more reactive violent offences. These findings are consistent with the Correctional Service of Canada's (2012) mandate to conduct supplementary psychological assessment, which involves administration of the PCL–R, with inmates who have a history of persistent violence and who are within 1 year of parole eligibility, as well as with serious violent offenders who are being considered for reclassification to a lower security level.

Identification of potentially invalid self-report protocols. Participants' scores on the validity scale of the CTQ were examined to identify any potentially problematic and invalid protocols. Although there is no specific cutoff score on the Minimization scale of the CTQ, scores greater than 0 on this scale, when paired with very low trauma scores, suggest a tendency to pervasively minimize or deny maltreatment (Bernstein & Fink, 1998). Accordingly, the profiles of 7 participants were flagged as potentially problematic on the basis of Minimization scores greater than 1 and total CTQ scores less than or equal to 28, which corresponded to the 10th percentile in the current sample. All subsequent analyses involving self-report data were conducted both including and excluding these participants, and the pattern of results did not change. To avoid biasing the sample by excluding offenders with particular response styles, the results presented in the subsequent sections are those from the analyses conducted on the full sample.

Table 3

Comparison of Demographic Characteristics and Rates of Offending of Participants With (n = 74) and Without (n = 77) Psychopathy Checklist–Revised Scores

Variable	Observed / expected count or <i>M (SD)</i>		χ^2 or <i>t</i>	<i>df</i>
	Participants with score missing	Participants with score available		
Employment status			0.16	1
Unemployed/unknown	55 / 56.1	55 / 53.9		
Employed	22 / 20.9	19 / 20.1		
Marital status			2.07	1
Single/separated/divorced	40 / 44.4	47 / 42.6		
Married/cohabitating	37 / 32.6	27 / 31.4		
Ethnicity			0.01	1
White	38 / 37.7	36 / 36.3		
Non-White	39 / 39.3	38 / 37.7		
Age	34.04 (11.25)	36.50 (10.82)	-1.37	149
Education	11.35 (2.09)	11.59 (1.90)	-0.75	149
Years incarcerated ^a	2.62 (3.60)	6.60 (6.71)	-4.56**	110.88
Frequency of nonviolent offending	8.08 (9.54)	7.54 (8.47)	0.37	149
Frequency of reactive violent offending	0.60 (0.92)	1.08 (1.80)	-2.09*	149
Frequency of instrumental violent offending	0.64 (1.13)	0.82 (0.85)	-1.15	149

^aLevene's test for equality of variance was significant, indicating that the assumption of equal variances was violated. This violation was corrected for by using the pooled estimate for the error term for the *t*-statistic and by using the Welch-Satterthwaite method to adjust the degrees of freedom.

p* < .05. *p* < .001.

Descriptive statistics for predictor variables. The final step in the data cleaning process involved calculating the means, standard deviations, and skew and kurtosis statistics for the predictor variables (see Table 4). All data points fell in the expected range, suggesting that there were no errors made during the data input or the calculation

of scale scores. However, three scales from the CTQ, the BPAQ-SF Anger scale, and the standardized alcohol screening measures were observed to significantly deviate from a normal distribution ($p < .001$), as indicated by standardized skew or kurtosis statistics greater than 3.29. Internal consistency estimates of reliability are also reported in Table 4. These estimates are based only on the data from the subset of participants who completed all of the items of the subscale in question ($ns \geq 146$). The majority of the reliability estimates were in the acceptable to excellent range ($\alpha \geq .77$), but the reliability estimates for the BPAQ-SF Hostility scale and the YSQ Entitlement/Grandiosity scale were poor ($\alpha = .56$ and $\alpha = .51$, respectively). This low reliability may simply reflect the short length of the corresponding scales (three and five items, respectively), but regardless of the explanation, low reliabilities indicate that any correlations involving these scales may be attenuated (Schmitt, 1996). That said, Schmitt (1996) explained that poor reliability is not considered a major impediment to the use of scales that have other desirable properties, such as meaningful content coverage.

The correlations between all of the predictor variables are presented in Table 5. These correlations are presented solely for descriptive purposes, with no intent to assess for multicollinearity, as no two of these variables were to be entered simultaneously into the same model in subsequent analyses. That said, the various psychosocial risk factors for violence tended to be positively correlated, with medium to large effects being observed between scales from the same measure. The noteworthy exception to this summary was that Factor 1 scores from the PCL-R, as well as the corresponding scores from Facets 1 and 2, did not positively correlate with any scales from the other measures.

Table 4

Descriptive Statistics for Predictor Variables

Predictor	# of Items	<i>M</i> (<i>SD</i>)	α	Range	Skew	Kurtosis
Childhood Trauma Questionnaire						
Emotional Abuse	5	10.98 (5.21)	.88	5–24	2.69	-1.98
Emotional Neglect	5	11.81 (5.45)	.91	5–25	2.42	-1.71
Physical Neglect	5	8.97 (4.55)	.84	5–22	5.61	0.65
Physical Abuse	5	10.31 (5.55)	.90	5–25	4.97	-0.29
Sexual Abuse	5	7.75 (4.95)	.94	5–25	8.19	3.12
Outcome Expectancies for Crime	12	33.32 (14.88)	.84	12–73	2.00	-1.78
Hypothetical vignettes	8	12.37 (3.61)	.77	8–24	3.16	0.52
Buss-Perry Aggression Questionnaire						
Anger	3	5.28 (2.74)	.80	3–13	5.73	0.56
Hostility	3	6.68 (2.42)	.51	3–12	1.18	-1.95
Young Schema Questionnaire						
Mistrust/Abuse	5	13.74 (5.75)	.81	5–29	2.69	-1.24
Entitlement/Grandiosity	5	10.85 (3.87)	.56	5–23	2.56	-0.34
Standardized alcohol screening						
Alcohol Dependence Scale	25	4.69 (8.22)		0–35	10.50	9.10
Problems Related to Drinking	15	1.79 (2.94)		0–12	8.28	3.66
UPPS-P Impulsive Behaviour Scale						
Negative Urgency	12	28.20 (7.54)	.91	12–45	-1.42	-1.56
Lack of Premeditation	11	21.62 (5.68)	.88	11–36	-0.07	-1.22
Lack of Perseverance	10	18.98 (4.40)	.80	10–32	-0.43	-0.43
Sensation Seeking	12	34.26 (7.31)	.86	12–48	-2.72	0.22
Positive Urgency	14	28.13 (9.44)	.95	14–49	0.26	-2.46
Psychopathy Checklist-Revised						
Factor 1	8	6.27 (2.79) ^a		1–14	0.83	-0.50
Facet 1 – Interpersonal	4	2.50 (1.95) ^a		0–7	2.30	-0.43
Facet 2 – Affective	4	3.74 (1.61) ^a		0–7	0.20	-1.14
Factor 2	10	12.43 (5.41)		2–20	-1.80	-1.72
Facet 3 – Lifestyle	5	6.42 (2.60) ^a		1–10	-1.71	-1.28
Facet 4 – Antisocial	5	6.07 (3.17)		0–10	-2.06	-1.78

Note. $N = 151$, but $n = 74$ for the Psychopathy Checklist-Revised statistics. Reliability estimates are not available for the standardized alcohol screening measures or Psychopathy Checklist-Revised, as the scores from these measures were retrieved from participants' files. Skewness and kurtosis are reported in z -scores (i.e., statistic/standard error). Those skew and kurtosis statistics in bold print represent significant deviations from normality at $p < .001$.

^a One-sample t tests indicated that these means are significantly lower than the corresponding means in the normative sample of 5,408 offenders (Hare, 2003).

Table 5

Correlations Between Predictor Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1. CTQ Emotional Abuse	—																								
2. CTQ Emotional Neglect	.72	—																							
3. CTQ Physical Neglect	.66	.73	—																						
4. CTQ Physical Abuse	.72	.54	.53	—																					
5. CTQ Sexual Abuse	.37	.35	.45	.21	—																				
6. OEC	.02	.02	-.04	.15	-.09	—																			
7. Hypothetical vignettes	.05	.08	.08	.17	.03	-.09	—																		
8. BPAQ-SF Anger	.14	.10	.15	.20	.10	.10	.28	—																	
9. BPAQ-SF Hostility	.20	.29	.20	.23	.09	.17	.25	.48	—																
10. YSQ Mistrust/Abuse	.27	.33	.20	.20	.13	.22	.17	.16	.33	—															
11. YSQ Ent./Grand.	.18	.26	.18	.25	-.02	.24	.20	.39	.46	.46	—														
12. ADS	.11	.03	.05	.06	.21	-.12	.02	.06	.05	-.11	-.06	—													
13. PRD	.12	.09	.06	.10	.20	-.17	.00	.10	.04	-.07	-.09	.81	—												
14. UPPS-P Neg. Urg.	.22	.20	.16	.19	.09	.19	.17	.51	.32	.21	.41	.01	.08	—											
15. UPPS-P Lack Prem.	.06	.13	.10	.12	.03	.03	.15	.28	.06	-.07	.15	-.14	.00	.56	—										
16. UPPS-P Lack Pers.	.14	.24	.14	.09	.12	-.08	.11	.23	.21	.03	.26	-.04	.04	.48	.65	—									
17. UPPS-P Sens. Seek.	.20	.11	.10	.14	.08	.14	.04	.14	.09	.15	.11	-.01	-.03	.31	.08	-.09	—								
18. UPPS-P Pos. Urg.	.15	.16	.12	.19	.04	.06	.20	.41	.27	.12	.38	.06	.08	.79	.51	.51	.24	—							
19. PCL-R Total	.17	.26	.21	.28	.04	.05	.07	.29	.36	.10	.15	-.16	-.09	.07	.18	.29	-.02	.12	—						
20. PCL-R Factor 1	-.02	.05	-.07	.08	-.08	.15	-.13	-.04	.23	.03	.10	-.22	-.16	-.13	-.05	.11	-.13	-.07	.70	—					
21. PCL-R Factor 2	.24	.31	.32	.31	.09	-.01	.20	.36	.34	.14	.15	-.11	-.05	.16	.24	.32	.06	.20	.90	.37	—				
22. PCL-R Interpersonal	.07	.07	-.02	.14	-.06	.22	-.14	-.05	.17	-.06	.10	-.24	-.17	-.01	.05	.19	-.09	.00	.58	.82	.31	—			
23. PCL-R Affective	-.12	.00	-.10	-.04	-.06	.00	-.08	-.02	.20	.13	.04	-.09	-.06	-.23	-.14	-.04	-.14	-.14	.52	.74	.28	.23	—		
24. PCL-R Lifestyle	.15	.23	.22	.22	.08	-.03	.08	.25	.25	.10	.02	-.13	-.06	.02	.12	.24	.02	.07	.83	.39	.91	.31	.33	—	
25. PCL-R Antisocial	.25	.33	.35	.32	.08	-.02	.25	.41	.37	.13	.21	-.10	-.04	.25	.33	.37	.11	.28	.86	.34	.93	.32	.22	.72	

Note. $N = 151$, but $n = 74$ for correlations involving the PCL-R (Psychopathy Checklist-Revised). CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. Ent./Grand. = Entitlement/ Grandiosity. OEC = Outcome Expectancies for Crime. UPPS-P = UPPS-P Impulsive Behaviour Scale. Neg. Urg. = Negative Urgency. Lack Prem. = Lack of Premeditation. Lack Pers. = Lack of Perseverance. Sens. Seek. = Sensation Seeking. Pos. Urg. = Positive Urgency. ADS = Alcohol Dependence Scale. PRD = Problems Related to Drinking. Correlations in bold font are significant at .01, and correlations in italics are significant at .05.

Negative Binomial Regression

The utility of the reactive-instrumental distinction could be demonstrated if the various psychosocial variables were differentially related to the frequencies of each type of violent offending. However, these relationships cannot be tested through ordinary least squares (OLS) regression techniques given that the proposed dependent variables are count variables. Count variables such as frequency of offending can only take on nonnegative discrete values (e.g., 0, 1, 2 ...), a property that when combined with the fact that there are often many low-count observations, results in frequency distributions that tend to be kurtotic and positively skewed. This deviation from normality was observed in the frequency distributions of the current data (refer back to Table 2), thereby introducing discrepancies between the stated and actual Type I error rates or reducing statistical power should OLS procedures be used (for detailed explanations, see Coxe, West, & Aiken, 2009, and Walters, 2007b). As an alternative to OLS techniques, Poisson-class regression has been developed as the standard statistical procedure for analyzing count data because, like count data, the Poisson distribution is only defined at nonnegative discrete values (Coxe et al., 2009; Gardner, Mulvey, & Shaw, 1995; Walters, 2007b).

Negative binomial regression is in the Poisson-class of regression models, but deviates from the standard Poisson regression by including a dispersion parameter (α), which allows for a situation referred to as overdispersion, whereby the conditional variance is larger than expected in Poisson regression (Walters, 2007b). When the data are overdispersed (i.e., when $\alpha > 0$), negative binomial regression is preferred over Poisson regression because the former produces more robust, albeit larger, standard

errors and is therefore more conservative (Long, 1997; Sturman, 1999). Accordingly, hypotheses were tested using negative binomial regression procedures.

An assumption of negative binomial regression is that all participants have had an equivalent exposure time (i.e., the length of time in which a count could be observed needs to be the same across observations). However, as a function of their varying ages and time incarcerated, participants had been at risk of offending for varying lengths of time. These individual differences in exposure can be accounted for in negative binomial regression by the inclusion of a predictor referred to as an offset variable. An algebraic explanation for the inclusion of an offset variable is provided elsewhere (Coxe et al., 2009), but briefly, including an offset variable changes the predicted outcome variable from the number of offences to the rate of offending (i.e., number of offences committed per year at risk).⁴ Time at risk for this study was the number of years during which an inmate could have committed a crime that would have contributed to his adult record (i.e., age at participation minus 18 years minus total number of years incarcerated in a federal institution).⁵ All analyses were conducted in Stata 12.1.

Identification of covariates. Preliminary negative binomial regressions of the bivariate associations between demographic variables and frequency of each type of offending were conducted to identify potential confounding variables. Specifically, separate negative binomial models were estimated to determine whether the rates of

⁴ Rate of offending cannot be entered directly as an outcome variable because outcome variables in Poisson-class regression can only take on nonnegative discrete values. Further, rate of offending cannot be entered as the outcome in an OLS regression because the significant positive skew of the rate of offending variables would violate the assumptions of OLS.

⁵ Although a better estimate of time at risk would have excluded the time offenders' had spent in provincial institutions, the information necessary to create such a variable was not available from the offenders' federal files.

nonviolent, instrumental violent, or reactive violent offending were related to any of the following: ethnicity (0 = White, 1 = non-White), employment status (0 = unemployed/unknown, 1 = employed), marital status (0 = single/separated/divorced, 1 = married/cohabitating), age, years of education, average severity of violence, or the rates of the other two types of offending.⁶ Average severity of violence was set to zero for those participants who had never been convicted of a violent offence, but otherwise, this variable was computed for each participant by averaging the severity of all violent convictions, disregarding whether the offences were reactive or instrumental. When rates of offending were entered as potential covariates, the rate variables were created by dividing participants' frequency of each type of offending by their number of years at risk for offending. The six continuous variables were standardized prior to entry, and as explained above, years at risk was entered as an offset variable in all models.

Poisson-class regression is “linear in the logarithm” (Coxe et al., 2009), meaning that in order to interpret a Poisson-class regression coefficient in terms of the predictor’s effect on the actual count (instead of on the logarithm of the count), the unstandardized coefficient, b , must be exponentiated. These exponentiated coefficients are presented in Table 6, and they are interpreted as incidence rate ratios (IRR), which represent the multiplicative change in the outcome expected with a 1-unit increase in the predictor, holding all other predictors constant. Therefore, the extent to which the IRR deviates from 1 reflects the magnitude of an observed effect. For example, in the first model

⁶ Readers may find it unnecessary to include age as a covariate given that it was used to calculate the offset variable of years at risk for offending. However, the inclusion of the offset variable simply transforms the predicted outcome from a count to a rate, and previous research has established that age is a significant predictor of rates of offending (e.g., Piquero, Farrington, & Blumstein, 2007).

predicting nonviolent offending rates, the IRR corresponds to a dichotomous variable, and its value of less 1 indicates that non-White participants are expected to have rates of offending that are only 0.58 times as high as the rates for White participants.

Alternatively, the final significant IRR in the table corresponds to a continuous (and standardized) variable, and its value greater than 1 indicates that participants whose average severity of violence is 1 standard deviation above the mean are expected to have rates of instrumental violent offending that are 1.84 times as high as the rates of participants whose average severity of violence is at the group mean.

Table 6

Negative Binomial Models for the Prediction of Rates of Offending from Potential Covariates

Covariates	Nonviolent offending		Reactive violent offending		Instrumental violent offending	
	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>
Ethnicity	0.58 (0.39-0.84)	-2.85**	0.95 (0.58-1.56)	-0.20	2.40 (1.40-4.12)	3.20**
Employment	0.49 (0.31-0.75)	-3.27**	0.49 (0.27-0.88)	-2.36*	0.72 (0.38-1.35)	-1.03
Marital status	1.10 (0.74-1.62)	0.46	0.87 (0.53-1.44)	-0.54	0.64 (0.37-1.12)	-1.55
Age	0.94 (0.75-1.17)	-0.59	0.72 (0.56-0.91)	-2.75**	0.60 (0.47-0.76)	-4.11**
Education	0.85 (0.67-1.07)	-1.40	0.62 (0.48-0.81)	-3.59**	1.07 (0.80-1.44)	0.45
AvgSOV	0.56 (0.45-0.70)	-5.17**	1.21 (0.90-1.62)	1.23	1.84 (1.33-2.53)	3.71**
Rate NVO	—	—	1.05 (0.79-1.41)	0.35	0.97 (0.76-1.25)	-0.20
Rate RVO	1.01 (0.85-1.21)	0.14	—	—	0.75 (0.51-1.11)	-1.45
Rate IVO	0.94 (0.77-1.16)	-0.55	0.80 (0.55-1.18)	-1.12	—	—

Note. $N = 151$. The covariates were entered as predictors in separate models. For all significant effects, the omnibus likelihood ratio chi-square ($LR \chi^2$) for the corresponding model was also significant ($p < .05$), with $df = 1$. Ethnicity (0 = White, 1 = non-White), employment status (0 = unemployed/unknown, 1 = employed), and marital status (0 = single/separated/divorced, 1 = married/cohabitating) were dichotomous variables, whereas all other variables were standardized continuous variables. Years at risk of offending was included as the offset variable in all models. $z = b/SE$. IRR = incidence rate ratio (i.e., the exponentiated unstandardized regression coefficient, e^b). AvgSOV = average severity of violence. NVO = nonviolent offending. RVO = reactive violent offending. IVO = instrumental violent offending.

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

In the same way as is done in OLS regression, the significance of individual coefficients can be tested by calculating z statistics for each regression coefficient (i.e., the unstandardized regression coefficient divided by its standard error). Variables are

then identified as being unique predictors of the outcome variable if the absolute value of the corresponding z -score is greater than 1.96 (assuming a Type I error rate of .05), or alternatively, if the 95% confidence interval around the IRR does not contain 1.

As can be seen in Table 6, the rates of all three types of offending were unrelated to each other and were unrelated to marital status; however, all other potential covariates were significantly related to the rate of at least one type of offending. For example, non-White participants tended to have lower rates of nonviolent offending and higher rates of instrumental violent offending than did White participants. As well, although participants who were employed at the time of their most recent arrest had lower rates of nonviolent offending and reactive violent offending than those who were unemployed, employment status did not have a unique effect on rates of instrumental violent offending. Age was a significant correlate of the rates of reactive and instrumental violent offending, such that older participants had lower rates of violent offending than younger participants. Greater education was associated with lower rates of reactive violence, but was unrelated to instrumental or nonviolent offending. Finally, average severity of violence was positively associated with rates of instrumental violence, but it was negatively associated with rates of nonviolent offending and was unrelated to rates of reactive violence. Although the rates of each type of offending were predicted by a unique set of covariates, all five variables that were significantly related to at least one outcome were retained in subsequent analyses in order to facilitate the comparison of results across models. However, the four nonsignificant covariates at the bivariate level were dropped from subsequent analyses.

The correlations between the retained covariates are presented in Table 7, along with the correlations between the covariates and the psychosocial risk factors. The large majority of these correlations were not significant, and those that were significant were small to moderate in magnitude. Therefore, multicollinearity was not a problem for subsequent analyses.

Psychosocial correlates of rates of offending. To determine which of the 25 psychosocial variables were related to the rates of nonviolent, reactive violent, and instrumental violent offending, 75 negative binomial regression analyses were conducted. That is, the frequency of each type of offending served as the dependent variable in a separate analysis, with the five covariates and one psychosocial variable entered as predictors, and with years at risk of offending entered as the offset variable. To facilitate the interpretation of the regression coefficients, all psychosocial variables were standardized prior to entry. When conducting multiple analyses, it is often recommended to control for the increased risk of committing a Type I error by adjusting the stated significance level (e.g., by using the Bonferroni method). However, given the large number of analyses being conducted in this study, the resulting significance level would be unrealistically conservative. Therefore, rather than changing the significance level from the conventional .05 level, it is instead acknowledged that a liberal criterion was used and that the results of this study will need to be replicated.

The results of the negative binomial analyses are presented in Table 8. However, to conserve space and to avoid presenting redundant information, the coefficients and corresponding *z*-scores for each of the covariates are not presented. A review of Table 8 indicates that the rates of nonviolent offending, reactive violent offending, and

Table 7

Correlations Between Covariates and Psychosocial Risk Factors

Variable	Ethnicity	Employment	Age	Education	Average severity of violence
Ethnicity	—				
Employment	-.03	—			
Age	-.15	.09	—		
Education	.00	.31**	-.04	—	
Average severity of violence	.09	.06	.05	.10	—
CTQ Emotional Abuse	-.10	-.04	.12	-.12	-.04
CTQ Emotional Neglect	-.06	-.12	.15	-.10	-.01
CTQ Physical Neglect	.04	-.18*	.15	-.14	-.03
CTQ Physical Abuse	.02	-.03	.06	-.11	-.04
CTQ Sexual Abuse	-.01	-.06	.29**	-.03	.07
Outcome Expectancies	-.01	.03	-.14	-.02	-.16*
Hypothetical vignettes	.11	-.20*	.04	-.20*	-.01
BPAQ-SF Anger	.02	-.13	.00	-.21*	-.09
BPAQ-SF Hostility	.09	-.10	-.04	-.25**	-.08
YSQ Mistrust/Abuse	.04	-.09	-.07	-.13	-.08
YSQ Entitlement/Grandiosity	.04	-.14	-.03	-.15	-.21*
Alcohol Dependence Scale	.07	-.04	.33**	-.19*	.24**
Problems Related to Drinking	-.04	-.02	.22**	-.13	.20*
UPPS-P Negative Urgency	-.09	-.19*	.02	-.12	-.17*
UPPS-P Lack of Premeditation	-.09	-.11	.01	.00	-.25**
UPPS-P Lack of Perseverance	-.06	-.19*	.00	-.16*	-.24**
UPPS-P Sensation Seeking	-.03	.04	-.16	.11	-.10
UPPS-P Positive Urgency	.04	-.14	.10	-.14	-.18*
PCL-R Total	-.07	-.19	-.05	-.38**	-.47**
Factor 1	-.02	.14	.07	-.23*	-.28*
Facet 1 – Interpersonal	-.07	.15	.13	-.16	-.41**
Facet 2 – Affective	.03	.06	-.07	-.24*	-.01
Factor 2	-.10	-.35**	-.13	-.39**	-.49**
Facet 3 – Lifestyle	-.12	-.23	-.23*	-.32**	-.36**
Facet 4 – Antisocial	-.09	-.38**	-.05	-.42**	-.52**

Note. $N = 151$ for the covariates and self-report variables, but $n = 74$ for the Psychopathy Checklist-Revised (PCL-R). Employment status (0 = unemployed/unknown, 1 = employed), marital status (0 = single/separated/divorced, 1 = married/cohabitating), and ethnicity (0 = White, 1 = non-White) were dichotomous variables. CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. UPPS-P = UPPS-P Impulsive Behaviour Scale.

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

Table 8

Negative Binomial Models for the Prediction of Rates of Offending from Psychosocial Risk Factors (With Covariates)

Predictor	Nonviolent offending		Reactive violent offending		Instrumental violent offending	
	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>
CTQ Emotional Abuse	1.29 (1.09-1.54)	2.99**	0.99 (0.80-1.24)	-0.06	<u>1.39 (1.10-1.75)</u>	<u>2.76**</u>
CTQ Emotional Neglect	1.27 (1.07-1.52)	2.78**	1.04 (0.83-1.29)	0.32	<u>1.30 (1.03-1.64)</u>	<u>2.22*</u>
CTQ Physical Neglect	1.24 (1.04-1.46)	2.44*	1.02 (0.82-1.28)	0.19	<u>1.35 (1.07-1.70)</u>	<u>2.55*</u>
CTQ Physical Abuse	<u>1.23 (1.04-1.45)</u>	<u>2.44*</u>	1.01 (0.81-1.28)	0.12	<u>1.30 (1.03-1.64)</u>	<u>2.22*</u>
CTQ Sexual Abuse	<u>1.22 (1.01-1.46)</u>	<u>2.10*</u>	1.07 (0.86-1.32)	0.59	<u>1.25 (1.00-1.55)</u>	<u>1.99*</u>
Outcome Expectancies for Crime	1.19 (1.00-1.42)	2.01*	0.85 (0.67-1.07)	-1.37	<u>1.27 (1.00-1.60)</u>	<u>1.98*</u>
Hypothetical vignettes	1.02 (0.86-1.22)	0.22	1.13 (0.91-1.39)	1.10	0.87 (0.69-1.11)	-1.13
BPAQ-SF Anger	1.30 (1.09-1.57)	2.85**	1.33 (1.08-1.63)	2.71**	1.09 (0.86-1.38)	0.72
BPAQ-SF Hostility	1.30 (1.08-1.56)	2.82**	1.36 (1.09-1.71)	2.66**	1.04 (0.81-1.32)	0.29
YSQ Mistrust/Abuse	1.01 (0.84-1.22)	0.13	1.02 (0.81-1.27)	0.14	1.11 (0.88-1.41)	0.91
YSQ Entitlement/Grandiosity	1.03 (0.86-1.23)	0.32	1.25 (1.01-1.54)	2.03*	<u>1.27 (1.01-1.60)</u>	<u>2.01*</u>
Alcohol Dependence Scale	0.91 (0.74-1.10)	-0.99	1.20 (0.97-1.48)	1.67	0.96 (0.75-1.22)	-0.37
Problems Related to Drinking	0.88 (0.74-1.06)	-1.35	1.31 (1.10-1.57)	2.96**	0.99 (0.79-1.25)	-0.06
UPPS-P Negative Urgency	1.22 (1.01-1.48)	2.05*	1.11 (0.89-1.40)	0.93	0.96 (0.76-1.21)	-0.37
UPPS-P Lack of Premeditation	1.07 (0.89-1.29)	0.76	1.04 (0.83-1.30)	0.33	0.89 (0.69-1.14)	-0.96
UPPS-P Lack of Perseverance	1.00 (0.84-1.19)	-0.05	1.22 (0.96-1.55)	1.61	0.91 (0.71-1.17)	-0.73
UPPS-P Sensation Seeking	1.27 (1.05-1.52)	2.51*	0.91 (0.73-1.13)	-0.87	1.10 (0.87-1.38)	0.80
UPPS-P Positive Urgency	1.05 (0.88-1.25)	0.57	1.08 (0.86-1.36)	0.68	0.87 (0.68-1.10)	-1.17
PCL-R Total	1.75 (1.33-2.29)	4.05**	1.45 (1.04-2.01)	2.19*	<u>1.43 (1.03-1.98)</u>	<u>2.16*</u>
Factor 1	1.13 (0.87-1.46)	0.91	1.11 (0.83-1.48)	0.67	<u>1.54 (1.15-2.07)</u>	<u>2.87**</u>
Facet 1 – Interpersonal	1.12 (0.84-1.50)	0.77	0.92 (0.70-1.21)	-0.59	1.32 (0.97-1.79)	1.79
Facet 2 – Affective	1.10 (0.86-1.41)	0.79	1.36 (1.00-1.85)	1.99*	1.46 (1.10-1.95)	2.63**
Factor 2	2.10 (1.60-2.76)	5.31**	1.52 (1.06-2.19)	2.27*	1.34 (0.93-1.94)	1.57
Facet 3 – Lifestyle	1.79 (1.37-2.35)	4.22**	1.28 (0.93-1.76)	1.52	1.17 (0.85-1.61)	0.97
Facet 4 – Antisocial	2.11 (1.57-2.81)	5.05**	1.70 (1.14-2.55)	2.59**	1.37 (0.92-2.03)	1.56

Note. $N = 151$ for the self-report variables, but $n = 74$ for the Psychopathy Checklist-Revised (PCL-R). CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. UPPS-P = UPPS-P Impulsive Behaviour Scale. IRR = incidence rate ratio (i.e., the exponentiated unstandardized regression coefficient, e^b). Each predictor variable was entered into a separate model, which included five covariates (i.e., ethnicity, employment status, age, education, average severity of violence) and years at risk of offending as the offset variable. $z = b/SE$. For all models, the omnibus likelihood ratio chi-square ($LR \chi^2$) was significant ($p < .01$), with $df = 6$. Bold typeface identifies effects that were significant when the covariates were excluded, and italics and underlined typeface identifies effects that were not significant when the covariates were excluded (see Appendix G).

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

instrumental violent offending were associated with an overlapping but unique combination of psychosocial risk factors. For example, higher rates of both nonviolent offending and reactive violent offending were associated with greater anger, hostility, and Factor 2 and Facet 4 traits of the PCL–R. In comparison though, higher rates of both nonviolent offending and instrumental violent offending were associated with greater childhood maltreatment and positive outcome expectancies for crime. The only variables to be uniquely associated with rates of violence—both reactive and instrumental—were the schemas of entitlement/grandiosity as measured by the YSQ and the affective deficits of psychopathy (PCL–R Facet 2). Negative urgency and sensation seeking were the only facets of impulsivity that were significantly related to offending rates, and these relationships were specific to nonviolent offending. Finally, the Problems Related to Drinking scale was uniquely associated with higher rates of reactive violence. This pattern of results was similar to that found in the parallel analyses that were conducted without the covariates (see Appendix G), although any differences associated with the inclusion of covariates have been noted in Table 8.

Comparison of reactive and instrumental profiles. A similarity index was computed to summarize the extent to which the rates of reactive and instrumental violence showed a similar pattern of relationships with the various psychosocial risk factors. To compute this index, the unstandardized regression coefficients from the series of negative binomial regressions predicting reactive violence were correlated with those from the analyses predicting instrumental violence. To avoid overrepresenting psychopathic traits in this profile similarity analysis, only the coefficients from the analyses involving the PCL-R Facet scores were included, whereas the coefficients

corresponding to the PCL-R Total and Factor scores were excluded. The resulting Pearson correlation coefficient could range from -1 to +1, with values reflecting the similarity in shape of the two profiles (i.e., the similarity between the patterns of highs and lows in the two profiles). The advantages of the Pearson correlation as an index of shape similarity over alternative indices, such as the double-entry intraclass correlation, have been discussed elsewhere (Furr, 2010).

Using the Pearson correlation approach, the similarity index between rates of reactive and instrumental violence was $r(20) = -.05, p < .83$, indicating that the profile of psychosocial variables associated with reactive violence was independent from that associated with instrumental violence. To provide a point of comparison for interpreting this similarity index, the similarity index was also calculated between the profiles associated with the rate of nonviolent offending and both the rate of reactive violent offending ($r[20] = .32, p < .07$) and the rate of instrumental violent offending ($r[20] = .46, p < .02$). These additional similarity indices indicate that there was moderate convergence between the profile of psychosocial risk factors associated with nonviolent offending and the profiles associated with both instrumental and reactive violent offending. The lack of relationship between the profiles for reactive and instrumental violent offending can be seen in Figure 1, as can the moderate similarity between the nonviolent offending profile and the profile for each subtype of violent offending.

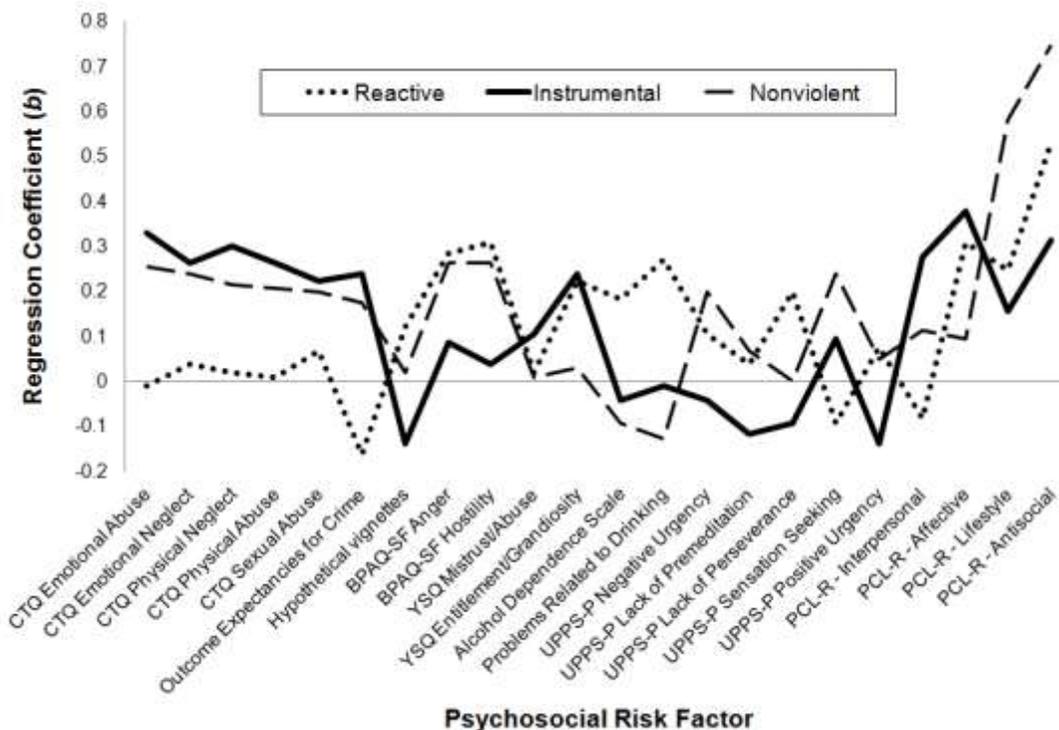


Figure 1. Profile of negative binomial regression coefficients for each offending type

Hierarchical Linear Modeling

Hierarchical linear modeling (HLM) was used to determine whether any of the psychosocial risk factors could explain individual variations in the likelihood of committing one type of violence relative to the other. HLM is ideally suited for the analysis of hierarchical or nested data, where observations are made at multiple levels of analysis. In the current data, observations about the offences (i.e., type of violence, severity of violence) were nested within individuals, who were characterized by varying levels of psychosocial risk factors. In other words, clusters of offences shared the characteristics of the offender in which they were nested, and this lack of independence violated a fundamental assumption of more traditional analyses (e.g., ordinary least-squares regression, chi-square tests, and analysis of variance; Nezlek, 2008). In contrast,

HLM can accommodate non-independence of observations by, in effect, estimating a separate model to reflect the relationship between a predictor and an outcome within each individual and then producing a weighted average of these estimates.

Identification of covariates. Before testing specific hypotheses, preliminary HLM analyses were conducted to identify potential confounding variables at both the offence level of analysis (Level 1) and the offender level of analysis (Level 2). The outcome variable was type of offence (0 = reactive, 1 = instrumental), and the dichotomous nature of this variable was indicated by specifying a logit link function that transforms the outcome variable so that its values are constrained to follow a Bernoulli distribution. Models were estimated using restricted maximum likelihood procedures through HLM for Windows Version 6.08. Given the outcome of type of violence, only participants with at least one violent offence could be included in the analyses.

Prior to evaluating potential covariates and to ensure that there was statistical justification for running HLM analyses, the unconstrained (null) model was run without any predictors. The chi-square test of the variance for this null model was significant, $\chi^2(111) = 160.00, p < .01$, indicating that there was sufficient variance in the outcome variable across offenders to support using HLM. Next, potential covariates were entered as the lone predictor in separate models using grand mean centering. The Level 2 variables that were considered included the same five demographic variables that were evaluated as potential covariates in the negative binomial analyses (i.e., ethnicity, employment status, marital status, age, and years of education), as well as frequency of nonviolent offending. Severity of violence was considered as a covariate at Level 1. Given that the goal of these analyses was not to model the variability in slopes, the

variance parameter was not estimated (i.e., the effects were modeled as fixed). The results presented in Table 9 are the estimates from the unit-specific model with robust standard errors, although in all cases, the results reported herein are consistent with the non-robust estimates and the population average estimates.

Table 9

Hierarchical Linear Modeling Predicting Type of Violence (0 = Reactive, 1 = Instrumental) from Potential Covariates

Predictor	Coefficient (SE)	Odds ratio (95% confidence interval)	
		Odds of instrumental > odds of reactive	Odds of reactive > odds of instrumental
Level 1			
Severity of violence	.28 (.11)*	1.32 (1.06-1.66)	
Level 2			
Ethnicity	.77 (.34)*	2.15 (1.09-4.25)	
Employment status	.26 (.45)	1.29 (0.54-3.13)	
Marital status	-.34 (.33)		1.40 (0.72-2.74)
Age	-.22 (.17)		1.24 (0.90-1.72)
Education	.65 (.21)**	1.92 (1.26-2.93)	
Frequency of NVO	-.46 (.23)*		1.58 (1.01-2.49)

Note. $N = 236$ violent offences committed by 112 offenders. $df = 236$ for Level 1 variable. $df = 110$ for Level 2 variables. Severity of violence was scored on a 6-point ordinal scales; ethnicity (0 = White, 1 = non-White), employment status (0 = unemployed/unknown, 1 = employed), and marital status (0 = single/separated/divorced, 1 = married/cohabitating) were dummy coded; and age, education, and frequency of NVO (nonviolent offending) were standardized continuous variables. Variables were entered using grand mean centering. * $p < .05$. ** $p < .01$.

The sign and the significance of the regression coefficients presented in Table 9 indicate that the likelihood of instrumental violence, relative to reactive violence, was greater for inmates of ethnic minorities, who were more educated, and who committed more severe violence. In comparison, the relative likelihood of reactive violence was greater for participants who had committed more frequent nonviolent offences.

Employment status, marital status, and age were unrelated to the likelihood of committing one type of violence over the other, and these variables were excluded as covariates in subsequent analyses.

To aid in interpretation, odds ratios are also presented in Table 9. An odds ratio is the ratio of the odds that an event will occur at level c of the covariate compared to the odds that the event will occur at $c - 1$, where the odds of an event occurring corresponds to the ratio of two probabilities (e.g., the probability of an instrumental offence divided by the probability of a reactive offence). Odds ratios are determined by exponentiating the regression coefficients, a procedure by which positive coefficients produce odds ratios greater than 1 and negative coefficients produce odds ratios less than 1. The interpretation of the odds ratio depends on the scale of the predictor variable. For example, the odds of an offence being instrumental (vs. reactive) are approximately 1.32 times higher for each 1-point increase in the ordinal scale of severity of violence. In comparison, the odds ratio for the dummy coded variable of ethnicity indicates that the odds of instrumental violence are over twice as high for non-White participants than for White participants. Given that the education variable was standardized prior to entry, the corresponding odds ratio of 1.92 indicates that individuals whose level of education was 1 standard deviation above the mean had an odds of instrumental violence that was nearly twice as high as that for individuals with a mean level of education. Finally, although negative coefficients typically produce odds ratios less than 1, Osborne (2006) argued that the interpretation of such odds ratios is less intuitive, and he recommended that they should be inversed (i.e., $1/\text{odds ratio}$) to produce odds ratios that are greater than 1. In heeding this recommendation, all negative coefficients are discussed as positive effects in

the opposite direction (i.e., in the direction of increased odds of reactive violence), and their corresponding odds ratios are presented in a separate column.

Psychosocial correlates of the relative likelihood of subtypes of violence. A series of 25 HLM analyses was conducted by adding the psychosocial variables, one at a time, to the model containing the four predetermined covariates. Again, the multiple analyses introduces the possibility of Type I error, but a Bonferroni correction was deemed too conservative given the preliminary status of the current research. All psychosocial variables were standardized, which has the effect of being entered using grand mean centering. As can be seen from Table 10, only three variables had a unique effect, beyond that of the covariates, on the likelihood of type of violence. Specifically, greater positive outcome expectancies were associated with increased odds of instrumental violence relative to reactive violence, whereas greater hostile attribution biases and problems related to drinking were associated with greater relative odds of reactive violence. A parallel series of analyses was conducted without the covariates, and these results can be found in Appendix H. When the covariates were excluded, an additional five psychosocial variables were found to be associated with increased odds of reactive violence relative to instrumental violence: the Lack of Premeditation, Lack of Perseverance, and Positive Urgency scales from the UPPS-P, as well as Factor 2 and Facet 4 from the PCL-R. Despite these bivariate relationships, there is no evidence that impulsivity-related traits or the social deviance features of psychopathy can differentiate between reactive and instrumental violence when differences in demographics (i.e., ethnicity and education) and other offending characteristics (i.e., severity of violence and frequency of nonviolent offending) are controlled.

Table 10

Hierarchical Linear Modeling Predicting Type of Violence (0 = Reactive, 1 = Instrumental) from Psychosocial Risk Factors (Entered in Separate Models but With Covariates)

Predictor	<i>B (SE)</i>	<i>Odds ratio (95% Confidence Interval)</i>	
		<i>Odds of instrumental > odds of reactive</i>	<i>Odds of reactive > odds of instrumental</i>
CTQ Emotional Abuse	.28 (.16)	1.33 (0.96-1.83)	
CTQ Emotional Neglect	.16 (.16)	1.18 (0.86-1.62)	
CTQ Physical Neglect	.22 (.16)	1.25 (0.91-1.71)	
CTQ Physical Abuse	.18 (.17)	1.20 (0.86-1.68)	
CTQ Sexual Abuse	.16 (.18)	1.18 (0.83-1.68)	
Outcome Expectancies for Crime	<u>.47 (.16)**</u>	<u>1.61 (1.17-2.21)</u>	
Hypothetical vignettes	-.30 (.15)*		1.34 (1.02-1.76)
BPAQ-SF Anger	-.15 (.19)		1.17 (0.80-1.70)
BPAQ-SF Hostility	-.31 (.18)		1.36 (0.94-1.95)
YSQ Mistrust/Abuse	.08 (.16)	1.09 (0.78-1.50)	
YSQ Entitlement/Grandiosity	-.06 (.16)		1.06 (0.77-1.47)
Alcohol Dependence Scale	-.24 (.16)		1.28 (0.94-1.76)
Problems Related to Drinking	-.32 (.16)*		1.37 (1.01-1.86)
UPPS-P Negative Urgency	-.16 (.18)		1.17 (0.82-1.69)
UPPS-P Lack of Premeditation	-.28 (.19)		1.32 (0.90-1.94)
UPPS-P Lack of Perseverance	-.34 (.21)		1.40 (0.93-2.10)
UPPS-P Sensation Seeking	.08 (.14)	1.09 (0.82-1.45)	
UPPS-P Positive Urgency	-.27 (.18)		1.31 (0.92-1.87)
PCL-R Total	.14 (.27)	1.16 (0.67-1.99)	
Factor 1	.20 (.23)	1.22 (0.78-1.92)	
Facet 1 – Affective	.23 (.25)	1.26 (0.76-2.09)	
Facet 2 – Interpersonal	.09 (.23)	1.09 (0.69-1.73)	
Factor 2	.18 (.31)	1.20 (0.65-2.21)	
Facet 3 – Lifestyle	.19 (.26)	1.21 (0.72-2.02)	
Facet 4 – Antisocial	.04 (.30)	1.04 (0.60-1.91)	

Note. CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. UPPS-P = UPPS-P Impulsive Behaviour Scale. PCL-R = Psychopathy Checklist-Revised. Each predictor variable was standardized and entered using grand mean centering into a separate model, which included the four predetermined covariates (severity of violence, ethnicity, education, and frequency of nonviolent offending). For the models including the self-report variables, $n = 236$ violent offences committed by 112 inmates, $df = 107$. For the models including the PCL-R scores, $n = 141$ violent offences committed by 66 offenders, $df = 61$. Bold typeface identifies effects that, when the covariates were excluded, were significant in the direction of larger odds for reactive than instrumental violence; italics and underlined typeface identifies an effect that was a nonsignificant trend ($p < .06$) when the covariates were excluded (see Appendix H).

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

Discussion

The overarching goal of this dissertation was to provide a comprehensive test of the clinical utility of the reactive-instrumental distinction in a sample of adult male inmates. This objective was accomplished by examining the extent to which histories of reactive and instrumental violence diverged in their associations with a variety of psychosocial risk factors, including childhood maltreatment, social-cognitive processing, problematic alcohol use, impulsivity, and psychopathy. Of particular importance was the extent to which any divergence could be detected while controlling for alternative explanatory factors, such as severity of violent offending, frequency of nonviolent offending, and various demographic variables.

After reviewing participants' entire offence histories, two complementary statistical approaches were used to compare the predictors of both the rates and the odds of reactive versus instrumental violent offending. As will be discussed below, the results differed across these analytic approaches, but the overall support for the utility of the reactive-instrumental distinction was strong, with notable independence between the profiles of the psychosocial factors associated with each type of violence. This general lack of convergence between the profiles was summarized by a similarity index that did not statistically differ from zero ($r = -.05$), indicating that the rates of reactive and instrumental violence were associated with different risk factors. However, although some of the more specific hypotheses regarding individual psychosocial risk factors were supported, others were not. Therefore, the results pertaining to each of the psychosocial domains will be discussed in turn, before turning to a more global discussion of the implications of the current findings for both theories of crime and the treatment of violent

offenders. Finally, the limitations of the current study and possible directions for future research will be presented.

Rates Versus Odds of Reactive and Instrumental Violent Offending

Before discussing the specific findings of this study, the general patterns of results from the negative binomial regressions and from the hierarchical linear modeling (HLM) analyses are briefly contrasted. Whereas the former set of analyses was used to determine whether the risk factors were related to inmates' rates of each type of violent offending, the latter was used to determine whether the risk factors were related to the odds that a prior violent offence was reactive versus instrumental. Both statistical approaches offered an advantage over some prior research in that they allowed for inmates' entire history of violence to be considered. These lifetime rates and odds were thought to provide more reliable estimates of propensities towards violence than has been available in past research, where individual differences in subtypes of violence have often been determined from a single most recent (e.g., Broomhall, 2005) or most severe offence (e.g., Woodworth & Porter, 2002).

Given that both sets of analyses were conducted to explain the variance in the same criminal history data, the hypotheses did not differ for the alternative analytic approaches. Nevertheless, the negative binomial regressions identified more significant effects and showed greater divergence between the subtypes of violence than did the HLM analyses. This difference may reflect, in part, the fact that the HLM analyses were conducted on a smaller subset of the sample, as only those participants who had committed at least one violent offence could be included (i.e., only 112 participants in the analyses involving the self-report variables, and only 66 participants in the analyses

involving the PCL-R). With these relatively smaller samples, power may have been an issue. Moreover though, it is possible that if psychosocial variables are associated with the use of one type of violence but unrelated to the other, then examining the correlates of the odds of one type of violence relative to the other may introduce unnecessary error variance as compared to when the correlates of each type of violence are examined separately. In general then, future research on the reactive-instrumental dichotomy may have more power for detecting differences if the two subtypes of violence are operationalized as two independent variables, as was done through negative binomial regression, rather than as opposing ends of a single continuum, as was done through HLM. With that said though, there was one instance where the HLM detected a difference between reactive and instrumental violence that was not detected through the negative binomial regressions. In this instance, the psychosocial risk factor in question, hostile attribution biases, appeared to have only small nonsignificant effects on rates of reactive and instrumental violence; because these effects were in opposite directions, HLM may have had greater power to detect a divergence.

Taken together then, the current results suggest that the relative statistical power attainable through negative binomial regression versus HLM may depend on the particular predictor variable being studied. However, there is no theoretical reason to suppose that the statistically significant effects detected through one analytic approach are more or less clinically meaningful than the statistically significant effects detected through the other approach. Therefore, any significant findings from either analytic approach are discussed below in an integrated fashion, without any particular regard for

whether the divergence between reactive and instrumental violence was detected through HLM or through negative binomial regression.

Childhood Maltreatment

Both types of violence were hypothesized to be related to a history of physical abuse, whereas reactive violence was also hypothesized to be associated with sexual abuse and emotional neglect, and instrumental violence was also hypothesized to be associated with physical neglect. Although these specific hypotheses were not supported, the results of the negative binomial regressions did support a differential relationship between childhood maltreatment and subtypes of offending. Specifically, all subtypes of maltreatment were associated with higher rates of both nonviolent offending and instrumental violent offending, but they were unrelated to the rates of reactive violent offending. These findings confirm the importance of differentiating between reactive and instrumental violence when examining the long-term correlates of childhood maltreatment, as a failure to do so may lead to erroneous conclusions regarding the cycle of violence. For example, longitudinal research has indicated that the effect of maltreatment on criminal behaviour weakens over time, particularly when looking at violent outcomes (English et al., 2002; Fagan, 2003). In contrast, the current results indicate that it may just be the relationship between maltreatment and reactive violence—and not that between maltreatment and violence more generally—that becomes relatively weak across the lifespan. This result was unexpected, and as such, is discussed in further detail below. Subsequently, the external validity of the current findings is discussed in light of the manner in which childhood maltreatment was assessed. However, given that the observed relationships between maltreatment and both nonviolent and instrumental

violent offending are consistent with social learning theory and the research reviewed in the Introduction, these replicated findings are not discussed in any detail.

Independence of adult reactive violence from childhood maltreatment. The current results are inconsistent with previous findings from the child literature, where physical abuse and harsh parenting have been associated with both types of aggression (Connor et al., 2004; Dodge et al., 1997, Study 2) or with reactive aggression specifically (Barker et al., 2010; Connor et al., 2003; Dodge et al., 1997, Study 1; Ford et al., 2010). However, the adult literature with which the current findings can be integrated is sparse, with the only two known studies having examined the retrospective effects of maltreatment on the self-reported impulsive and premeditated aggression of college students (Chen et al., 2013; Haden et al., 2008). Across the male samples in these studies, physical abuse was unrelated to either type of aggression, whereas sexual abuse was unrelated to premeditated aggression and either positively (Haden et al., 2008) or negatively related to impulsive aggression (Chen et al., 2013). Chen et al. (2013) also examined emotional abuse and emotional and physical neglect, which as in the current study, were all positively correlated with premeditated aggression, but not impulsive aggression. Therefore, in comparison to the now replicated finding that at least some forms of maltreatment are associated with adults' use of instrumental/premeditated aggression, there is little to no evidence that the relationship between maltreatment and childhood reactive aggression generalizes to adulthood.

The discrepancy between how maltreatment relates to subtypes of aggression in childhood, as compared to in adulthood, may reflect the differing developmental trajectories of reactive and proactive aggression. Specifically, whereas mean levels of

reactive aggression have been found to decrease from childhood to adolescence, proactive aggression remains stable over this timeframe (Tuvblad, Raine, Zheng, & Baker, 2009). Vitaro, Brendgen, et al. (2006) argued that the decrease in reactive aggression with increasing age may reflect concomitant increases in both internal self-regulation abilities and social pressure to inhibit public expressions of anger. In comparison, proactive aggression was argued to stabilize as a result of family and peers who support the use of aggression for personal gain. Given the relatively greater discontinuity in reactive aggression across the lifespan, a risk factor for the initiation of reactive aggression in childhood, such as maltreatment, may not be a risk factor for continuing to use reactive violence at high rates in adulthood. Rather, adult reactive violence may be better understood in accordance with the cumulative risks approach (Watson, Fischer, Andreas, & Smith, 2004), whereby aggression is thought of as a consequence of the accumulation of multiple risk factors that undermine normal functioning, irrespective of the particular risk factors involved. Indeed, children who use reactive aggression, relative to their proactively aggressive peers, have been found to experience greater negative evaluation, rejection, and victimization from peers, as well as to have greater difficulty forming friendships (Dodge & Coie, 1987; Dodge et al., 1997; Poulin & Boivin, 2000a; Price & Dodge, 1989; Prinstein & Cillessen, 2003). Further, childhood reactive aggression, but not proactive aggression, has been linked with antecedent, concurrent, and future problems related to negative emotionality, such as anxiety and depression (Dodge et al., 1997; Fite et al., 2010; Vitaro, Brendgen, & Tremblay, 2002). Within the context of this constellation of psychosocial adversity, the unique relationship between maltreatment and reactive aggression may weaken over time

and no longer be detectable by adulthood, when other more proximal situational factors (e.g., poverty, social support) may exert a greater effect.

Alternatively, the absence of a relationship between maltreatment and reactive violence may be understood by considering the likely variability across participants in terms of their genetic susceptibility to environmental adversities. For example, one well-studied moderator of the cycle of violence phenomenon is the monoamine oxidase A (MAOA) gene, which regulates neurotransmitter signaling throughout the brain by encoding the MAOA enzyme that deactivates serotonin, norepinephrine, and dopamine (Shih, Chen, & Ridd, 1999). Two meta-analyses have now demonstrated that childhood maltreatment has a statistically larger effect on a variety of antisocial outcomes for individuals with the low-activity variant of the MAOA gene, relative to those with the high-activity variant (Kim-Cohen et al., 2006; Taylor & Kim-Cohen, 2007). Given these findings, previous inconsistencies across studies of the maltreatment-aggression relationship may be an artifact of variation in genetic vulnerability across samples.

Variation in genetic vulnerability may be particularly relevant for understanding the nonsignificant relationship between childhood maltreatment and reactive violence that was observed in the current study. For example, the low-activity MAOA genotype, which occurs in approximately one third of the population (Kim-Cohen et al., 2006), has been linked to a number of intermediary processes that are of theoretical importance for reactive aggression. Such processes have included both structural and functional changes in the corticolimbic circuits involved in affect regulation, emotional memory, and cognitive inhibitory control (Meyer-Lindenberg et al., 2006). Low MAOA activity has also been associated with greater activity in the dorsal anterior cingulate cortex after

social rejection, as well as with greater self-reported interpersonal hypersensitivity (Eisenberger, Way, Taylor, Welch, & Lieberman, 2007). Therefore, reduced MAOA activity seems to confer a vulnerability for reactive aggression at the level of a neural reactivity to environmental threat cues, which may be further potentiated by early experiences of maltreatment (McCrory, De Brito, & Viding, 2010; Viding & Frith, 2006). If environmental stressors serve to calibrate the stress system to correspond to the demands of a hostile environment (McCrory et al., 2010), then the moderating effects of MAOA may increase across the lifespan as stressors accumulate. Indeed, the only known longitudinal study of the physical abuse-MAOA interaction found a significant effect on self-reported offending in adulthood, but not on symptoms of conduct disorder or officially recorded convictions during late adolescence (Fergusson, Boden, Horwood, Miller, & Kennedy, 2011). Taken together, the existing evidence of the direct and interactive effects of MAOA provides a possible explanation for why, in the current study where genotypic variation was not assessed, the main effect of maltreatment on adult reactive violence was not detected. That is, childhood maltreatment may only increase risk for reactive violence in adulthood for individuals with low MAOA activity.

Measurement of maltreatment. Given that the hypotheses regarding the relationships between subtypes of maltreatment and subtypes of violence were not supported, a discussion is warranted on the validity of the indices of childhood maltreatment applied herein. In particular, the discriminant validity of the Childhood Trauma Questionnaire (CTQ) scales may be questioned on the grounds that they were not only highly correlated with one another, but also undifferentiated from each other in terms of their relationships with the three types of offending. However, a confirmatory

factor analysis of the current data supported the five-factor structure (see Appendix A), and the discriminant validity of the five scales has been demonstrated previously by their divergent relationships with various indices of psychopathology (Grilo & Masheb, 2002; Kuo, Goldin, Werner, Heimberg, & Gross, 2011; Lipschitz et al., 1999; Michal et al., 2007; Zlotnick, Mattia, & Zimmerman, 2001). Furthermore, the current results are consistent with previous studies of substantiated cases of maltreatment, where neglect, physical abuse, and emotional abuse (and sometimes sexual abuse) have been found to have similar effects on violent outcomes in adulthood (English et al., 2002; Maxfield & Widom, 1996; Mersky & Reynolds, 2007; Widom, 1989a). Therefore, the observation that the CTQ scales shared the same pattern of relationships with the offending variables may simply reflect the high rate at which multiple types of maltreatment tend to co-occur (Herrenkohl & Herrenkohl, 2009), particularly in high-risk samples (Higgins & McCabe, 2000).

Although generally high, estimates of the co-occurrence of maltreatment types have varied considerably across studies (i.e., 16% to 95% of maltreated children have experienced multiple forms of maltreatment; Herrenkohl & Herrenkohl, 2009). Herrenkohl and Herrenkohl (2009), therefore, argued for more multi-trait, multi-method analyses to compare the construct validity of various operational definitions of maltreatment types. Maltreatment was operationalized in the current study through self-reports of frequency of events, but maltreatment could alternatively been operationalized based on chronicity (English, Graham, Litrownik, Everson, & Bangdiwala, 2005), timing (Sternberg, Baradaran, Abbott, Lamb, & Guterman, 2006), substantiation status (Hussey et al., 2005), or severity (Litrownik et al., 2005). Not only have these dimensions of

maltreatment been shown to be associated with distinct mental health outcomes, but they have also been demonstrated to interact with each other to predict different outcomes (English, Upadhyaya, et al., 2005). Accordingly, the extent to which the current results generalize across other operational definitions of maltreatment remains to be determined. Alternatively, the apparent interactions between different operationalizations of maltreatment may point to nonlinear relationships that remain to be explored in future research (Cortina, 1993).

A final measurement issue that should be considered when interpreting the current results is that the maltreatment data were based on retrospective accounts of experiences occurring up to decades ago. Widom (1989b) questioned the accuracy of retrospective reports, arguing that people may selectively recall or redefine their early life experiences to be consistent with or to explain their current situation. However, although individuals with a criminal history might be expected to exaggerate their abuse history so as to elicit sympathy, in actuality, they have been found to retrospectively underreport previously substantiated maltreatment (Femina, Yeager, & Lewis, 1990). When participants were asked to clarify these discrepancies, their stated reasons for retrospective denial included embarrassment, a desire to protect their parents, feelings that the abuse was deserved, and wish to forget their abuse history. Despite these biases, previous research has demonstrated moderate correspondence between retrospective and prospective reports of maltreatment, with both approaches to assessment having similar relationships with a range of antisocial outcomes in adolescence and adulthood (C. A. Smith, Ireland, Thornberry, & Elwyn, 2008; Tajima, Herrenkohl, Huang, & Whitney, 2004; Widom & Shepard, 1996).

There are, however, two threats to the validity of the present findings based on retrospective reports. First, there is no way of determining whether there was a systematic difference between high reactive versus high instrumental offenders in their tendency to deny previous maltreatment experiences. Although there is no empirical basis to expect such differences, if present, they could explain the observed pattern of results. Second, retrospective data do not inform the temporal sequence or the causality of the maltreatment-instrumental violence link. This limitation is problematic in light of previous behavioural genetic findings that the correlation between maltreatment and conduct problems was more consistent with the interpretation of an evocative gene-environment correlation—whereby children’s genetically-influenced conduct problems evoked parental maltreatment—than with the causal interpretation (Schulz-Heik et al., 2010). In summary then, although there is preliminary evidence that childhood maltreatment is more relevant to the understanding of adult instrumental violence than reactive violence, the validity of these findings would be supported by future longitudinal and genetically-informed research that takes a multi-trait, multi-method approach to the assessment of maltreatment.

Social-Cognitive Processing

On the basis of a considerable body of research on children’s use of subtypes of aggression, adult reactive and instrumental violence were hypothesized to be related to unique patterns of social-cognitive processing. Results varied depending on whether the relationships were examined through negative binomial regression or through hierarchical linear modeling, but taken together, the current results provide strong support for divergence between the cognitive profiles associated with reactive and instrumental

violence. The unique relationships that were observed between subtypes of violence and positive outcome expectancies, hostility-related traits, and entitlement are discussed in turn.

Positive outcome expectancies. In line with a social learning theory of instrumental violence, positive outcome expectancies for crime were associated with higher rates of instrumental violent offending, as well as with higher odds of instrumental violence relative to reactive violence. These findings are consistent with the unique relationship previously reported between positive outcome expectancies and the proactive aggression of not only children and adolescents (Crick & Dodge, 1996; Hubbard et al., 2001; Marsee & Frick, 2007; Schwartz et al., 1998; Smithmyer et al., 2000), but also of community adults (Miller & Lynam, 2006). However, this study is the first to demonstrate that the unique effect of positive outcome expectancies on instrumental violence generalizes to an adult correctional sample.

The differential relationship between positive outcome expectancies and subtypes of violent offending was detected despite using a measure that assessed expectancies regarding only nontangible outcomes (e.g., respect, control, power, excitement). Such methodology provides a conservative test of the reactive-instrumental distinction given that, first, many instrumental offences are committed to achieve more tangible goals (e.g., money, access to drugs), and second, the nontangible outcomes assessed are potential by-products of reactive violence. That is, had the measure of expectancies included more tangible outcomes, the differential effects would likely have been more pronounced.

Further supporting the robustness of the current findings, of those participants who were thinking of a violent crime when completing the expectancies measure, 27%

indicated that they were provoked by the victim and 41% indicated that they were angry at the time of the crime. In other words, many participants were likely reporting on their outcome expectancies for reactive violence. Irrespective of this potential source of measurement error, positive outcome expectancies were nonetheless associated with greater odds and rates of instrumental violence. These results are consistent with those of Smithmyer et al. (2000), who found that adolescent inmates' positive outcome expectancies for both subtypes of aggression were each uniquely related to the adolescents' use of proactive aggression, but not to their reactive aggression.

Finally, although there was no stated hypothesis regarding the relationship between positive outcome expectancies and rates of nonviolent offending, the observed positive relationship may be attributed to the fact that 49% of participants indicated that they were thinking of a nonviolent crime while reporting their expectancies. Furthermore, of these participants, 56% indicated that they had committed the nonviolent crime in order to achieve a specific goal. Given this instrumental quality, social learning theory principles could be expected to play a similar role in both nonviolent and instrumental violent offending. However, future research might better disentangle the correlates of these subtypes of offending by assessing outcome expectancies for instrumental violence and nonviolent crime separately. This recommendation is based on previous findings that the relationship between antisocial beliefs and antisocial behaviour is stronger when both beliefs and behaviour are measured with greater specificity, for example, when aggressive and non-aggressive attitudes and behaviour are teased apart (Crane-Ross et al., 1998).

Hostility-related traits. As hypothesized, adult inmates' hostile attributions in response to ambiguous vignettes were associated with higher odds of reactive relative to instrumental violent offending. These results are consistent with previous findings from the child literature, where hostile attribution biases have been linked to reactive aggression, but not proactive aggression (Crick & Dodge, 1996; Dodge & Coie, 1987; Kempes et al., 2006; Schwartz et al., 1998). Although hostile attribution biases have also been found to be characteristic of adult violent offenders in general (James & Seager, 2006; Lim, Day, & Casey, 2011; Seager, 2005; Vitale et al., 2005), the current study provides the first evidence that hostile attributions in adulthood are uniquely related to reactive violence. Dodge (2006) argued for the causal interpretation of these findings, citing evidence that (a) the relationship between hostile attributions and aggression remains when controlling for other variables that might otherwise account for the observed covariation (e.g., impulsivity, general skills at discriminating stimuli, or verbal intelligence), (b) hostile attribution biases predict increases in aggression over time, and (c) clinical intervention aimed at decreasing hostile attribution biases produces parallel reductions in aggression. However, this indirect support for the causal role of hostile attributions comes exclusively from work with children, meaning that additional research will now be needed to determine whether support for the causal relationship generalizes to the prediction of reactive violence in adulthood.

The unique association between reactive violence and hostile attribution biases, observed in the current study, may reflect individual differences in more enduring cognitive or emotional dispositions. Indeed, and also in line with hypotheses, both anger and hostility were uniquely associated with higher rates of reactive violent offending, but

not instrumental violent offending. These results are consistent with a previous meta-analysis of community-based studies, where trait anger was found to predict greater laboratory aggression after provocation, but to be unrelated to aggression in the absence of provocation (Bettencourt et al., 2006). In contrast, in a previous study of adult offenders, there was only a trend for primarily reactive violent offenders to self-report greater trait anger than primarily instrumental violent offenders (Levi et al., 2010). This lack of significance may reflect reduced power associated with dichotomizing violent offenders, many of whom likely had histories of both types of violence. In comparison, there may have been greater power to detect a differential relationship between subtypes of violence and anger and hostility in the current study, where propensities towards each type of violence were operationalized as independent continuous variables.

The current results are consistent with the idea that individuals with angry and hostile dispositions are primed for reacting aggressively to provocation; however, anger and hostility may exert a more general effect on delinquency given that these traits were observed to be associated not only with rates of reactive violence, but with rates of nonviolent offending as well. Such findings are not unprecedented, as a recent meta-analysis indicated that the angry hostility facet of the five-factor model of personality was positively associated, to the same extent, with both antisocial behaviour in general and with aggression more specifically (Jones et al., 2011). These broad effects on delinquency are in line with general strain theory (Agnew, 1992), according to which, the experience of social adversity or strain causes negative affect, which in turn creates pressure for corrective action, perhaps through illegitimate means if other coping strategies are unavailable. More specifically, Agnew (1992) argued that anger could be

conducive to delinquency by energizing the individual for action, lowering their inhibitions, and fostering beliefs that delinquency is justified to alleviate negative affect or to escape the source of strain. Agnew contended that general strain theory had the potential to explain a wide range of criminal behaviour, including property, drug, and violent crime, but the results of the current study suggest that instrumental violent offending may be one notable exception.

Although the current study supported the hypotheses related to hostile attribution biases, anger, and hostility, the results were inconsistent with the hypothesis that schemas of mistrust would also be associated with higher odds and rates of reactive violence. The current null findings are in contrast to the results of previous community-based studies, where the same indicator of mistrust from the Young Schema Questionnaire was related to both aggression in general (Tremblay & Dozois, 2009) and to reactive aggression in particular (Calvete & Orue, 2010, 2012). Further, the absence of a relationship between mistrust and any type of offending, observed herein, is inconsistent with meta-analytic results indicating that the trust facet from the five-factor model of personality is inversely related to both general antisocial behaviour and aggression (Jones et al., 2011). However, much of this previous research was conducted using self-reports of antisocial behaviour, meaning that the observed effects may have been attributable, at least in part, to shared method variance. Furthermore, in the two studies that identified a positive bivariate correlation between mistrust and reactive aggression (Calvete & Orue, 2010, 2012), there was also a negative indirect effect between these variables that was mediated through social information processing. Specifically, schemas of mistrust were associated with lower likelihood of becoming angry (Calvete & Orue, 2012) and of behaving

aggressively (Calvete & Orue, 2010) in hypothetical social scenarios involving ambiguous provocation, thereby reducing the net effect of mistrust on reactive aggression.

Calvete and Orue (2012) speculated that the opposing direct and indirect effects of mistrust on aggression may be a function of the variability in the emotional responses of individuals with schemas of mistrust. Indeed, mistrust has been associated not only with anger, but with a broader spectrum of negative emotionality, including depression and anxiety (Muris, 2006; Sanz, García-Vera, & Magán, 2010). Further, while certain emotional responses, such as anger, can increase intentions to engage in crime, other emotions, such as fear, can decrease criminal intentions (Ganem, 2010). Such opposing effects may have cancelled each other in the current study and may explain why mistrust was observed to be unrelated to any type of offending.

Schemas of entitlement. The relationships between schemas of entitlement and subtypes of violence were examined for exploratory purposes, as previous findings have been mixed. Specifically, past community-based research, primarily with children, has variously demonstrated entitlement to be more strongly associated with reactive aggression (Archer & Thanzami, 2009; Bukowski et al., 2009; Fossati et al., 2010), more strongly associated with proactive aggression (Seah & Ang, 2008; Washburn et al., 2004), or similarly related to both types of aggression (Barry et al., 2007; Koolen et al., 2012). In the current study, entitlement was associated with higher rates of both types of violent offending, with the effects being similar in magnitude. This lack of divergence replicates the preliminary findings from two other studies with adult inmates, where

grandiosity was less favourably operationalized through a single item (Cornell et al., 1996) or as part of a broad composite of criminal attitudes (Walters et al., 2007).

The observed similarity in the bivariate relationships between entitlement and both reactive and instrumental violence does not preclude the possibility that different intermediary processes may be involved. For example, in line with the threatened egotism hypothesis, Calvete and Orue (2010, 2012) found that the relationship between entitlement and reactive aggression was mediated by the anger experienced in provocative scenarios. Similarly, although formal mediation analyses were beyond the scope of this dissertation, the relationship between entitlement and rate of reactive violent offending that was observed in the current study was no longer significant when anger was added to the model ($IRR = 1.13$ [CI = 0.90-1.42], $p < .29$). In contrast, a sense of entitlement may predispose individuals to instrumental violence via a bias during the goal clarification stage of social information processing. For example, proactively aggressive children have been found to select more self-enhancing goals and fewer relationship-enhancing goals during social interactions than reactively aggressive or non-aggressive children (Crick & Dodge, 1996), and this selfish goal selection may reflect an underlying sense of entitlement. Given that these differential pathways between entitlement and subtypes of violence remain speculative at this point, future research on potential mediators appears warranted and may help to clarify some of the previous inconsistencies in the entitlement-aggression literature.

The final point to be made on the topic of the social-cognitive results pertains to the unexpected observation that entitlement was unrelated to rates of nonviolent offending. This finding is inconsistent with previous research showing that egotism and

low modesty are associated not only with greater aggression, but with greater nonviolent antisocial behaviour as well (Calvete, 2008; Costello & Dunaway, 2003; Jones et al., 2011). The present null effect may reflect the poor internal consistency of the YSQ Entitlement/Grandiosity scale that was obtained in the present sample ($\alpha = .56$). The reliability of this scale has been reported to be acceptable elsewhere (Stopa et al., 2001; Tremblay & Dozois, 2009)—and indeed the lack of reliability herein did not preclude significant results in the analyses involving rates of violence—but such poor reliability may be a sign of the scale’s multidimensionality. That is, as reflected by the name of the scale, items assessing both entitlement and grandiosity were included. Although these constructs are moderately correlated with one another (Miller, Price, & Campbell, 2012), they have been found to diverge in their relationships with various indicators of personality, mental health, and misconduct (R. P. Brown, Budzek, & Tamborski, 2009; Maxwell, Donnellan, Hopwood, & Ackerman, 2011; Tamborski, Brown, & Chowning, 2012). These differences highlight the importance of assessing the grandiosity and entitlement separately in subsequent research in this area.

Problematic Alcohol Use

As hypothesized, inmates with greater self-reported problems related to drinking had higher rates and odds of reactive violent offending, but not of instrumental violent offending. These findings corroborate the rather limited existing research in this area. That is, the only previous indications that adult offenders’ alcohol problems are a particular risk factor for reactive violence, rather than instrumental violence, have come from research using self-reports of aggression subtypes (Swogger et al., 2010), or otherwise, from research where the observed trend among small samples of offender

subtypes did not reach significance (Levi et al., 2010). Nonetheless, the converging pattern of results from adult samples is in contrast to the larger evidence-base stemming from the child and adolescent literature, where proactive aggression, but not reactive aggression, has been associated with concurrent and future problems with alcohol use (Connor et al., 2004; Cornell et al., 1987; Fite et al., 2008, 2010; Loper et al., 2001; Pulkkinen, 1996).

The apparent changes in the alcohol-aggression relationships that occur from childhood to adulthood may reflect differences in the psychosocial factors associated with early-onset versus late-onset or persistent problem drinking. For example, the concurrent onset of alcohol use and proactive aggression during childhood or adolescence may reflect a shared stress-diathesis, involving on the one hand, a genetic vulnerability towards a broad spectrum of externalizing behaviour and, on the other hand, a pathogenic environment (e.g., deviant peers, poor parental monitoring, opportunity to use substances; Fite et al., 2012; Vrieze, Perlman, Krueger, & Iacono, 2012). In comparison, Vrieze et al. (2012) demonstrated that the emergence of alcohol dependence in adulthood is relatively independent of a general externalizing liability, which is consistent with the current finding that the alcohol use variables were unrelated to the rates of both nonviolent and instrumental violent offending. Moreover, the personality variables that have previously been shown to predict the persistence and escalation of alcohol problems into adulthood include negative emotionality and impulsivity-related traits (Chassin, Forth, & King, 2004; Hicks, Durbin, Blonigen, Iacono, & McGue, 2012; Stice, Myers, & Brown, 1998), which have elsewhere been linked to reactive aggression (Miller & Lynam, 2006; Raine et al., 2006; Vitaro, Barker, et al., 2006). In other words, the relationship between

problematic drinking and reactive violence that was observed in this study may reflect, at least in part, common underlying risk factors.

Alternatively, alcohol consumption may have a more direct effect on reactive violence, as was discussed in the Introduction, by narrowing attention during the acute intoxication stage, in turn increasing the salience of provocative cues in the environment (Steele & Josephs, 1990). Although this particular mechanism was not tested herein, indirect support for a causal effect of intoxication comes from the observation that both the rates and odds of reactive violence were associated with higher scores on the Problems Related to Drinking scale, but not the Alcohol Dependence Scale. Scores on this latter scale reflect symptoms of dependence, including tolerance, withdrawal, alcohol-seeking behaviour, and cravings to consume alcohol, whereas scores on the former scale reflect the various psychosocial consequences of excessive consumption, including many problems that specifically occur during intoxication. Thus, the results suggest that it may be the acute effects rather than the chronic effects of excessive alcohol use that are associated with greater likelihood of reactive violence. This more proximate, causal explanation could be tested in experimental studies, whereby participants consume alcohol prior to completing laboratory aggression paradigms under both reactive and instrumental conditions. Future research might also involve comparing the official descriptions of reactive and instrumental violent offences, as well as those of nonviolent offences, to determine whether intoxication at the time of the offence is related to the odds that an offence was reactive versus instrumental or nonviolent. Such research would help to clarify the extent to which the current findings reflect a causal effect.

Impulsivity

Reactive and instrumental violence were hypothesized to have divergent relationships with trait impulsivity. Specifically, reactive violence was hypothesized to be associated with both urgency and a lack of premeditation, and instrumental violence was hypothesized to be relatively independent of the impulsivity-related traits. Contrary to these hypotheses though, when the various demographic factors were statistically controlled, none of the UPPS-P scales were significantly related to the odds or rates of either type of violence. This failure to differentiate between reactive and instrumental offending is not unprecedented in research using official crime or misconduct data, as groups of reactive and instrumental violent inmates were previously found to self-report similar levels of urgency and of a lack of premeditation (Barratt et al., 1997; Levi et al., 2010; cf. Dolan & Fullam, 2004 and Stafford & Cornell, 2003). In comparison, when the subtypes of aggression have been found to be differentially related to impulsivity-related traits, the findings have typically come from research using questionnaire-based measures of aggression (Barratt et al., 1999; Miller & Lynam, 2006; Miller, Zeichner, et al., 2012; Raine et al., 2006). Given that these studies have also relied on self-reports of impulsivity, previous significant effects between impulsivity and both subtypes of aggression may reflect, in part, shared method variance. Moreover, the relatively larger effects previously reported between impulsivity and reactive aggression may be partially attributed to item overlap. These methodological confounds were avoided in the current study by measuring subtypes of violence through official crime data, thereby allowing for a more conservative test of the impulsivity-violence relationship.

Although none of the UPPS-P scales were related to any of the violent offending variables, both negative urgency and sensation seeking were associated with higher rates of nonviolent offending. These results are consistent with those of Burt and colleagues (Burt et al., 2011; Burt & Donnellan, 2008; Burt, 2012), who have demonstrated that when the shared variance between non-aggressive and aggressive forms of antisocial behaviour is accounted for, only non-aggressive antisocial behaviour remains statistically related to impulsivity. Furthermore, the two facets of impulsivity that were associated with nonviolent offending in the current study were the same two facets of personality that best differentiated, in a recent meta-analysis, between the general antisocial behaviour and aggressive antisocial behaviour (Jones et al., 2011).

Although the current study adds to the growing evidence that impulsivity is more strongly related to nonviolent antisocial behaviour than to violent behaviour, such conclusions may be specific to studies in which impulsivity is operationalized through questionnaires. An alternative approach to operationalizing impulsivity is through laboratory behavioural measures, where performance is thought to reflect such underlying cognitive processes as response initiation, response inhibition, sensitivity to consequences, and time perception (Dougherty, Mathias, Marsh, & Jagar, 2005; Mathias, Marsh-Richard, & Dougherty, 2008; Parker & Bagby, 1997). Although these laboratory-based indicators of impulsivity purportedly assess the same construct as is captured through questionnaires, these different approaches to assessing impulsivity tend to correlate weakly or not at all with each other (Helmers, Young, & Pihl, 1995; Milich & Kramer, 1984; Reynolds, Ortengren, Richards, & de Wit, 2006; White et al., 1994). Further, questionnaire- and laboratory-based impulsivity seem to diverge in their

relations to various forms of antisocial behaviour. Specifically, in contrast to the findings from questionnaire-based research discussed above, the findings from laboratory-based research indicate that impulsivity is more strongly related to violent than to nonviolent antisocial behaviour (Cherek, Moeller, Dougherty, & Rhoades, 1997; Hancock, Tapscott, & Hoaken, 2010; Mathias et al., 2002). There have also been preliminary reports that reactive violent offenders are more impaired on these laboratory measures than instrumental violent offenders (Broomhall, 2005; Dolan & Fullam, 2004). Therefore, if future comparisons of reactive and instrumental violence were to include both questionnaire- and laboratory-based measures of impulsivity, the results might help to clarify the unexpected findings presented herein.

Psychopathy

Consistent with descriptions of psychopathy as “one of the most potent risk factors for violence” (Hare, 1999a, p. 182), PCL–R total scores were associated with higher rates of both reactive and instrumental violent offending, and these effects were larger than those involving any of the other psychosocial risk factors examined. Moreover, the results from the negative binomial regressions replicated previous demonstrations that the Affective-Interpersonal (Factor 1) and Social Deviance (Factor 2) features of psychopathy were uniquely associated with instrumental and reactive violence, respectively (Declercq, Willemsen, Audenaert, & Verhaeghe, 2012; Flight & Forth, 2007; Swogger et al., 2010). Supplementary analyses of the current data (not shown) confirmed that these divergent relationships held when both factors were entered simultaneously into models predicting each type of violence. However, this factor-level

summary of findings is misleading, as the underlying facet-level relationships provide only mixed support for the hypotheses.

Factor 1 traits. Contrary to hypotheses, Facet 1 (Interpersonal) was unrelated to rates of instrumental violence. This finding is discrepant with a large body of research identifying a link between instrumental violence and the interpersonal features of psychopathy (Camp et al., 2013; Cornell et al., 1996; Declercq et al., 2012; Flight & Forth, 2007; Laurell et al., 2010; Vitacco et al., 2009, 2006; Walsh et al., 2009). However, unlike in many of these previous studies, offending behaviour was operationalized in the current study as the frequency of convictions, and this methodology may be relatively problematic when examining relationships between crime and Facet 1 traits. That is, interpersonally charming individuals who are manipulative and deceitful may very well be committing the hypothesized level of offences, but simply have the skill-set needed to avoid repeated convictions (Leistico et al., 2008). To the extent that Facet 1 traits are associated with systematic differences in the discrepancy between officially documented and actual offending, research results regarding Facet 1 may be expected to vary across studies that are conducted using different samples and methodologies. Future research might investigate whether the file drawer effect has resulted in a publication bias, whereby previous null findings involving Facet 1 and official crime data have gone unpublished. Future research on the relationship between Facet 1 and subtypes of violence might also be strengthened by assessing offending behaviour, not only through conviction data, but simultaneously through other means, including self-reports, dismissed charges, or staff observations.

Whereas Facet 1 was unrelated to either type of violence, Facet 2 (Affective) was associated with higher rates of both reactive and instrumental violence. This finding replicates that of Flight and Forth (2007), who similarly observed that Facet 2 was positively related with adolescent inmates' frequency of both types of violence. These results, when contrasted with a larger body of null findings, highlight the importance of assessing propensities towards reactive and instrumental violence as two independent variables. That is, when differences in violence have been captured by dichotomizing offenders or by using a single continuum, with reactive violence at one end and instrumental violence at the other, Facet 2 has appeared to be unrelated to either type of violence (Camp et al., 2013; Cornell et al., 1996, Study 1; Declercq et al., 2012; Laurell et al., 2010; Vitacco et al., 2006; Walsh et al., 2009). In comparison, the current methodology unmask the importance of affective deficits in understanding violent behaviour, particularly considering that Facet 2 was unrelated to nonviolent offending rates.

The relationship between Facet 2 and instrumental violence was hypothesized and, as such, does not warrant further discussion. However, the relationship between this facet and reactive violence was not expected, as individuals with shallow affect were thought to be relatively unresponsive to provocation. Indeed, Blair's (2010) review of the available neurocognitive data supported that psychopathy is associated with reduced sensitivity to basic threat, but he went on to argue that psychopaths should nonetheless be at increased risk for reactive violence, as their impaired emotional learning puts them at greater risk of encountering frustrating events. Specifically, psychopathy is associated with impairments in stimulus-reinforcement learning (i.e., the ability to link sensory

representations of stimuli with social judgments about their value) and reversal learning (i.e., the ability to alter behaviour following changes in contingencies). Both of these deficits would increase the risk for frustration when the affected individual engages in some behaviour, expecting certain outcomes, but does not receive them. Psychopaths' apparent outbursts in such situations have been characterized as "proto-emotions," meaning that they experience shallow, primitive responses to immediate needs (Hare, 1999b, p. 53). Cleckley (1941/1976) likewise suggested that psychopaths' violence may occur as the result of "weak emotion breaking through even weaker restraints" (p. 263). From these various arguments, a tentative hypothesis regarding the observed relationship between Facet 2 and reactive violence is that the relationship may be mediated by deficits in emotional learning; however, this possibility remains to be tested by future research.

Factor 2 traits. Although Factor 2 was uniquely related to the rate of reactive violent offending, this relationship did not extend downwards to both of the underlying facets of Factor 2. Specifically, the hypothesized relationship between reactive violence and Facet 3, which reflects the impulsive lifestyle features of psychopathy, was not supported. This finding adds to the mixed evidence-base concerning Facet 3, which has previously been found to be associated with either a greater risk of both types of violence (Flight & Forth, 2007; Lehmann & Ittel, 2012; McDermott et al., 2008) or, less explicitly, with greater likelihood of instrumental violence in particular (Camp et al., 2013; Cornell et al., 1996). Null findings have also been reported previously, where Facet 3 was unrelated to either end of a reactive-instrumental continuum (Laurell et al., 2010; Vitacco et al., 2009, 2006); however, the current study is the first to suggest that Facet 3 may be unrelated to either type of violence when these propensities are measured

as two independent variables. Despite the contradictory nature of the findings across studies, the current results are internally consistent with those presented earlier herein, as the self-reports of impulsivity that were completed by the entire sample of participants were also unrelated to the rates of violent offending and positively related to the rate of nonviolent offending. Overall though, the inconsistent results throughout the psychopathy literature preclude any firm conclusion regarding the role of Facet 3 traits on violent offending.

In contrast, the only PCL–R facet to be differentially related to subtypes of violence as hypothesized was Facet 4 (Antisocial), which was associated with a higher rate of reactive violence, but not instrumental violence. This unique relationship between Facet 4 and reactive violence replicates prior findings from adolescent offender samples (Flight & Forth, 2007; Vitacco et al., 2006), but it is the first such finding in an adult offender sample. Rather, previous studies in adult correctional samples have found an effect in the opposite direction, where Facet 4 has been more strongly related to instrumental violence (Camp et al., 2013; Cornell et al., 1996; Walsh et al., 2009). In these prior studies, though, the reactive-instrumental distinction was based solely on either the type of offenders' most serious violent incidents or, alternatively, on whether offenders' had ever committed an instrumental offence, irrespective of how many reactive offences they may have committed. The former of these approaches may not be representative of offenders' entire criminal histories, and the latter approach is confounded by offending versatility. Although the current study addressed these limitations by accounting for all previous offences, the resulting original observation of a unique relationship between Facet 4 and reactive violence is in need of replication.

Sampling considerations. Two limitations of this dissertation are discussed here, as they relate specifically to the psychopathy findings. First, PCL–R scores were only available for approximately half of the sample, and this subsample was not representative of the larger sample. Specifically, while there were no differences between those with and without PCL–R scores on any of the demographic variables (i.e., employment status, marital status, ethnicity, age, or education), individuals with PCL–R scores available had been incarcerated longer and had been convicted of more reactive violent offences. These differences likely reflect the Correctional Service of Canada's (2012) mandate to conduct supplementary psychological assessment, including the PCL–R, with inmates who have a history of persistent or gratuitous violence and who are within 1 year of parole eligibility, as well as with those serious violent offenders who are being considered for reclassification to a lower security level. Although these selection criteria could be expected to artificially inflate the current sample's psychopathy scores relative to those found in the population of Canadian offenders as a whole, the opposite effect was observed. That is, the mean scores for Facets 1, 2, and 3 were significantly lower in this subsample of participants than in the normative sample, resulting in a mean Total score for the current subsample that was at the 42nd percentile (Hare, 2003). Regardless of the direction of the bias, the extent to which it impacted the current results remains unknown.

A second limitation reflects the possible criterion contamination that may have occurred as a result of using psychopathy scores that were determined on the basis of a review of prior crime data. For example, if the clinicians who scored the PCL–R considered a history of violence to be indicative of the presence of callous-unemotional

traits, the observed relationships between both types of violence and Facet 2 may have been inflated. Consistent with this possibility, meta-analytic results indicate that the relationship between Factor 1 traits and violence tends to be higher in studies using retrospective designs than in studies with prospective designs (Kennealy et al., 2010). Therefore, the current findings—particularly those pertaining to Facets 1 and 2—should be replicated in prospective designs or in research where the PCL–R administrators are blind to the details about prior violence.

Implications for Theories of Crime

The current dissertation was designed to contribute to the field’s understanding of the heterogeneity of violent offending, and as such, its findings have implications for theories of aggression. First though, the implications of this study on Gottfredson and Hirschi’s (1990) general theory of crime are discussed, as this parsimonious theory—attributing all forms of crime to a single underlying trait—can be treated as the null hypothesis that must be rejected in order to warrant a more complex explanation of crime.

In developing their general theory, Gottfredson and Hirschi (1990) endorsed the classical perspective of human behaviour, assuming that the pursuit of self-interest is natural and universal and, accordingly, that everyone is motivated towards the “immediate, easy, and short-term pleasure” (p. 41) afforded by crime. In other words, they explicitly rejected the notion that motivational differences may explain variation in crime, and they reasoned that a theory of crime need not explain why some people engage in crime, but rather, should explain why some people do not engage in crime. From this perspective, Gottfredson and Hirschi attributed individual differences in

avoiding crime to the construct of self-control. With only a single individual-level cause of crime identified, they further theorized that offenders are versatile in the crimes that they commit. Gottfredson and Hirschi's theory has been very influential, with their book being ranked third in citation prevalence among criminological theory publications, and with the authors themselves ranked first and second among most prevalently cited criminological theorists (Wright & Rourke, 1999). Nonetheless, the current findings are largely inconsistent with several of Gottfredson and Hirschi's main tenets, specifically those stating that self-control predicts rates of all crime, that offenders are versatile in their offending, and that motivational factors are irrelevant to understanding crime.

The results involving the UPPS-P Impulsive Behaviour Scale are particularly relevant in evaluating the general theory of crime, as this measure overlaps considerably with popular operational definitions of self-control that emphasize such traits as impulsiveness, lack of persistence, risk-seeking, and a volatile temper (Grasmick, Tittle, Bursik, & Arneklev, 1993; Longshore, Turner, & Stein, 1996; Pratt & Cullen, 2000). The absence of relationships between the UPPS-P scales and the rates of violent offending are, therefore, in stark contrast to Gottfredson and Hirschi's (1990) assertion that low self-control is "for all intents and purposes, *the* individual-level cause of crime" (p. 232, emphasis in original), explaining "all crimes, at all times" (p. 117). Such null findings may be explained away by proponents of the general theory by criticizing the validity of the self-report methodology (e.g., Hirschi & Gottfredson, 1993), but less easily dismissed are the negative relations between three facets of impulsivity and the rate of instrumental violence, observed herein, when covariates were excluded from analyses (Appendix G). These inverse relationships cannot be consolidated with a theory

that attributes all crime to low self-control, thereby pointing to the possibility that the scope of the general theory of crime may need to be refined. For example, the explanatory power of self-control may be limited to some types of crime and not others, or alternatively, self-control may be related to the number of different types of crimes an individual commits (i.e., an offender's versatility), but not to the number of offences committed within a specific category of crime. This latter possibility is consistent with the observation that indicators of self-control were associated with rates of offending in the heterogeneous category of nonviolent offending, but not with rates of offending in the more homogeneous categories of violent offending.

The proposition that the observed results reflect a relationship between self-control and offender versatility is to be distinguished from Gottfredson and Hirschi's (1990) theory that offenders are versatile in their deviant behaviour, randomly sampling across the various types of crime available to them. That is, only the latter perspective implies that rates of different types of offending should be positively related to one another, and only the latter is brought into question by the divergence between the three rates of offending that was observed in the current study. Furthermore, even though Gottfredson and Hirschi's versatility hypothesis is consistent with the patterns of deviant and criminal behaviour of children and adolescents (e.g., Farrington, Snyder, & Finnegan, 1988; Klein, 1984; Smith & Smith, 1984), those studies that have explored the extent of versatility versus specialization in different age groups have demonstrated that specialization increases with age (Kempf, 1987; Peterson, Braiker, & Polich, 1980, Tables 27-29; Phillpotts & Lancucki, 1979, Table 4.3; Piquero, Paternoster, Mazerolle, Brame, & Dean, 1999; Wolfgang, Thornberry, & Figlio, 1987). Similarly, a growing

number of methodologies and statistical approaches have now supported specialization among adult offender samples (i.e., the tendency to repeat the same crime type over time; Deane, Armstrong, & Felson, 2005; Lo, Kim, & Cheng, 2008; Schwanert, 1998; Stander, Farrington, Hill, & Altham, 1989).

Farrington et al. (1988) argued that “specialization implies heterogeneity among offenders on more than one underlying theoretical construct” (p. 462). Therefore, in contrast to the general theory of crime, individuals who repeatedly engage in a specific type of crime may have crime-specific motivations that warrant study. The current results involving the social-cognitive variables support this position, as proneness to anger and hostility, schemas of entitlement, and outcome expectancies could affect motivation by influencing the perceived costs and benefits of different types of crime. Given that these social-cognitive variables differentially predicted rates of violent offending, whereas the impulsivity-related traits were unrelated to violent offending, this dissertation lends support to the conclusions of others that the general theory of crime may be incomplete or oversimplified (e.g., Armstrong, 2005; Arneklev, Grasmick, Tittle, & Bursik, 1993; Tittle, Ward, & Grasmick, 2004).

Diverging from Gottfredson and Hirschi (1990), Felson (2009) argued that in addition to any theories that can explain why people are willing to break the law, more specific theories of aggression and violence are needed to explain why some people desire to cause physical harm or are indifferent to causing physical harm. Although theories of aggression are numerous, they tend to be tailored to explain some forms of aggression better than others (Anderson & Bushman, 2002). As a result, there is no theoretical account of whether some psychosocial processes may increase the likelihood

of engaging in various types of violent crime, without necessarily affecting the likelihood of engaging in victimless, nonviolent crime. Contributing to this gap in the literature, two variables were identified in the current study that were associated with rates of both types of violence, but that were unrelated to the rate of nonviolent offending: schemas of entitlement and the affective deficits of psychopathy. These variables may be particularly important for differentiating individuals on violent versus nonviolent criminal trajectories, as all but one of the other variables (i.e., problems related to drinking) that were associated with the rate of either type of violence were also associated with the rate of nonviolent offending.

Beyond their similar relations to entitlement and the affective facet of psychopathy, the overall profiles of psychosocial risk factors for rates of reactive and instrumental violence did not converge with one another, as was summarized by a similarity index of $-.05$. Further, the specific variables that differentiated the two rates of violence were in line with the theoretical distinction between instrumental and reactive aggression. For example, consistent with social learning theory (Bandura, 1973), inmates who had committed higher rates of instrumental violence had histories involving greater opportunity to learn aggression vicariously (i.e., greater childhood maltreatment), and they tended to have more positive expectancies regarding the outcomes of future crime. In comparison, in line with the frustration-aggression model (Berkowitz, 1989), inmates prone to more reactive violent crime were characterized by traits related to greater likelihood of experiencing negative affect in provocative situations, including hostile attribution biases, trait anger, hostility, and problems related to alcohol use. These relationships were discussed in sufficient detail in the relevant subsections above, but

they are summarized here to highlight that the overall pattern of findings is very much consistent with existing theories of aggression. In conclusion then, the theoretical implications of this dissertation are far-reaching: Its results provide evidence against the general theory of crime, in favour of the more specific theories of reactive and instrumental violence, and suggestive that schemas of entitlement and affective deficits should be considered during any future attempts to develop a unifying theory of aggression. Beyond advancing theory though, the current findings also have implications that are more applied in nature, as is discussed next.

Implications for Treatment

The observed divergence between reactive and instrumental violent offending has important implications for offender treatment. That is, greater consideration of the characteristics of offenders' violence may help to identify priorities for more streamlined rehabilitation initiatives. Before these implications can be elaborated upon, a brief description of the currently available programming for Canadian violent offenders is provided.

In accordance with the Corrections and Conditional Release Act, the Correctional Service of Canada provides a range of rehabilitation programs intended to help offenders successfully reintegrate into the community upon their release (Correctional Service of Canada, 2009). Although offenders with a history of violence could be referred to a specialized program if their violence is predominantly sexual (i.e., the National Sex Offender Program) or against an intimate partner (i.e., the Family Violence Prevention Program), offenders whose violence is more generalized are referred to the Violence Prevention Program. The high intensity version of this latter program consists of 94 two-

hour group sessions, which span a period of four months and cover such topics as motivation for change, self-awareness, anger management, problem-solving, interpersonal conflict resolution, self-control, prosocial attitudes, positive lifestyles and relationships, and relapse prevention (Cortoni et al., 2006). In an evaluation of this program's effectiveness, Cortoni et al. (2006) found that the rate of violent recidivism among program completers was less than half of the rate observed among a matched, untreated comparison group. These outcome data are encouraging, but improvements may be possible if the results of this dissertation are integrated with what is already known about effective offender rehabilitation.

Andrews, Bonta, and Hoge (1990) outlined several principles that should be adhered to when developing evidence-based correctional programming, and one of these principles is particularly relevant when discussing the current findings. According to the *need principle*, interventions will be effective in reducing recidivism to the extent that they target criminogenic needs, rather than noncriminogenic needs. Criminogenic needs are dynamic risk factors that are directly linked to criminal behaviour and that, if changed, will be associated with changes in the likelihood of recidivism (e.g., antisocial attitudes, substance abuse); in comparison, noncriminogenic needs are factors that may change, but without any concomitant change in criminal behaviour (e.g., personal distress, self-esteem; Andrews, Bonta, et al., 1990). Considerable meta-analytic research has supported the need principle, as treatment programs that adhere to it have been significantly more effective than those that do not in reducing recidivism among diverse offender samples (Andrews, Zinger, et al., 1990), including female offenders (Dowden &

Andrews, 1999a), juvenile delinquents (Dowden & Andrews, 1999b), and violent offenders (Dowden & Andrews, 2000).

Given the importance of matching treatment to criminogenic need, the current results indicate that subsets of violent offenders may benefit from different aspects of existing generalized treatment. For example, the High Intensity Violence Prevention Program involves 56 hours of skills-based training in anger management (12 sessions), communication and conflict resolution skills (8 sessions), and impulse control (8 sessions; Cortoni et al., 2006). Although such modules may target the criminogenic needs of reactive violent offenders, they do not appear to target any risk factors associated with instrumental violence. Conversely, certain aspects of the problem-solving module (10 sessions) may be more relevant for predominantly instrumental violent offenders, who could likely benefit from re-evaluating the potential outcomes of future violence, as well as from learning strategies for generating alternative methods for attaining their goals. Such strategies may be less beneficial for predominantly reactive violent offenders, who do not associate positive outcomes with their violent behaviour.

The results of this dissertation serve to highlight several problems associated with the current practice of providing all of the above treatment modules to all violent offenders, irrespective of their motivation for using violence. First, given that the effect of treatment on violent recidivism is known to decrease with the number of noncriminogenic needs targeted (Dowden & Andrews, 2000), it would seem that the provision of extraneous treatment may dilute the positive effects of the active treatment components. That is, if offenders are required to attend treatment modules that they view as irrelevant to their criminal behaviour, they may be less attentive or less motivated for

treatment by the time the personally relevant modules are presented. Alternatively, a mismatch between offenders' needs and the treatment provided may lead to drop-out, which could lead to worse outcomes than no treatment at all. For example, whereas offenders who did not receive any of the Violence Prevention Program had violent recidivism rates that were 2.10 times the rates of program completers, individuals who started but who did not complete the program had rates of violent recidivism that were 4.25 times higher than program completers (Cortoni et al., 2006). Thus, any efforts at improving treatment retention rates appear worthwhile. Finally, the delivery of superfluous—and potentially harmful—treatment components unnecessarily inflates the financial cost of rehabilitation programs. The High Intensity Violence Prevention Program, for example, costs the system over \$10,000 for each offender who successfully completes the program (Correctional Service of Canada, 2009).

In light of these problems associated with the existing generalized treatment programs, the current findings underscore the importance of renewing efforts to restructure treatment so that offenders only receive those modules that are relevant to their unique patterns of violence. Although the rationale for more specialized programming is evident from this study, some additional research, such as that proposed below, is likely needed before any streamlined initiatives can be implemented.

Limitations and Directions for Future Research

The limitations of the current study are now briefly discussed, both to be explicit about the generalizability of the current findings, as well as to highlight areas for future research. The limitations to be addressed pertain to decisions that were made at three

different stages of the research process, including those related to the sampling procedure, construct operationalization, and study design.

In regards to the sampling procedure, nearly half of those inmates who were randomly selected to participate in the study declined to be involved for various reasons (e.g., skepticism about the research process, scheduling conflicts with correctional programming). Perhaps as a result, the current sample was representative of the larger population of federal inmates on some, but not all, of the demographic and offending variables examined. For example, although the distributions for age and marital status in the sample approximated those in the population, the sample tended to be more educated and more ethnically diverse than the population (refer back to Table 1). As well, the sample was representative of the population in terms of the proportion of inmates currently serving time for homicide (23% vs. 26%), robbery (25% vs. 32%), and drug-related offences (24% vs. 25%); however, sex offenders were considerably underrepresented in the sample (4% vs. 17%; Axford, 2011). This discrepancy may be related to the stigma experienced by sex offenders within the correctional system (Ricciardelli & Moir, 2013), which may have limited their willingness to participate in the study. If willingness to participate in research varies non-randomly across the population, future researchers might employ a stratified sampling procedure, both to ensure that certain groups of offenders are not underrepresented and to increase the generalizability of their findings.

The generalizability of the current findings is also limited by the decision to sample only among male offenders, who commit more frequent and more serious violent offences than female offenders (Greenfeld & Snell, 1999; Shaw & Dubois, 1995).

However, given the known gender differences in the risk factors for both general and violent offending (Deschenes, Owen, & Crow, 2006; Dowden & Andrews, 1999a; Motiuk & Brown, 1993; Poels, 2007; Warren et al., 2005), future research will be needed to determine whether the utility of the reactive-instrumental distinction extends to the population of female offenders.

Although issues related to the measurement of the various psychosocial risk factors were already discussed in the relevant sections above, the discussion now turns to the method used in this study for operationalizing offending propensity. Specifically, offending behaviour was operationalized by counting the number of convictions of various types that were on participants' official criminal records. Research involving official crime data, though, has been criticized as underestimating total offending (Hood & Sparks, 1970, pp. 64-70), over-representing more serious violent crimes (Federal Bureau of Investigation, 2001), and introducing measurement error as a result of plea bargaining or biased police reporting (Murrie et al., 2004; Schwaner, 1998). Nonetheless, the validity of official data has been demonstrated by its high correlation with both self-report data (Hindelang, Hirschi, & Weis, 1981) and victimization data (Gove, Hughes, & Geerken, 1985). Therefore, considering that offenders, particularly those high in psychopathy, tend to exaggerate the reactivity of their violent offences (i.e., minimize the instrumentality; Porter & Woodworth, 2007), official data were thought to be the more valid source of information for a study on the utility of the reactive-instrumental distinction. This assumption might be tested in future research, when resources permit, by assessing propensities towards subtypes of violence simultaneously through official offending data and self-report questionnaires.

Finally, the strength of the current conclusions is also limited by this study's retrospective design. That is, the extent to which the psychosocial risk factors, examined herein, exert causal influences on subtypes of violence remains to be determined by prospective studies. In particular, prospective research is needed to examine the longitudinal effects of the social-cognitive processing variables, which may have changed between the time that participants committed their violent offences and the time that they were assessed in this study. For example, such variables may be modified by the experience of incarceration or by the effects of committing different types of violence. Given these potential alternative explanations for the current findings, prospective research is needed to inform whether psychosocial factors differentially predict future, not only historic, reactive and instrumental violent offending. Any divergence between subtypes of violence that is observed through prospective designs would lend credence to the current call for the development of more specialized rehabilitation programs for violent offenders.

Prospective studies could also inform whether adults with a history of one type of violent offence are more likely to reoffend with that same type of violence than with the other type. To date, longitudinal research has demonstrated that aggressive behaviour, in general, is remarkably stable across time (Huesmann, Eron, Monroe, & Walder, 1984). However, proactive and reactive aggression have been shown to have different developmental courses, with the former being relatively more stable across adolescence than the latter (Tuvblad et al., 2009). It remains to be determined whether these differences in stability generalize to when the timeframe under consideration is adulthood.

General Conclusions

Five decades have passed since psychologists began differentiating between a defensive, hot-blooded form of aggression and one that was more instrumental and cold-blooded (e.g., Buss, 1961; Feshbach, 1964). This distinction has led to more refined etiological theories of aggression (Bandura, 1978; Berkowitz, 1989; Dodge, 1991), as well as to considerable speculation that individuals who use aggression to serve different purposes may benefit from alternative courses of treatment (Crick & Dodge, 1996; Fontaine, 2007; Merk et al., 2005; Vitiello & Stoff, 1997). Nonetheless, correctional programs for violent offenders do not yet recognize the heterogeneity in the motivational factors underlying violence (Cortoni et al., 2006; Polaschek, 2006, 2011). This lag in the transfer of knowledge from research to clinical practice with adult offenders may be a function of the fact that much of the existing support for the reactive-instrumental distinction comes from research on childhood aggression; much less research has investigated the correlates of subtypes of adult violence.

The current research sought to determine whether the pattern of divergent validity between subtypes of aggression in childhood generalized to a sample of adult violent offenders. This objective was accomplished, and the resounding conclusion is that reactive and instrumental violent offending in adulthood are indeed associated with distinct psychosocial profiles: Reactive violence was related to anger, hostility, hostile attribution biases, and problems related to drinking, whereas instrumental violence was associated with childhood maltreatment and positive outcome expectancies. This study was not without its limitations that need to be addressed in future investigations, and many of the results of this study were novel, making replication all the more important.

Nonetheless, the current findings suggest that previous declarations that the reactive-instrumental dichotomy has “outlived its usefulness” (Bushman & Anderson, 2001, p. 274) may have been premature. Rather, it seems that more work is needed for the utility of the reactive-instrumental distinction to be fully realized.

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Appendix A

Confirmatory Factor Analyses of the Childhood Trauma Questionnaire and the UPPS-P Impulsive Behaviour Scale

The factor structures of two of the self-report measures used in the current dissertation had not previously been validated in an offender sample. Consequently, confirmatory factor analysis (CFA) was conducted to determine whether the proposed factor structures of the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) and the UPPS-P Impulsive Behaviour Scale (UPPS-P; Lynam, Smith, Cyders, Fischer, & Whiteside, 2007) were a good fit for the current data.

Model Specification

All analyses were conducted using maximum likelihood estimation in LISREL 8.80. There were no missing data for the CTQ, meaning that the CFA for this measure was conducted with a sample size of 151. However, listwise deletion resulted in a sample size of 150 for the CFA for the UPPS-P. The indicators for each factor were specified to be consistent with the previously established factor structures of the CTQ (Bernstein & Fink, 1998) and UPPS-P (Lynam et al., 2007). Specifically, the items that were allowed to load on each factor are specified in the first column of Tables A1 and A2. Those items from the CTQ that required reverse-scoring were re-coded prior to analysis, and the descriptive statistics for each item were calculated using SPSS 19 (Columns 2 to 4). None of the items violated the assumption of normality, as defined by an absolute skewness index greater than 3 or an absolute kurtosis index greater than 10 (Kline, 2005). For each of the CFAs, the standard model (i.e., simple structure) was tested by specifying models in which (a) none of the items were allowed to cross-load on

a secondary factor, (b) all factors were allowed to correlate, and (c) none of the errors associated with individual items were allowed to correlate with other errors. The metric for each factor was defined by using the first item in each factor as the marker indicator, meaning that its unstandardized factor loading was set to 1.0.

Table A1

Item Descriptive Statistics and Factor Loadings for the Confirmatory Factor Analysis of the Childhood Trauma Questionnaire (N = 151)

Factor and item number	Mean (SD)	Skew ^a	Kurtosis ^b	Unstandardized factor loading (standard error) ^c	Standardized factor loading
Physical Neglect					
Item 1	1.65 (1.02)	1.40	0.89	1.00 (--)	.67
Item 2	2.06 (1.31)	0.98	-0.31	1.25 (0.17)	.65
Item 4	1.90 (1.31)	1.16	0.02	1.43 (0.18)	.74
Item 6	1.60 (0.99)	1.56	1.48	1.01 (0.13)	.70
Item 26	1.76 (1.14)	1.35	0.72	1.44 (0.16)	.86
Emotional Neglect					
Item 5	2.26 (1.30)	0.54	-1.06	1.00 (--)	.72
Item 7	2.11 (1.24)	0.73	-0.70	1.14 (0.11)	.86
Item 13	2.26 (1.18)	0.54	-0.78	1.10 (0.10)	.88
Item 19	2.58 (1.23)	0.25	-0.96	1.09 (0.11)	.83
Item 28	2.59 (1.39)	0.41	-1.01	1.24 (0.12)	.84
Physical Abuse					
Item 9	1.58 (1.06)	1.83	2.43	1.00 (--)	.82
Item 11	2.15 (1.40)	0.83	-0.75	1.48 (0.11)	.92
Item 12	2.80 (1.43)	0.15	-1.30	1.06 (0.13)	.64
Item 15	2.14 (1.48)	0.88	-0.81	1.47 (0.12)	.86
Item 17	1.65 (1.14)	1.70	1.78	1.10 (0.09)	.83
Emotional Abuse					
Item 3	2.15 (1.24)	0.64	-0.80	1.00 (--)	.70
Item 8	1.85 (1.13)	1.07	0.14	0.99 (0.05)	.75
Item 14	2.43 (1.19)	0.34	-0.96	1.07 (0.12)	.77
Item 18	2.22 (1.37)	0.72	-0.79	1.23 (0.14)	.77
Item 25	2.33 (1.43)	0.56	-1.12	1.37 (0.15)	.83
Sexual Abuse					
Item 20	1.68 (1.19)	1.50	0.91	1.00 (--)	.88
Item 21	1.36 (0.85)	2.39	5.10	0.58 (0.05)	.71
Item 23	1.52 (1.01)	1.73	1.77	0.85 (0.05)	.88
Item 24	1.58 (1.16)	1.81	1.91	1.04 (0.06)	.95
Item 27	1.60 (1.22)	1.75	1.51	1.11 (0.06)	.96

^aStandard error = 0.197. ^bStandard error = 0.392. ^cAll loadings are statistically significant at $p < .01$, with the exception of the factor loadings that were fixed at 1.00 and not tested for statistical significance.

Table A2

Item Descriptive Statistics and Factor Loadings for the Confirmatory Factor Analysis of the UPPS-P Impulsive Behaviour Scale (N = 150)

Factor and item number	Mean (SD)	Skew ^a	Kurtosis ^b	Unstandardized factor loading (standard error) ^c	Standardized factor loading
Negative Urgency					
Item 2	2.23 (0.93)	0.12	-0.99	1.00 (--)	.55
Item 7	2.34 (0.97)	0.02	-1.03	0.88 (0.18)	.47
Item 12	2.56 (0.84)	-0.39	-0.45	1.00 (0.17)	.61
Item 17	2.20 (0.90)	0.09	-0.98	1.24 (0.19)	.71
Item 22	2.01 (0.86)	0.36	-0.74	1.25 (0.19)	.75
Item 29	2.38 (0.92)	-0.13	-0.92	1.46 (0.21)	.82
Item 34	2.33 (0.89)	-0.12	-0.94	1.36 (0.20)	.78
Item 39	2.47 (0.86)	-0.25	-0.67	1.07 (0.18)	.64
Item 44	2.28 (0.90)	0.08	-0.86	1.45 (0.21)	.83
Item 51	2.55 (0.86)	-0.57	-0.50	1.18 (0.18)	.70
Item 54	2.30 (0.76)	0.08	-0.35	0.79 (0.15)	.53
Item 58	2.56 (0.92)	-0.40	-0.72	1.45 (0.21)	.80
Lack of Premeditation					
Item 1	2.07 (0.89)	0.56	-0.37	1.00 (--)	.27
Item 6	1.89 (0.74)	0.47	-0.15	2.27 (0.71)	.74
Item 11	2.09 (0.89)	0.17	-1.09	1.99 (0.66)	.54
Item 16	1.93 (0.72)	0.43	-0.01	2.41 (0.75)	.80
Item 21	1.97 (0.85)	0.52	-0.43	2.09 (0.68)	.59
Item 28	1.94 (0.71)	0.55	0.55	1.64 (0.54)	.56
Item 33	1.89 (0.67)	0.54	0.78	2.11 (0.66)	.76
Item 38	1.95 (0.77)	0.53	0.01	1.89 (0.62)	.59
Item 43	1.86 (0.67)	0.44	0.24	1.80 (0.58)	.64
Item 48	1.99 (0.75)	0.41	-0.11	2.36 (0.74)	.76
Item 49	2.04 (0.81)	0.47	-0.20	2.45 (0.77)	.73
Lack of Perseverance					
Item 4	1.63 (0.60)	0.54	0.48	1.00 (--)	.66
Item 9	1.79 (0.80)	0.86	0.36	1.01 (0.19)	.44
Item 14	1.93 (0.76)	0.68	0.49	0.69 (0.17)	.35
Item 19	1.91 (0.77)	0.76	0.59	0.25 (0.17) ^d	.13
Item 24	2.25 (0.90)	0.27	-0.66	1.55 (0.22)	.67
Item 27	1.81 (0.61)	0.12	-0.44	1.19 (0.15)	.76
Item 32	1.85 (0.60)	0.44	1.27	1.21 (0.15)	.78
Item 37	1.87 (0.68)	0.30	-0.33	1.36 (0.17)	.78
Item 42	1.97 (0.78)	0.75	0.60	0.94 (0.18)	.48
Item 47	1.97 (0.80)	0.30	-0.81	1.13 (0.19)	.55
Sensation Seeking					
Item 3	2.99 (0.77)	-0.61	0.33	1.00 (--)	.31
Item 8	2.30 (1.00)	-0.06	-1.24	1.89 (0.60)	.45

(Table continued on next page)

Table A2 (continued)

Factor and item number	Mean (SD)	Skew ^a	Kurtosis ^b	Unstandardized factor loading (standard error) ^c	Standardized factor loading
Item 13	2.88 (0.85)	-0.50	-0.23	0.88 (0.38)	.24
Item 18	3.13 (0.95)	-0.91	-0.11	2.53 (0.73)	.63
Item 23	2.66 (0.91)	-0.41	-0.57	2.22 (0.65)	.58
Item 26	2.82 (1.22)	-0.44	-1.41	4.09 (1.13)	.80
Item 31	2.75 (0.83)	-0.61	-0.02	2.13 (0.62)	.61
Item 36	3.05 (1.10)	-0.82	-0.73	2.76 (0.80)	.59
Item 41	2.74 (0.90)	-0.51	-0.41	2.49 (0.71)	.66
Item 46	2.76 (1.09)	-0.35	-1.19	3.72 (1.02)	.81
Item 52	3.13 (1.02)	-1.02	-0.10	2.50 (0.73)	.58
Item 56	3.06 (1.00)	-0.74	-0.57	2.38 (0.70)	.57
Positive Urgency					
Item 5	2.02 (0.90)	0.47	-0.66	1.00 (--)	.81
Item 10	1.95 (0.86)	0.35	-0.98	0.90 (0.08)	.76
Item 15	1.89 (0.82)	0.36	-1.04	0.94 (0.08)	.83
Item 20	1.79 (0.77)	0.46	-0.88	0.86 (0.07)	.82
Item 25	1.95 (0.74)	0.29	-0.52	0.80 (0.07)	.78
Item 30	1.97 (0.86)	0.44	-0.66	0.88 (0.09)	.74
Item 35	1.99 (0.89)	0.47	-0.68	0.92 (0.09)	.75
Item 40	1.90 (0.86)	0.38	-1.09	0.97 (0.08)	.82
Item 45	1.97 (0.83)	0.28	-0.97	0.92 (0.08)	.80
Item 50	2.10 (0.88)	0.22	-0.89	0.99 (0.08)	.82
Item 53	2.11 (0.87)	0.17	-0.94	1.00 (0.08)	.84
Item 55	2.01 (0.81)	0.21	-0.90	0.78 (0.08)	.70
Item 57	2.20 (0.90)	0.20	-0.83	0.89 (0.09)	.72
Item 59	2.28 (0.93)	0.12	-0.92	0.84 (0.10)	.65

^aStandard error = 0.197. ^bStandard error = 0.392. ^cAll loadings are statistically significant at $p < .01$, except where noted. ^dNot statistically significant ($p < .07$, one-tailed).

Model Fit

A variety of statistical indices are available to quantify the extent to which the proposed factor structure fits the observed pattern of relationships among test items. Because each of these indices reflects only a particular aspect of model fit, current recommendations are to report the values of a small set of indices (Harrington, 2009; Kline, 2005). The model chi-square is a fit index that tests the hypothesis that the model holds perfectly in the population; a nonsignificant value indicates that the model is a plausible representation of the data. The chi-square is rarely used to evaluate model fit

because it tests an unrealistic hypothesis (i.e., perfect fit) and is very sensitive to sample size (i.e., it is almost always significant in sufficiently large samples); however, it is virtually always reported because it is included in the formulae of most of the other fit indices (Kline, 2005). Thus although chi-square values are reported herein, interpretation of model fit is based solely on the values of four other fit indices that have been shown to perform relatively well in detecting errors in model specification (Hu & Bentler, 1999).

The Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR) are absolute fit indices, meaning that they assess the discrepancy between the proposed model and the observed data. Higher values reflect poorer fit and values of less than .10 are “generally considered favorable” (Kline, 2005, p. 141). In contrast, the Comparative Fit Index (CFI) and the Non-Normed Fit Index (NNFI) are referred to as incremental fit indices, meaning that they quantify the discrepancy between a proposed model and the null model in which there are no covariances among the measured variables. Incremental fit indices range from 0 to 1, with higher values reflecting better fit. Values greater than .90 indicate reasonably good fit, and values greater than .95 indicate excellent fit (Harrington, 2009; Hu & Bentler, 1999; Kline, 2005). Although more stringent cutoffs are sometimes used, those presented above reflect the preference in the current study for Type II errors (i.e., failures to reject misspecified models) over Type I errors (i.e., incorrect rejections of true models). That is, in the absence of strong evidence to the contrary, there was a desire to retain previously established factor structures to facilitate the integration of this dissertation’s primary findings with the existing literature. Despite this apparent bias, the use of multiple fit indices is associated with notable reductions in both Type I and Type II error

rates (Hu & Bentler, 1999). Indices of model fit for the two CFAs are presented in Table A3. Based on the above guidelines, all four indices for each of CFAs provide evidence that there is an acceptable fit between the proposed factor structure and the current data.

Table A3

Fit Indices for Confirmatory Factor Analyses of the Childhood Trauma Questionnaire (CTQ) and the UPPS-P Impulsive Behaviour Scale (UPPS-P)

Fit index	CTQ (<i>N</i> = 151)	UPPS-P (<i>N</i> = 150)
χ^2 (<i>df</i>)	604.48 (265)*	2811.28 (1642)*
RMSEA (90% CI)	.089 (0.079 - 0.099)	.062 (.058-.067)
SRMR	.067	.096
CFI	.96	.95
NNFI	.96	.95

Note. RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR = standardized root-mean square residual; CFI = comparative fit index; NNFI = non-normed fit index.

**p* < .001.

Evaluation of Parameter Estimates

In addition to evaluating goodness-of-fit indices, the proposed models were further evaluated by examining the parameter estimates for any *Heywood cases*. Heywood cases are improper solutions with out-of-range values of parameter estimates such as factor correlations with absolute values greater than 1.0, negative factor variances, or negative variances of error terms (Dimitrov, 2012). No such statistically implausible parameter estimates were observed in the current analyses.

Substantive support of the model fit was also provided by the statistical significance and magnitude of the factor loadings, which were all in the expected direction (see Tables A1 and A2). For example, the ratio of the unstandardized factor loadings and its standard error (Column 5) produces a z -score that can be used to determine the statistical significance of the loading, and across the two CFAs, factor loadings were significant at $p < .01$ for all indicators except Item 19 from the UPPS-P ($t[149] = 1.48, p < .07$, one-tailed). The standardized factor loadings are also presented, which can be interpreted as the estimated Pearson correlations between an indicator and a factor, so long as the indicators load on only one factor. Standardized factor loadings equal to or greater than .71 are considered excellent, .63 very good, 0.55 good, .45 fair, .32 poor, and less than 0.32 are non-interpretable (Comrey & Lee, 1992). As can be seen from the final column in Tables A1 and A2, the standardized factor loadings for the CTQ and the UPPS-P ranged from .64 to .96 ($M = .64, SD = .09$) and from .13 to .84 ($M = .65, SD = .16$), respectively. Only a small minority of factor loadings were poor or non-interpretable (6 items from the UPPS-P).

Finally, the estimated factor correlations are reported in Tables A4 and A5. Although some of these correlations are quite large, none are greater than .85, which suggests that the factors have acceptable discriminant validity (Kline, 2005). Taken together, the joint evaluation of four model fit indices and the associated model parameter estimates provide statistical and substantive support for the previously established factor structures of the CTQ and the UPPS-P. Accordingly, it is justified to calculate subscale scores on these measures as was described in the Method section.

Table A4

Factor Correlations Estimated in the Confirmatory Factor Analysis of the Childhood Trauma Questionnaire (N = 151)

Factor	2	3	4	5
1. Physical Neglect	.85	.61	.78	.53
2. Emotional Neglect	—	.60	.81	.38
3. Physical Abuse		—	.81	.23
4. Emotional Abuse			—	.42
5. Sexual Abuse				—

Table A5

Factor Correlations Estimated in the Confirmatory Factor Analysis of the UPPS-P Impulsive Behaviour Scale (N = 150)

Factor	2	3	4	5
1. Negative Urgency	.65	.54	.29	.84
2. Lack of Premeditation	—	.79	.10	.60
3. Lack of Perseverance		—	-.06	.55
4. Sensation Seeking			—	.23
5. Positive Urgency				—

Appendix B

Hypothetical Vignettes for the Assessment of Hostile Attribution Biases

- 1) You asked someone to do you a favour. You explained to them that it was really important and they agreed to do it. You have just found out that they haven't done what they promised and now it's too late. This leaves you in a real bind.**
- 2) It's early Saturday morning and your neighbour is making a lot of noise. This is not the first time this has happened. You go next door and ask them to keep it down.
- 3) You learn that somebody you care about needs to see you urgently. This means you would need to leave work early. You approach your boss, but they refuse to let you leave. You really need this job.
- 4) You and a friend have been planning a night out to play pool for some time. You have been waiting for 30 minutes for the only pool table around. The person at the table is just bouncing balls, not even using a pool cue.**
- 5) You are at a movie with a friend and the person behind you keeps talking. Not only can't you hear, but they keep telling their friend what's about to happen next, spoiling it for you.
- 6) You're at a party and someone walks by with a couple of drinks. They bump into you, spilling some drink in your lap. They continue to walk by and do not look your way.

**Responses to these two vignettes contributed to the total score.

Appendix C

Ethics Approval from the Research Ethics Board at the University of Western Ontario



Office of Research Ethics

The University of Western Ontario

Telephone: [REDACTED] Fax: [REDACTED] Email: [REDACTED]
 Website: [REDACTED]

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. P.N.S. Hoaken

Review Number: 17412S

Review Date: September 09, 2010

Review Level: Full Board

Approved Local # of Participants: 170

Protocol Title: An investigation of the cognitive, personality, and social risk factors associated with instrumental reactive violence.

Department and Institution: Psychology, University of Western Ontario

Sponsor: SSHRC-SOCIAL SCIENCE HUMANITIES RESEARCH COUNCIL

Ethics Approval Date: December 03, 2010

Expiry Date: March 31, 2012

Documents Reviewed and Approved: UWO Protocol, Letter of information and Consent (main), Letter of Information and Consent (follow-up).

Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the study or consent form may be initiated without prior written approval from the NMREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the NMREB:

- changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- all adverse and unexpected experiences or events that are both serious and unexpected;
- new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the NMREB.

Chair of NMREB: Dr. Riley Hinson
 FDA Ref. #: IRB 0000941

[REDACTED]

Ethics Officer to Contact for Further Information		
<input checked="" type="checkbox"/> Grace Kelly	<input type="checkbox"/> Janice Sutherland	<input type="checkbox"/> Elizabeth Wambolt

This is an official document. Please retain the original in your files.

cc: ORE File

Appendix D

Ethics Approval from the Research Branch at the Correctional Service of Canada

 Correctional Services Canada / Service correctionnel Canada	PROTECTED / PROTÉGÉE A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> ONCE COMPLETED / UNE FOIS REMPLI
RESEARCH APPLICATION AND UNDERTAKING Research Branch	FORMULE DE DEMANDE DE RENSEIGNEMENTS À DES FINS DE RECHERCHE ET ENGAGEMENTS CORRÉLATIFS Direction de la recherche
NOTE - SEE REVERSE FOR TERMS AND CONDITIONS / NOTE - VOIR LES MODALITÉS ET CONDITIONS AU VERSO	
Date submitted / Date déposée: 2011 02 18	
RESEARCH PROJECT - PROJET DE RECHERCHE	
PROJECT TITLE - TITRE DU PROJET An investigation of the cognitive, personality and social risk factors associated with instrumental and reactive violence.	
PROJECT DESCRIPTION - DESCRIPTION DU PROJET Purpose - But : To test the generalizability of previous evidence for the divergent validity of Instrumental and reactive violence. Participants - Participants : 170 male offenders, residing at Fanbrook Institution will be divided into three groups and compared on 18 dependent variables.	
TYPE/CLASS OF INFORMATION REQUESTED - TYPE/CATÉGORIE DES RENSEIGNEMENTS DEMANDÉS Voluntary - Informed consent to participate - Consentement volontaire et éclairé pour participer Criteria - Critères: a. conformity with the principles of CCRA - conformité aux principes de la LSC/MLSC b. contribution to the achievement of the Mission and the priorities of CSC - contribution à la réalisation de la Mission et aux priorités du Service correctionnel du Canada; c. compliance with the Tri-councils Policy Statement on Ethical Conduct for Research Involving Humans - conformité à l'énoncé de politique des Instituts Conseil Éthique de la recherche avec des êtres humains d. level of disruption to the implementation of correctional objectives from an operational perspective - mesure dans laquelle le projet nuit à la mise en œuvre des objectifs correctionnels sur le plan opérationnel e. quality of the methodology - qualité de la méthode f. qualifications of the researchers - compétences des chercheurs g. anticipated benefit to corrections - avantages énumérés pour les services correctionnels h. value for money - rapport valeur-coût	
PRIMARY RESEARCHER - CHERCHEUR PRINCIPAL	
a) Name and title - Nom et titre Peter Hoaken, Ph.D.	Operational unit - Unité opér. / Sector - Secteur / Region - Région Psychology dept / University of Western Ontario
b) Address - Adresse	c) Telephone number - N° de téléphone
OTHER RESEARCHERS - AUTRES CHERCHEURS	
a) Name and affiliation - Nom et affiliation	e) Telephone number - N° de téléphone
b) Name and affiliation - Nom et affiliation	b) Telephone number - N° de téléphone
c) Name and affiliation - Nom et affiliation	c) Telephone number - N° de téléphone
APPROVAL - APPROBATION	
Director General Research - Directeur général de la Recherche Brian A. Grant	Date: JAN 20 2011
CSC/SCC 854 (R-89-04) 7530-21-	DISTRIBUTION Original = <input type="checkbox"/> / Copie = <input type="checkbox"/> Original = <input type="checkbox"/> / Copie = <input type="checkbox"/>

Appendix E

Letter of Information

Project Title: An investigation of the cognitive, personality, and social risk factors associated with instrumental and reactive violence

Principal Investigator: Peter N.S. Hoaken, Ph.D., Associate Professor, Department of Psychology, [REDACTED]
Phone: [REDACTED]; Fax: [REDACTED]; E-mail: [REDACTED]

Invitation to Participate in Research: You are being invited to participate in a research study conducted by researchers from the University of Western Ontario with the co-operation of the Correctional Service of Canada. The purpose of this letter is to provide you with the information you require to make an informed decision on participating in this research. We are asking you to take part because we are interested in learning more about the characteristics of individuals who have committed different types of offences.

Purpose of Research: Some researchers have suggested that there are two main types of violence. Some violence is unplanned and is committed only to harm an individual after being angered by that person. Other violence is planned ahead of time and is committed for a reason other than simply harming someone, for example to obtain money or power. Researchers are now trying to determine whether there is a different group of individuals at risk of committing each of these types of violence, or whether all individuals are just as likely to commit either type of violence. The purpose of this study is to try to better understand the relationship between different types of violence and characteristics of individuals such as their personality, their ability to successfully solve puzzles, and their ability to correctly understand social interactions. It is hoped that this research will help to improve the treatment programs available for violent offenders.

Participant Exclusion Criteria: Any male offender currently incarcerated at Fenbrook Institution may be considered for participation in the study. However, you may only participate if you (a) have normal or corrected-to-normal vision (that is, you may participate if you wear glasses or contact lenses), (b) are fluent in English, (c) can hold and move an object (e.g., pencil, block) with your hand, and (d) can respond (verbally or in writing) to verbal and/or written questions.

Description of Research: Participation in this study will take approximately 2.5 to 3 hours of your time, but you can ask for breaks as needed. First, you will be asked to complete a series of questionnaires that assess your personality, attitudes, functioning in daily life, understanding of social situations, behaviour (including aggressive behaviour), strengths and weaknesses, and negative events that you may have experienced during your childhood (e.g., abuse). It is important for you to know that your answers to some of the questions will help us determine whether you are responding honestly. Second, you will be asked to solve a number of puzzles and problems such as your word knowledge, your ability to identify patterns, your ability to solve riddles, and your decision-making. For some other problem-solving tasks, we will ask you to follow a set of rules while you build towers and connect a series of dots. Third, we would also like to review your file information held by the

Correctional Service of Canada. This file review will entail access to your Case Management and Psychology files only. Your files will be reviewed to (a) determine the characteristics of any prior crimes, and (b) review psychological test results.

Potential Harms: There are no known risks to participating in this study, but you may become tired while completing the tasks. You may also be asked to discuss some sensitive topics that may make you feel uncomfortable. If this occurs please inform the researcher and we will provide you with available resources.

Possible Benefits: There are no direct benefits to you for participating in this study, but knowledge may be gained to help people understand the individual characteristics that are associated with committing specific types of crime.

Voluntary Participation: Participation in this study is voluntary. You should only agree to participate if you feel you have been given enough information about the study. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. Participation in this study, refusing to answer questions, or withdrawal at any time will not have any effect on the terms of your incarceration, case management plan, or decisions of release.

Participation in Other Studies: If you are already participating in another study at this time, you should tell the interviewer right away to decide if it is appropriate for you to participate in this study.

Confidentiality: Any information that you provide us with or that is obtained from your file is valuable, and we will respect your privacy by keeping this information confidential. To protect confidentiality, a participant code will be assigned to all documents and information that you provide to us or that we retrieve from your file. All data will be placed in a locked cabinet, in a securely locked room, in the Psychology Department at the University of Western Ontario, where it can only be viewed by the Principal Investigator and other approved personnel. If the results of the study are published, names will not be used and no information that discloses your identity will be released or published. Five years after the study has been completed and the findings published, we will destroy the data you have provided us. Please note that if you would like to receive a copy of the overall results of the study please bring this to the attention of the interviewer, and this will be provided to you when it becomes available (please be aware this may take several months). Also, please be aware that the Research Ethics Board at The University of Western Ontario may contact you directly to ask about your participation in the study.

Contact Persons: If you have any further questions about any aspect of this study, you may contact (at no charge, through the office of Dr. Rowntree): Dr. Peter Hoaken by calling [REDACTED] [REDACTED] If you have questions about the conduct of this study or your rights as a research subject, you may contact (at no charge, through the office of Dr. Rowntree): Office of Research Ethics, The University of Western Ontario, [REDACTED]

Compensation: Following the rules of the Correctional Service of Canada, no compensation is provided for participation in this study.

Appendix F

Consent Form

Project Title: An investigation of the cognitive, personality, and social risk factors associated with instrumental and reactive violence

Consent: By signing below, you are agreeing that you have read the Letter of Information (or had it read to you), the nature of the study has been explained to you, all questions have been answered to your satisfaction, and you agree to participate. *Please note that you do not waive any legal rights by signing this document.* You will be provided with a copy of this letter once it has been signed.

Participant's Full Name: _____

Participant's Signature: _____

Date: _____

Full Name of Person Obtaining Informed Consent: _____

Signature of Person Obtaining Informed Consent: _____

Date: _____

Appendix G

Negative Binomial Models for the Prediction of Rates of Offending from Psychosocial Risk Factors (No Covariates Included)

Predictor	Nonviolent offending		Reactive violent offending		Instrumental violent offending	
	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>	IRR (95% CI)	<i>z</i>
CTQ Emotional Abuse	1.30 (1.08-1.57)	2.71**	1.06 (0.83-1.36)	0.48	1.26 (0.96-1.65)	1.63
CTQ Emotional Neglect	1.27 (1.05-1.53)	2.47*	1.09 (0.85-1.40)	0.67	1.23 (0.94-1.62)	1.52
CTQ Physical Neglect	1.24 (1.03-1.50)	2.25*	1.07 (0.85-1.36)	0.60	1.26 (0.97-1.63)	1.74
CTQ Physical Abuse	1.18 (0.98-1.42)	1.76	1.06 (0.82-1.37)	0.42	1.25 (0.95-1.65)	1.61
CTQ Sexual Abuse	1.14 (0.94-1.38)	1.34	1.08 (0.86-1.35)	0.66	1.13 (0.89-1.45)	1.01
Outcome Expectancies for Crime	1.26 (1.04-1.53)	2.39*	0.88 (0.68-1.14)	-0.99	1.27 (0.97-1.67)	1.73
Hypothetical vignettes	1.07 (0.88-1.29)	0.68	1.20 (0.95-1.52)	1.53	0.90 (0.68-1.18)	-0.78
BPAQ-SF Anger	1.37 (1.13-1.67)	3.15**	1.39 (1.12-1.73)	2.98**	1.00 (0.77-1.30)	0.01
BPAQ-SF Hostility	1.29 (1.06-1.60)	2.54*	1.48 (1.16-1.88)	3.17**	1.06 (0.81-1.39)	0.42
YSQ Mistrust/Abuse	1.05 (0.85-1.29)	0.46	1.21 (0.96-1.53)	1.59	1.16 (0.88-1.53)	1.06
YSQ Entitlement/Grandiosity	1.15 (0.94-1.41)	1.39	1.29 (1.03-1.62)	2.23*	1.13 (0.87-1.48)	0.92
Alcohol Dependence Scale	0.82 (0.68-0.99)	-2.02*	1.25 (0.98-1.58)	1.82	0.97 (0.74-1.26)	-0.24
Problems Related to Drinking	0.85 (0.72-1.01)	-1.85	1.36 (1.11-1.66)	2.96**	0.97 (0.74-1.27)	-0.20
UPPS-P Negative Urgency	1.46 (1.20-1.78)	3.77**	1.19 (0.94-1.52)	1.43	0.84 (0.64-1.09)	-1.32
UPPS-P Lack of Premeditation	1.24 (1.03-1.50)	2.25*	1.03 (0.81-1.31)	0.23	0.74 (0.56-0.99)	-2.02*
UPPS-P Lack of Perseverance	1.15 (0.97-1.37)	1.60	1.29 (0.99-1.37)	1.89	0.76 (0.58-0.99)	-2.02*
UPPS-P Sensation Seeking	1.31 (1.07-1.60)	2.64**	0.89 (0.70-1.12)	-1.00	1.13 (0.87-1.47)	0.95
UPPS-P Positive Urgency	1.17 (0.98-1.40)	1.71	1.11 (0.87-1.42)	0.83	0.76 (0.58-1.00)	-1.96*
PCL-R Total	2.06 (1.56-2.72)	5.10**	1.77 (1.28-2.44)	3.44**	1.11 (0.81-1.52)	0.63
Factor 1	1.21 (0.89-1.64)	1.23	1.27 (0.93-1.74)	1.52	1.15 (0.85-1.55)	0.90
Facet 1	1.40 (1.01-1.92)	2.03*	1.01 (0.75-1.35)	0.04	0.97 (0.71-1.33)	-0.20
Facet 2	0.99 (0.75-1.32)	-0.04	1.65 (1.19-2.28)	2.99**	1.39 (1.01-1.92)	2.01*
Factor 2	2.33 (1.81-3.00)	6.59**	1.79 (1.30-2.47)	3.56**	1.08 (0.79-1.49)	0.49
Facet 3	2.06 (1.57-2.71)	5.19**	1.55 (1.13-2.13)	2.75**	1.09 (0.79-1.49)	0.51
Facet 4	2.31 (1.79-2.98)	6.44**	1.89 (1.36-2.62)	3.79**	1.04 (0.76-1.43)	0.25

Note. $N = 151$ for the self-report variables, but $n = 74$ for the Psychopathy Checklist-Revised (PCL-R). CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. UPPS-P = UPPS-P Impulsive Behaviour Scale. IRR = incidence rate ratio (i.e., the exponentiated unstandardized regression coefficient, e^b). Each predictor variable was entered into a separate model, which included years at risk of offending as the offset variable. $z = b/SE$. For all significant effects, the likelihood ratio chi-square ($LR \chi^2$) for the corresponding model was also significant ($p < .06$), with $df = 1$.

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

Appendix H

Hierarchical Linear Modeling Predicting Type of Violence (0 = Reactive, 1 =
Instrumental) from Psychosocial Risk Factors (No Covariates Included)

Predictor	<i>B (SE)</i>	<i>Odds ratio (95% confidence interval)</i>	
		<i>Odds of instrumental > odds of reactive</i>	<i>Odds of reactive > odds of instrumental</i>
CTQ Emotional Abuse	.14 (.16)	1.15 (0.84-1.58)	
CTQ Emotional Neglect	.10 (.16)	1.11 (0.81-1.52)	
CTQ Physical Neglect	.14 (.16)	1.15 (0.85-1.57)	
CTQ Physical Abuse	.13 (.17)	1.14 (0.81-1.59)	
CTQ Sexual Abuse	.11 (.19)	1.11 (0.77-1.62)	
Outcome Expectancies for Crime	.34 (.17)	1.40 (0.99-1.97)	
Hypothetical vignettes	-.35 (.15)*		1.42 (1.06-1.91)
BPAQ-SF Anger	-.30 (.20)		1.35 (0.90-2.01)
BPAQ-SF Hostility	-.34 (.18)		1.40 (0.97-2.01)
YSQ Mistrust	-.02 (.18)		1.02 (0.73-1.44)
YSQ Entitlement	-.13 (.16)		1.14 (0.82-1.56)
Alcohol Dependence Scale	-.24 (.17)		1.27 (0.91-1.76)
Problems Related to Drinking	-.35 (.17)*		1.42 (1.03-1.97)
UPPS-P Negative Urgency	-.31 (.20)		1.37 (0.93-2.01)
UPPS-P Lack of Premeditation	-.37 (.19)*		1.44 (1.00-2.08)
UPPS-P Lack of Perseverance	-.50 (.18)**		1.64 (1.14-2.37)
UPPS-P Sensation Seeking	.12 (.14)	1.13 (0.86-1.47)	
UPPS-P Positive Urgency	-.40 (.18)*		1.49 (1.04-2.12)
PCL-R Total	-.42 (.22)		1.52 (0.98-2.35)
Factor 1	-.13 (.22)		1.14 (0.74-1.78)
Facet 1	-.10 (.24)		1.10 (0.69-1.77)
Facet 2	-.14 (.25)		1.15 (0.70-1.90)
Factor 2	-.46 (.23)*		1.58 (1.00-2.51)
Facet 3	-.34 (.21)		1.40 (0.92-2.12)
Facet 4	-.55 (.25)*		1.72 (1.04-2.85)

Note. CTQ = Childhood Trauma Questionnaire. BPAQ-SF = Short Form Buss-Perry Aggression Questionnaire. YSQ = Young Schema Questionnaire. UPPS-P = UPPS-P Impulsive Behaviour Scale. PCL-R = Psychopathy Checklist-Revised. Each predictor variable was standardized and entered using grand mean centering into a separate model. For the models including the self-report variables, $n = 236$ violent offences committed by 112 inmates, $df = 110$. For the models including the PCL-R scores, $n = 141$ violent offences committed by 66 offenders, $df = 64$.

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

Curriculum Vitae
Jennifer L. Tapscott, M.Sc.

EDUCATION

- In progress** *Doctor of Philosophy, Clinical Psychology, University of Western Ontario*
Dissertation: Towards an improved understanding of the heterogeneity of violence: A test of the clinical utility of the reactive-instrumental distinction among adult male inmates
- 2009** *Master of Science, Clinical Psychology, University of Western Ontario*
Thesis: Psychopathic traits and the severity and frequency of instrumental and reactive violent offending
- 2007** *Bachelor of Arts (Honours), Psychology, Queen's University*
Thesis: Convergent and divergent validity of the Direct Cuckoldry Risk Scale and the Tactics to Obtain Sex Scale

PUBLICATIONS AND PRESENTATIONS

Peer-Reviewed Journal Articles

- **Tapscott, J. L.**, Vernon, P. A., & Veselka, L. (2012). A comparison of the construct validity of two alternative approaches to the assessment of psychopathy in the community. *Journal of Personality Assessment*, 5, 541–554.
- **Tapscott, J. L.**, Hancock, M., & Hoaken, P. N. S. (2012). Severity and rates of reactive and instrumental violent offending: Evidence of divergent validity of subtypes of violence from an adult forensic sample. *Criminal Justice and Behavior*, 39, 202–219.
- Hancock, M., **Tapscott, J. L.**, & Hoaken, P. N. S. (2010). The role of executive dysfunction in predicting frequency and severity of violence. *Aggressive Behavior*, 36, 338–349.
- Camilleri, J. A., Quinsey, V. L., & **Tapscott, J. L.** (2009). Assessing the propensity for sexual coaxing and sexual coercion in relationships: Factor structure, reliability, and validity of the Tactics to Obtain Sex Scale. *Archives of Sexual Behavior*, 38, 959–973.

Invited Book Chapter:

- Hoaken, P. N. S., Hamill, V. L., Ross, E. H., Hancock, M., Lau, M. J., & **Tapscott, J. L.** (2012). Drug use and abuse and human aggressive behaviour. In J. C. Verster, K. Brady, M. Galanter, & P. Conrod (Eds.), *Drug abuse and addiction in medical illness: Causes, consequences, and treatment* (pp. 467–477). USA: Springer/Humana Press.

Conference Proceedings

- Hancock, M., **Tapscott, J. L.**, & Hoaken, P.N.S. (2012, March). *The influences of executive functioning on reactive and instrumental violence*. Paper session presented at the annual American Psychology Law Society Conference, San Juan, Puerto Rico.
- **Tapscott, J. L.**, Hoaken, P. N. S., & Hancock, M. (2010, March). *Establishing the validity of the distinction between instrumental and reactive violent offending*. Paper session presented at the American Psychology–Law Society Conference, Vancouver, British Columbia.
- Hancock, M., Hoaken, P. N. S., & **Tapscott, J. L.** (2010, March). *The role of executive dysfunction in predicting frequency of violence: A potential avenue for rehabilitation*. Paper session presented at the American Psychology–Law Society Conference, Vancouver, British Columbia.
- **Tapscott, J. L.**, & Hoaken, P. N. S. (2009, June). *Frequency of offending and the validity of the distinction between instrumental and reactive violence*. Poster session presented at the Canadian Psychological Association’s 70th Annual Convention, Montreal, Quebec.
- MacNeil, B., **Tapscott, J.**, Olivier, D., & Holden, R. (2007, June). *The Dark Triad and faking ability*. Poster session presented at the North American Correctional and Criminal Justice Psychology Conference, Ottawa, Ontario.

Other Professional Presentations

- **Tapscott, J. L.** (February, 2011). *Navigating the mental health care system in London*. Talk presented at the public library through the “Finding Your Way: Psychology in Everyday Life” lecture series.
- **Tapscott, J. L.** (March, 2010). *Managing your procrastination*. Talk presented to students at The University of Western Ontario’s Student Development Centre.
- **Tapscott, J. L.**, & Hancock, M. (November, 2009). *Rolling with the punches: Two students’ experiences applying to graduate school and conducting research with violent offenders*. Presented to Western’s Psychological Association.
- **Tapscott, J. L.** & Hancock, M. (October, 2009). *Rolling with the punches: An endeavor to measure psychopathy and executive functioning in a population of violent offenders*. Talk presented to the faculty and graduate students of The University of Western Ontario’s Department of Psychology.

RECOGNITION OF SCHOLARSHIP

Awards and Honors

- *Ontario Graduate Scholarship, 2013*: Awarded by the province of Ontario (\$15,000)
- *SSHRC Joseph-Armand Bombardier Canada Graduate Scholarship, 2009–2011*: Awarded to successful applicants in a doctoral program in the social sciences or humanities at a Canadian university (\$105,000)

- *Leola E. Neal Award, 2009*: Awarded by The University of Western Ontario's Psychology Graduate Program for the "most outstanding" Master's thesis (\$450)
- *SSHRC Joseph-Armand Bombardier Canada Graduate Scholarship, 2008*: Awarded to successful applicants in a master's program in the social sciences or humanities at a Canadian university (\$17,500)
- *Ontario Graduate Scholarship, 2008*: Awarded by the province of Ontario (\$15,000; declined)
- *Ontario Graduate Scholarship, 2007*: Awarded by the province of Ontario (\$15,000)
- *Dean's Honour List with Distinction, 2004, 2006, & 2007*: Awarded to students who have obtained a weighted year average in the top 3% of their degree program (Queen's University)
- *R. W. Leonard Penultimate Year Scholarship, 2006*: Awarded annually to the student who made the highest standing throughout the first three years in the B.A. (Hons.) program (Queen's University, \$350)
- *Dean's Special Award, 2006*: Awarded for "exceptional academic achievement" (Queen's University, \$165)
- *Gordon & Myrtle Adams Scholarship, 2005*: Presented annually to outstanding students who have completed the first two years of a B.A. (Hons.) degree program (Queen's University, \$1,155)
- *Principal's Scholarship, 2003*: Entrance scholarship awarded to students of "exceptional ability" (Queen's University, \$8,000)

Research Grants

- **Tapscott, J.** (2010). *The status of impulsivity as a cardinal trait of psychopathy: Are all psychopaths impulsive in the full sense of the word?* Graduate Thesis Research Award (The University of Western Ontario, \$750)
- Hoaken, P. N. S., Hancock, M., & **Tapscott, J.** (2008). *Establishing the validity of the distinction between instrumental and reactive violence in a forensic population.* SSHRC Operating Grant Internal Competition (The University of Western Ontario, \$4,650)
- **Tapscott, J.** (2007). *Establishing the validity of the distinction between instrumental and reactive violence in a forensic population.* Graduate Thesis Research Award (The University of Western Ontario, \$750)

SUPERVISED CLINICAL PRACTICE

- *Clinical Pre-Doctoral Internship, Bath Institution & Collins Bay Institution, Correctional Service of Canada* (2013–current; Supervisors: Dr. Dave Hall and Dr. Geris Serran)
- *The Fertility Clinic, Victoria Hospital* (2012–2013; Supervisor: Dr. Christopher Newton)
- *Dialectical Behaviour Therapy Program, Victoria Hospital* (2012; Supervisor: Dr. Walter Friesen)

- *Operational Stress Injury Clinic, Parkwood Hospital* (2012; Supervisor: Dr. Charles Nelson)
- *Fenbrook Institution, Correctional Service Canada* (2008 & 2011; Supervisor: Dr. Peter Hoaken)
- *Services for Students with Disabilities, Western's Student Development Centre* (2011; Supervisor: Dr. Susan Davies)
- *Child and Parent Resource Institute* (2010–2011; Supervisor: Dr. Louise LaRose)
- *Forensic Services, Regional Mental Health Care St. Thomas* (2010; Supervisor: Dr. Rod Balsom)
- *Psychological Services, Western's Student Development Centre* (2009–2010; Supervisor: Dr. Susan Ruscher)
- *Centre for Children and Families in the Justice System* (2009; Supervisor: Dr. Karen Bax)
- *London Health Services Centre, University Hospital, Clinical Neurological Sciences* (2009; Supervisor: Dr. Michael Harnadek)

TEACHING, SUPERVISION, & PROFESSIONAL SERVICE

Teaching Assistantships

- *Human Sexuality* (2012–2013)
- *Statistics for Psychology – Tutorial Instructor* (2008–2009, 2011–2012)
- *Exceptional Children: Behavioural Disorders* (2010)
- *Research Methods and Analysis – Tutorial Instructor* (2007–2008)

Supervisory Roles

- *Primary Clinical Supervisor, Operational Stress Injury Clinic* (2012)
- *Honours Thesis Research Advisor, University of Western Ontario* (2010–2011)
Project Title: The role of impulsivity in mediating the relationship between subtypes of psychopathy and decision-making

Editorial Experience

- Manuscript Reviewer, *Personality and Individual Differences* (2010–present)

Committee Memberships

- *Clinical Student Advisory Committee* (2009–2010)
- *Advocacy Through Action* (2010–2013; Evaluations Committee Co-chair, 2011–2013)